Special Issue:

Age of Disruption

Dossier Editor

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Editorial

We are living in an age of disruption, where rapid changes in technology, society, and the environment are transforming the way we live, work, and plan for the future. In this context, the concept of resilience has become increasingly important, as we seek to build systems and structures that can withstand and adapt to the challenges of our time. This special issue of the Journal of Design for Resilience in Architecture and Planning explores the various dimensions of resilience in the built environment, showcasing innovative approaches and insights from researchers and practitioners around the world. The articles in this issue cover a wide range of topics, from the impact of alternative workplace strategies on regional property markets to the role of slow cities in promoting sustainable urban planning.

The first article, "Office Market Adjustment to Alternative Workplace Strategies" by Hannum, explores the impact of alternative workplace strategies on regional property markets and the economy using a Computable General Equilibrium (CGE) model. The findings highlight the need for a policy approach focused on vacancy reduction to restore equilibrium after a sudden shock in office space demand.

Sezgin et al. present an integrated and inclusive methodology for municipal resilience against multiple crises in their article. By evaluating the transformation of the RESLOG-Türkiye Project's resilience assessment methodology, the authors demonstrate how a holistic approach can be used to assess the impacts of the 6th February earthquakes on local governments.

In "Embracing the Slow Life: Assessing the Performance of Türkiye's Slow Cities in Promoting Resilient and Sustainable Architecture," Akşit et al. examine the role of the Cittaslow movement in promoting sustainable urban planning. The study analyzes the membership criteria of selected slow cities in Turkey and concludes that integrating these criteria can lead to a sustainable city development model.

Erdem et al. present "A tale of Aliağa: Transformation from a farm to an industrial hub," which analyzes the industrialization, capital concentration, and spatial transformation processes of Aliağa district in İzmir, Turkey. The study contributes to the literature by examining how capital accumulation affects spatial change and transformation.

Dökmeci et al. investigate the spatial distribution of coffee shops in Istanbul in their article "The Evolving Landscape of Istanbul's Coffee Shops: Navigating Disruption in a Changing Urban Environment." The authors find that the location of coffee shops is influenced by a district's social life index and the proportion of its population aged over 65, and suggest further research on the balanced distribution of coffee shops with respect to other small businesses.

"Modeling Demand Factors for Sustainable Reconstruction: Insights from Türkiye's Earthquake-Affected Real Estate Market" by Önem et al. explores the potential for low carbon investments in the real estate sector to drive recovery and redevelopment in disaster-affected areas. The study offers valuable insights for promoting sustainable and resilient reconstruction efforts.

Aşut et al. present a theoretical discussion on the need for digital design environments that strengthen our relations with the tangible, tacit, and implicit dimensions of design cognition in their article "A theoretical framework on embodiment in digital design." The authors argue for the development of digital design tools that accommodate designers' tacit ways of knowing through intuitive and embodied interactions.

Finally, Kısacık et al. examine the level of participation in land development stages using the case of Homeruskwartier in Almere, Netherlands. The study finds that the stage with the highest participation is the construction focused on self-organization and that participation is not concentrated in a single stage in projects designed to meet social housing needs.

We hope that this special issue will contribute to the ongoing discourse on resilience, sustainability, and the built environment, and inspire further research and practice in this critical field.

Best regards,

The Guest Editor…

Following names that provided valuable contribution as referees of articles in this issue are:

Ayşenur Albayrak, (Assist. Prof. Dr.), Canakkele Onsekiz Mart University
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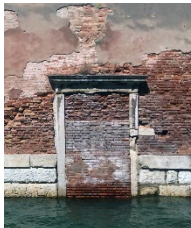
Cover photo: Image copyright ©Sena Özfiliz, (December 2023). The image on the left is detail "Arsenale of Venice"

DRArch's objectives are:

- to question how future building technologies are revolutionizing architectural design, city planning, urban design, landscape design, industrial design, interior design and education,

- to catalyze the processes that lean on interdisciplinary and collaborative design thinking, creating a resilient thinking culture,

- to improve the quality of built environment through encouraging greater sharing of academicians, analysts and specialists to share their experience and answer for issues in various areas, which distributes top-level work,

- to discover role of the designers and design disciplines -architecture, city planning, urban design, landscape design, industrial design, interior design, education and art in creating building and urban resilience,

- to retrofit the existing urban fabric to produce resilience appears and to support making and using technology within the building arts,

- to discuss academic issue about the digital life and its built-up environments, internet of space, digital in architecture, digital data in design, digital fabrication, software development in architecture, photogrammetry software, information technology in architecture, Archi-Walks, virtual design, cyber space, experiences through simulations, 3D technology in design, robotic construction, digital fabrication, parametric design and architecture, Building Information Management (BIM), extraterrestrial architecture, , artificial intelligence (AI) systems, Energy efficiency in buildings, digitization of human, the digitization of the construction, manufacturing, collaborative design, design integration, the accessibility of mobile devices and sensors, augmented reality apps, and GPS, emerging materials, new constructions techniques,

-to express new technology in architecture and planning for parametric urban design, real estate development and design, parametric smart planning (PSP), more human-centered products, sustainable development, sustainable cities, smart cities, vertical cities, urban morphology, urban aesthetics and townscape, urban structure and form, urban transformation, local and regional identity, design control and guidance, property development, practice and implementation.

Editorial Team

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Office market adjustment to alternative workplace strategies

Christopher Michael Hannum*

Abstract

Regional CGE models have been a valuable tool for regional development and regional policy analysis and can have valuable applications in real estate analysis as well. This paper describes the Colorado Real Estate (CO-RE) Computable General Equilibrium (CGE) model and its application to the analysis of the impacts of alternative workplace strategies (AWS) such as office hoteling on regional property markets and the regional economy. AWS, modeled as a productivity-enhancing "technological" improvement that reduces firms' office space requirements, is shown to spur investment in non-office sectors through a positive impact on local economic growth. The impact on local government finances may be negative due to falling office property values. The impact of a sudden, permanent drop in underlying demand for office space by office-using sectors includes dramatic if sluggish decreases in rents and increases in office vacancy.

Keywords: office market, real estate, computable general equilibrium, remote work, alternative workplace strategies

1. Introduction

Data suggests that office square footage used per worker declined significantly during the great recession and recovery from it (Miller, 2012). Surveys conducted by CoreNet Global, the Building Owners and Managers Association International (BOMA, 2011) and others indicate a trend toward increased efficiency of office space usage. This trend can be attributed to a variety of changes the way businesses operate referred to as alternative workplace strategies or AWS (CoreNet Global, 2009), including telework, office hoteling, open floor plans and more, a transition to which has been ongoing for decades. CoreNet Global (2012) forecasted a decline in actual office space usage per worker in the neighborhood of 1/3 from 2010 to 2017 and gave a "best practice" target of only around ½ of the nationwide average in office space per worker as of 2010. Managers may not follow through with stated plans (Miller, 2012) and prior to the COVID-19 pandemic the transition was slow. However, the forced experience of office closures and remote workplaces led to an immediate spike in remote work and a renewed emphasis on AWS and a rationalization of the usage of office space (Dessalines, 2023) including resizing their office footprint, with Boland et al. (2020) projecting that firms could reduce their real-estate costs by 30 percent or more.

An accurate forecast of office demand - as well as how a long-run trend toward more efficient utilization of office space will affect rents, prices and construction - will be of paramount importance to owners, managers and investors in office property. However, the broader impacts of such a transition on a regional economy may also be significant. Improved efficiency would lower costs and increase profits for firms in office-using sectors, but decreased office rents and property values could mean lower tax revenues and income from property investments for local households. If efficiency gains lead office-using sectors to expand, this might increase demand for other property types but low rents might lead some firms to substitute or repurpose office space instead.

The concepts of alternative workplace strategies and telecommuting are intertwined in practice, in the literature and in public perception. Though this study focuses on the impacts of alternative workplace strategies, some explanation of the two concepts and most importantly how they differ may be required. In principle the terms telework or telecommuting refer to replacing a physical commute to the office with telecommunications technology, which eliminates the need to be

physically present at a given location in order to perform critical job responsibilities. The result can be that a home office replaces a work office, with less commercial office space utilized by that particular worker at least at certain points during a workweek. According to Safirova (2002) the concept of telework or telecommuting was first researched by Nilles with case studies on productivity and social implications. As Safirova (2002) and Nilles (1988) have described, chief among the promoted benefits of telecommuting were assumed to be a reduction in traffic and time spent behind the wheel and flexible working hours which would improve the standard of living and productivity for telecommuters by improving their ability to balance the demands of work and family.

It should be noted that where there is a connection between telecommuting and adoption of AWS, the connection could be lagged or contemporaneous. This study will analyze the impacts of a transition to AWS and it is therefore a relevant question whether there should be any strong expectation that recent trends toward AWS occur contemporaneously with trends toward increased telecommuting. Studies such as Noonan and Glass (2012) have shown that the prevalence of telecommuting had not risen greatly since the 1990s after reaching approximately 20% of the urban workforce (including those who work from home occasionally), and perhaps not in such a way as to truly transform the nature of work. According to Boland et al. (2020) this figure rose to 25% by 2019 before spiking to 62% at the peak of the COVID-19 pandemic. Though the dataset used by Noonan and Glass was discontinued after 2004, other sources (Walls et al., 2007) corroborated the finding. There is no doubt, however, that remote work and telecommuting increased dramatically during and following the COVID-19 pandemic, with a tripling or quintupling of job listings explicitly offering remote work (Hansen et al., 2023). According to Boland et al. (2020) this figure rose gradually to 25% by 2019 before spiking to 62% at the peak of the COVID-19 pandemic. By early 2023 this had fallen to 13% of full-time workers that were fully remote and 28% that worked hybrid models (Dessalines, 2023). In spite of return-to-work strategies by many firms, the share of workers that telecommute at least part of the time remain elevated. The forced experience of the remote workplace during the pandemic likely broke down reluctance from some managers that feared low productivity or a disruption to firm culture (Ozimek, 2020).

Recent research may suggest some reasons why this might be the case, though arguments for and against remote work or telecommuting are varied and contradictory. According to a survey based study by Neufeld and Fang (2005) 47% of telecommuters reported higher self-assessed productivity than when they were working from the office, but the remaining 53% reported lower self-assessed productivity. Among those who reported lower productivity, key reasons given were the lack of face-time with managers and co-workers and distractions involved in mixing work and family. Noonan and Glass (2012) found no evidence that those who would theoretically benefit from flexible work schedules, namely those with children, were more likely to telecommute. Singles were found to be more likely to telecommute than married people as well, perhaps because while the benefits of flexible hours for work/family balance do improve well-being such situations are not inherently conducive to productivity. This result is confirmed by Safirova and Walls (2004) who find that telecommuters are more likely to be male and from smaller households.

According to an experiment by Dutcher (2012) productivity for telecommuters is higher than for those in the office only for creative tasks, while for mundane tasks productivity in the office is higher. These findings are supportive of the idea that, in terms of productivity, telecommuting is appropriate only for certain workers in certain work situations and is not without drawbacks. Emanuel & Harrington (2024) found evidence that less productive workers self-select into remote jobs and that potential savings for the firm in other areas are not sufficient to offset this productivity loss. Faruque et al. (2024), on the other hand, in an analysis of remote work for small businesses found increases in productivity due to reduced interruptions and flexible schedules. Ozimek (2020) found that a greater share of managers surveyed considered that remote workers were more productive than less productive.

In terms of improvement in quality of life for the telecommuter, it is clear that many workers do prefer remote work with analysis by Boland et al. (2020) finding satisfaction with the arrangement

at 80%. However, Noonan and Glass (2012) found that the only variable that strongly varied between telecommuters and non-telecommuters was increased work hours for telecommuters, as they may be "always on call". In addition, Peters et al., (2004) found that a majority of those who had been offered the opportunity to telecommute had declined. In explanation Safirova and Walls (2004) find that those workers most enthusiastic about telecommuting are those with less education who are less likely to be allowed or encouraged to telecommute by managers perhaps because the tasks involved in their work would be more "mundane" and their productivity would be negatively affected. There are also common complaints about the nature of remote work, particularly the experience of online meetings rather than those held face to face. If this is the case, we may not expect a strong push for telecommuting from workers themselves or any kind of a hedonic wage effect.

It has also been proposed that an important benefit for telecommuters would be reduced time spent in traffic. According to a survey of the literature by Walls and Safirova (2004) most studies indicated reduced vehicle miles by telecommuters, however many studies looked only at travel to the workplace. Sridhar and Sridhar (2003) found empirical evidence for a complementary relationship between telecommuting and face-time, either with clients or managers. This need by those who telecommute to commute in order to meet face to face with others may explain why many telecommute only part of the time as Zhu's (2012, 2013) findings using a larger sample and more recent data than those included in the survey by Walls and Safirova that telecommuters make longer trips to work (though less frequently) and engage in more non-commute work travel. Zhu's findings cast some doubt on the oft-assumed negative relationship between telecommuting and vehicle miles traveled or congestion. The mechanism suggested is that remote workers may choose to live farther from their offices, in larger homes in more pleasant neighborhoods. Balemi et al. (2021) found some apparent evidence of an increase in housing demand resulting from remote work during the pandemic while Ahrend et al. (2023) also found an increase in relative housing demand for homes in rural areas just outside of metropolitan boundaries, indicating longer but less frequent commutes by hybrid workers.

As detailed by Becker and Steele (1990, 1995) Alternative Workplace Strategies or AWS is a concept from the discipline of facilities management and like the concepts of remote work and telecommuting, not new. Fundamentally, AWS refers to the elimination of assigned workspace and movement towards shared workspace through what is often referred to as "office hoteling" or "hot desking"[1]. As Haynes and Price (2004) note: "offices or workstations are notoriously underutilized" (p. 9) and this tendency is exacerbated by increases in the prevalence of telecommuting. As such, a transition to AWS involves a rationalization (Duffy, 2000) of the office in response to current usage patterns rather than a drive to change usage patterns. As Duffy (2000) laments, the pace of change in office organization has been slow and has not kept up with predictions made decades earlier with blame laid upon conservatism by suppliers and organizational hierarchies. However, the process was greatly accelerated by the COVID-19 pandemic and we are now in a phase of office footprint rationalization, both in form and quantity, in response to changes in the labor market and workplace that have already largely occurred (Boland et al., 2020).

The reduction in costs (Duffy 2000; Sridhar & Sridhar 2003; Young 1995; Kaczmarczyk 2005) has been the predominant concern for individual firms transitioning to AWS with potential impacts on workplace productivity either ignored or simply less touted. To the extent that telecommuting increases office underutilization a transition to AWS could be due to a concurrent increase in telecommuting, but as such office rationalizations may occur with significant lags it may be more likely a reaction to past increases in telecommuting. If related to concurrent increases in telecommuting, the empirical impacts of telecommuting on worker productivity, worker quality of life and vehicle miles traveled remain ambiguous. Where office workers are frequently away from their assigned space for reasons other than telecommuting; business travel, meetings, etc… AWS

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[1] The two concepts differ only in whether shared office space is available on a first-come first-serve basis (hot desking) or is reserved for some period in advance (office hoteling) (Gibson, 2003)

may produce the same benefits. For these reasons, this study will model a transition to AWS, whether occurring contemporaneously to a transition to remote work or at a lag, exclusively as a reduction in operating expenses for affected firms due to decreased office space requirements. The impact of AWS on space requirements is unambiguous and, according to Duffy (2000) has always been the chief driver of the trend, while the impact of AWS or remote work on productivity, job satisfaction, traffic congestion and consumption patterns remain ambiguous or context specific.

This paper describes a regional computable general equilibrium (CGE) model, the Colorado Real Estate (CO-RE) model, designed for analysis of impacts originating in or of particular relevance to local property markets and its application to the issue of reduced office space per worker requirements. The model represents the Colorado economy in a baseline year, built upon a series of key assumptions: perfect competition, market clearance, utility maximization by households and profit maximization/cost minimization by firms. The model features, in addition to 24 industry sectors and 7 household groups defined by household income, 5 labor groups and 7 tax categories, 20 capital categories corresponding to important classes of real and personal property. The model can estimate the impact of exogenous shocks and changes in production technology (as in the case of office sharing) on regional real estate markets as well as the impact of shocks to regional real estate markets on the broader economy, regional employment and tax revenues.

2. Model Description

A Computable General Equilibrium (CGE) model is a whole-economy simulation incorporating profit-maximizing firms, utility-maximizing firms, government entities, interregional migration and trade and endogenous supply of factors of production. As illustrated in Figure 1, the structure of the economy follows a circular flow: households are endowed with factors of production (labor, land, and capital) as well as streams of income from outside the region (such as social security income) and demand goods and services and housing. Firms rent factors of production from households and demand intermediate goods from other firms, using these to produce an output that can be sold to local households, local government entities and exported outside the region. Local governments levy taxes, revenues from which are spent on goods and services as well as factors of production. Production and consumption decisions depend upon relative prices; endogenous supply of factors of production depends upon returns.
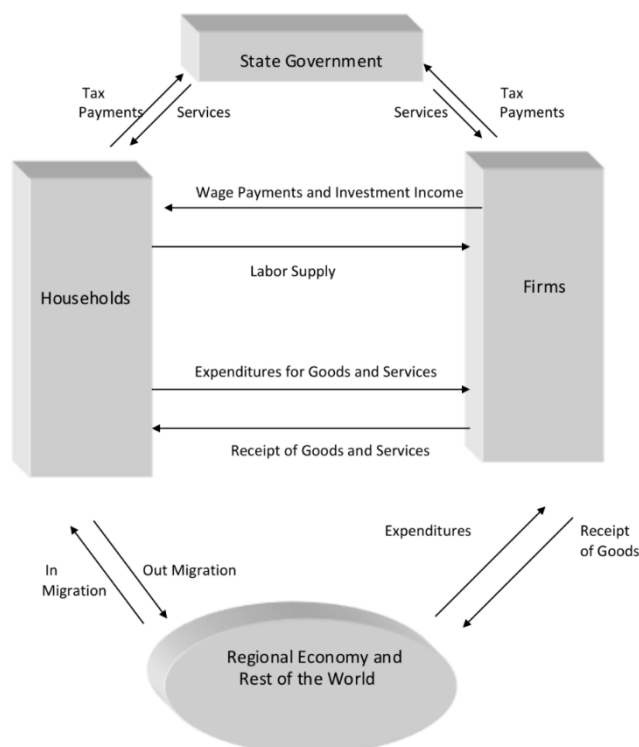
Figure 1 The structure of the economy

The CO-RE model incorporates seven representative local household groups defined by income level ranging from RAH(1) with incomes under $10,000 to RAH(7) with household incomes greater than $100,000 as well as a non-local household group representing owners of Colorado capital and land outside the region. Each representative household is endowed with a certain initial allocation of land, each of five types of labor and each of twenty types of capital. In addition local household groups receive exogenously determined streams of non-Colorado sourced income such as pensions, social security payments and returns to prior investments. Average income levels for each Colorado household group are shown in Table 1 below, note that incomes include implicit rents for owner-occupied housing.

Table 1 Household Groups

Household Group	Average Income
HH1	$21,898
HH2	$26,019
HH3	$44,172
HH4	$58,329
HH5	$73,156
HH6	$118,757
HH7	$185,384

The representative non-local household group (RAF) is endowed with land and each type of capital, but not with labor. The majority of local household capital endowments are composed of single-family residential capital with proportions derived from 5-year American Community Survey (ACS) public use microdata (PUMS). The majority of the non-local household endowment is composed of multi-family and non-residential capital. Local households demand only welfare produced using a consumption bundle of Demand for Colorado exports is represented by a separate household group endowed with a steam of "foreign exchange", non-Colorado sourced and monetary income.

The CO-RE model includes, in addition to a single homogeneous land type, five labor groups defined by relative wage level as a proxy for skill level. Average annual wages for each labor/leisure group are given in Table 2 below, note that no distinction is made between full-time and part-time work. Wage and employment data is derived from the Quarterly Census of Employment and Wages for the state of Colorado.

Table 2 Labor Groups

Labor Group	Average Wage
L1	$7,870
L2	$41,789
L3	$68,699
L4	$95,317
L5	$197,176

One novel innovation of the Colorado Real Estate model is the inclusion of 20 types of capital based upon asset definitions used by the US Bureau of Economic Analysis in their National Income and Product Account (NIPA) tables. Estimates for the total residential and non-residential capital stock for the state of Colorado are obtained from the Colorado Department of Local Affairs (DOLA) Property Tax Division, estimates for the breakdown of non-residential capital into real and personal property categories are obtained using asset proportions from the NIPA tables adjusted to reflect the structure of the Colorado economy. A list of property types used and the corresponding NIPA definitions can be found in the appendix.

The Federal government collects income tax and payroll tax revenues, all of which flow out of the region. State and local governments are funded by retail sales taxes, levied on sales of goods and services in proportions derived from Colorado Department of Revenue data, personal income

taxes, business income taxes, property taxes and fees for permits or services. State and local tax revenues are used to fund five government service sectors: education, administration, justice/law enforcement, transportation and health.

Production sectors are largely organized along the lines of 2-digit National Industry Classification System (NAICS) definition with the Mining and Utilities sectors split into subsectors. In addition, production of housing services is organized into six sectors for multifamily housing, attached housing and four detached single family housing sectors grouped by price range. Government services are organized into production sectors as mentioned above but are demanded solely by state and local governments and funded solely by tax revenues. Figure 2 gives a complete list of production sectors.

Mathematically, production of goods and services is assumed to take place using a nested constant elasticity of substitution (CES) functional form. Reference input and output quantities for production functions are obtained by scaling IMPLAN input-output proportions to fit BEA regional output quantities for the reference year. To reflect complementarity between labor and capital (and between different capital types) an elasticity of substitution between labor and different capital types (and therefore for substitution between capital types as well) is set at 0.4 for all production functions following Kemfort (1998) and Young (2012). Intermediate goods used in production are included in a Leontief nest with elasticity of substitution of zero. Substitution elasticities between these two nests and land are set to one as has been empirically estimated (Thorsnes, 1997 ; Clapp, 1979). The resulting two-level nested CES production function, as illustrated in Sato (1967), has the basic CES form but will lack the constant elasticity of substitution property (Uzawa, 1962). For each industry "I", within the capital/labor (kl) nest, within the land nest and within the intermediate (j) nest substitution elastiticities in producing the input aggregates $Z_{i,kl}$, $Z_{i,land}$ and $Z_{i,j}$.

equation 1.1.) $$Z_{i,(kl)} = \left[\sum_{kl=1}^{KL} \beta_{i,kl} Q_{i,kl}^{(0.4)-1/0.4}\right]^{-\sigma_{(kl)}/1-\sigma_{(kl)}} \text{ where } \sigma_{(kl)} = 0.4$$

equation 1.2) $$Z_{i,(land)} = \left[\beta_{i,land} Q_{i,land}^{\sigma_{land}-1/\sigma_{land}}\right]^{-\sigma_{land}/1-\sigma_{land}} \text{ where } \sigma_{land} = 1$$

equation 1.3) $$Z_{i,(j)} = min\left(\beta_{i,j} Q_{i,j}\right)$$

equation 1.4) $$Y_i = \left[\alpha_{i,(kl)} Z_{i,(kl)}^{\sigma/1-\sigma} + Z_{i,land} \alpha_{i,land}^{\sigma/1-\sigma} + \alpha_{i,(j)} Z_{i,(j)}^{\sigma/1-\sigma}\right]^{-\sigma/1-\sigma} \text{ where } \sigma = 1$$

Goods and services consumed as intermediate inputs or in the generation of welfare/utility for household consumption are first aggregated with their non-local equivalents following an Armington (1969) formulation. Domestic households consume only welfare/utility, produced using goods and services and housing with a CES specification much like that for goods and services. Elasticities of substitution in production of utility/welfare are set to 1, a Cobb-Douglas functional form. Each representative households consumption bundle "d" includes 24 goods or services and 6 housing categories.

equation 1.5) $$W_h^r = \prod_{d=1}^{D} Q_{h,d}^{\gamma_{h,d}} \text{ where } \gamma_{h,d} \text{ represents the proportion of spending on } Q_{h,d} \text{ in household}$$

h's budget

The endogenous supply of land as existing land is zoned, platted and prepared for development is represented through a side constraint equation which sets households' endowment of land relative to the current price of land with an elasticity of 2.5. Empirical estimates for the price elasticity of the supply of developable land vary dramatically with local geography, economic

conditions and policies. However, even empirical estimates of a single nationwide elasticity, which might be more broadly applicable to large regions such as US states, range from near-zero to near-infinite. Capital supply is treated as a positive endowment to local and non-local households; capital investment expenditures to build new capital or offset depreciation of existing capital are treated as negative endowments. Capital supply and capital investment expenditures for each capital type are subject to a similar constraint with a single-period elasticity of supply of unity (Goolsbee, 1998). Lower estimates of the elasticity of capital supply (Zheng et al., 2012) based on data from urban areas may not be applicable to larger aggregated regions such as US states, in which much development is suburban or exurban and less constrained by policy and land availability. In the dynamic model, capital and land supply constraints follow a "moving average" process, which will cause short-run deviations in prices to die out over time.

The representative local household's endowment of labor is also set subject to two side constraints to first represent migration into or out of the state (MIG(h)) and second flexible labor supply decisions by existing households (LSUP(h)) as a result of changes in wages, employment opportunities and the cost of living. As studies have shown very limited migration responses to tax and wage differentials (Day & Winer, 2006; Coomes & Hoyt, 2008; Young & Varner, 2011) the single-period elasticity of migration with respect to changes in the real wage is set to 0.1, the elasticity of labor supply by existing households with respect to changes in the real wage is set to 0.3 (Eviers et al., 2008). In the dynamic model, migration responses follow a "moving average" specification, with continuing in-migration so long as the real wage remains above the baseline. Labor supply responses by existing households are one-off, so over a long time period the labor supply response by non-residents will dominate (Bartik, 1993).

3. Real Property Markets

Commercial property markets have been understood to be characterized by certain specific features and phenomena (Pyhrr et al., 1999; McDonald 2002) including slow adjustment of stocks and price, disequilibrium and cyclicality without attention to which economic impacts of or on commercial property markets cannot be accurately understood or explained. Through side equations the CGE model is adapted to fit the general Torto-Wheaton stock adjustment model (Wheaton 1987; Wheaton et al., 1997) with some adaptations to fit the idea of a balanced-growth path and some limitations of the Arrow-Debreu general equilibrium framework. Torto and Wheaton model absorption, period-to-period changes in occupied stock of a given real property type, as the product of the slow adjustment process from desired occupied space (OCCSF*$_t$) from the previous periods occupied space (OCCSF$_{t-1}$) where desired occupied space is a function of the number of office workers (EMP$_t$) and an interaction term between the number of office workers and lagged office rents (EMP$_t$R$_{t-1}$).

The occupied stock adjustment equation $OCCSF_t - OCCSF_{t-1} = \tau(OCCSF_t^* - OCCSF_{t-1})$ (1)

Becomes $ABSORPTION_t = \tau(\beta_0 + \beta_1 EMP_t - \beta_2 EMP_t R_{t-1}) - \tau OCCSF_{t-1}$ (2)

New construction starts in the Torto-Wheaton model are a function of current rents (R$_t$), current vacancy rates (vacper$_t$), current interest rates (I$_t$) and a current construction cost index (CCI$_t$). In the absence of data for construction starts, net changes in stocks (S$_t$) can be modeled as a function of lags of these independent variables.

$$S_t - S_{t-1} = \gamma_0 + \gamma_1 R_{t-1} - \gamma_2 vacper_{t-1} - \gamma_3 I_{t-1} - \gamma_4 CCI_{t-1}$$ (3)

The absorption and construction equations combined with the identity

$$VACANCY_t = S_t - OCCSF_t$$ (4)

determine vacant stock (VACANCY$_t$) and the vacancy rate (vacper$_t$) relative to total occupied stock. The addition of a price adjustment equation incorporating the observed negative relationship between rents and vacancy rates completes the system of equations, in which each variable of interest can be explained by lagged values and exogenous shocks to employment, interest rates and construction costs.

$$R_t - R_{t-1} = \sigma(R_t^* - R_{t-1}) \ (5)$$

$$P_t = \sigma\left(\alpha_0 - \alpha_1 vacper_{t-1} + \alpha_2 \frac{ABSORPTION_{t-1}}{OCCSF_{t-1}}\right) + (1-\sigma)P_{t-1} \ (6)$$

It has been observed by Wheaton and Torto (1988), Grenadier (1995) and others that regional property markets do not adjust to shocks at the same speed nor do they exhibit identical characteristics such as natural or baseline vacancy rates. As such we have estimated values in three-stage least square for the parameters in equations (1) through (6) using CBRE data on the office market in the Denver metropolitan area to represent the State of Colorado rather than applying and scaling earlier published estimates for the United States as a whole. Variable values are scaled such that the 2010 values in the CBRE dataset are equal to the starting values in the Social Accounting Matrix; rents are normalized to unity and values for stocks and employment converted to abstract "units of capital" and "units of labor" as in the SAM. Parameter estimates for the absorption, construction (Ct) and rent equations are shown below with T-statistics in parenthesis. Estimates show a negative but insignificant relationship between lagged absorption rates and current rents, but a strong positive contemporaneous relationship between the two so lagged absorption rates have been replaced with contemporaneous absorption rates in equation (9).

$$ABSORPTION_t = 0.31\left(\underset{(33.087)}{303.981} + \underset{(0.016)}{0.081}EMP_t - \underset{(0.005)}{0.009}EMP_t R_{t-1}\right) - \underset{(0.144)}{0.31}OCCSF_{t-1} \ (7)$$

$$C_t = \underset{(28.474}{-45.693} + \underset{(10.476)}{76.826}R_{t-1} - \underset{(29.331)}{67.665}vacper_{t-1} - \underset{(24.457)}{15.664}CCI_{t-1} - \underset{(2.157)}{0.252}I_{t-1} \ (8)$$

$$R_t = \underset{(0.13)}{0.608} - \underset{(0.248)}{1.27}vacper_{t-1} + \underset{(2.04)}{8.523}\frac{ABSORPTION_t}{OCCSF_t} + \underset{(0.092)}{0.591}R_{t-1} \ (9)$$

The construction equation (8) is incorporated in the CGE model nearly as-is: converted from net new construction to gross new construction with the addition of $(\delta)St\text{-}1$ where δ is the BEA property-type-specific depreciation rate and scaled to fit the BGP with baseline rental rates, vacancy rates, interest rates and construction costs. Rents, vacancy and construction costs are determined endogenously within the CO-RE model, interest rates are an exogenous parameter assumed to be determined outside the region.

Absorption equation (7) shows that slightly under one third of the impact of any change in input demand (using office employment as a proxy) is felt in the first period following the shock and relatively low demand elasticity for real property. Equation (7) likewise requires some transformation to fit the concept of the BGP, eliminating β_0 and scaling up β_1 and β_2 such that at baseline rent levels a 1% increase in EMP$_t$ leads to a 1% increase in the desired level of occupied stock OCCSF$^*_t$. In addition, given a value for τ of 0.31 the economy will not begin on the BGP unless a certain amount of pressure has already built up – a gap between desired and actual occupied stock equal to $(GRO/\tau)OCCSF_{t-1}$ where GRO is the assumed BGP growth rate – so $\beta1$ and $\beta2$ are scaled up by (GRO/τ) so that the economy begins on and continues on an approximation of the BGP.

Equations (7) and (8) together determine endogenous vacancy, included in the CO-RE model as a "negative endowment" of real property capital types by household groups.

$$VACANCY_t = (1 - \delta)VACANCY_{t-1} + C_t - ABSORPTION_t \ (10)$$

An Arrow-Debreu general equilibrium model is not naturally compatible with the idea of sticky prices or exogenous prices or with the concept of disequilibrium – though our vacancy equation avoids this through a modeling technique. As prices are determined endogenously within a CGE model, the positive relationship between absorption and rents occurs naturally. However, it is necessary to parameterize a relationship between rents and vacancy rates through a side constraint setting an endogenous pricing instrument. If such a relationship is not explicitly declared, higher vacancy rates will imply less available stock – all else equal – and put upward pressure on rents rather than downward pressure. This pricing instrument sets SLUGP_K1(t) for each property type equal to the pricing equation (9) above, depending upon SLUGP_K1(t-1) rather than the R(t-1) determined within the model. SLUGP_K1(t) is then used to set an endogenous "tax" or "subsidy" SLUGP_K(t) for each capital type, with owners of capital footing the bill for a "subsidy" or receiving the benefits from a "tax", such that:

$$SLUGP\_K1_t = R_t * (1 + SLUGP\_K_t) \ (10)$$

4. Setting up the Simulations

In a CGE model, the abstract need for or desire to use office space can be separated from the actual demand or utilization. A variety of reasons may exist for a firm's target usage per worker to differ significantly from its actual usage including prices (DiPasquale & Wheaton, 1996) as well as complicating factors such as uncertainty and inflexible contracts (Miller, 2012). Here the change represented by phenomena such as telecommuting and office hoteling is represented in terms of a change in parameterization of the production functions for office-using sectors to reflect a new ability to produce the reference level of output while using 50% less of the "OfficeSF" capital type providing usage of other factor and intermediate inputs remains unchanged. The simulation is further broken down into one in which the change in target office space use is assumed to take place instantaneously, and one in which the change occurs gradually over 7 years.

According to the BEA, all broadly-defined 2-digit NAICS sectors are office-using to some degree. Relative importance ranges from a high of 43.4% of total capital requirements for the Management of Companies and Enterprises sector to a low of 0.94% of total capital requirements for the Accommodation and Food Service sector. Public Administration and government services sectors are assumed to demand none of the capital types utilized by other sectors. While this assumption may seem unrealistic, offices of government entities tend to be government-owned rather than privately owned and as they are not subject to taxation accurate valuation estimates are more difficult to acquire. Since it is unclear, theoretically or empirically, whether a change in business practices (i.e. "technology") leading to more efficient office space utilization should impact only sectors conventionally defined as office-using such as Finance and Insurance or all sectors which demand any amount of the OfficeSF capital type, two pairs of simulations are run. In the first pair, the change in production technology is assumed to impact all sectors equally either immediately (Fast) or over a span of seven years (Slow). In the second pair, the change in production technology is confined to the five sectors with the highest office space requirements, as a percentage of their total capital requirements; Fin, Real, Serv, Manage and Admin[2] either Fast or Slow .

While Miller (2012) proposes that the gap between actual and target office usage can be largely explained by factors such as employee turnover, search costs and delays in hiring and lease length - in a perfectly competitive economy such as that simulated by a CGE model all of that gap can be and must be explained by prices. While there can be a negative capital supply response, by allowing depreciation to occur without capital investment to offset it, this response is neither large nor quick for real property and all properties in existence must be occupied (though this is the functional

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[2]Finance and Insurance, Real Estate Rental and Leasing, Professional, Scientific and Technical Services, Management of Companies and Enterprises, Administrative and Support and Waste Management and Remediation Services

equivalent of assuming a constant vacancy rate) by some firm in some sector. Rents will immediately adjust across the board until it becomes worthwhile for some firm to utilize a property for some purpose, perhaps a purpose very different from that for which it was designed. While the model, as presently constructed, does not include the possibility of permanently converting a property from one type to another (due to a lack of data on the costs involved in such a conversion) we can assume that much of the end result of such conversions will show up in added office demand from unconventional sources at low prices.

The impact on office rents is expected to be negative; we should see a decrease in office space demand from office-using sectors, which far outstrip the decrease in supply due to depreciation. The only question is, if we assume instantaneous price adjustment to clear the office market, how large the decline in office rents will be. By assumption, any change in rents will be instantaneously capitalized in assessed property values. As shown in Figure 2 (below) if we assume a sudden shift towards a far lower target level of office space per worker, existing office stock will decrease by a maximum of 2.4% per year (BEA) as existing structures are allowed to depreciate. If allowed to correct immediately and fully, office rents will need to decline by over 80% in the first year in order to clear the market. The market correction will occur only through reductions in stock by depreciation and a slow increase in demand due to economic growth (at an assumed 3% per year). Office rents will recover, though slowly, after the initial plunge but will still be only 1/3 of initial levels after 10 years. It will take over years for rents to recover to 2009 levels at which time office stock growth would resume.
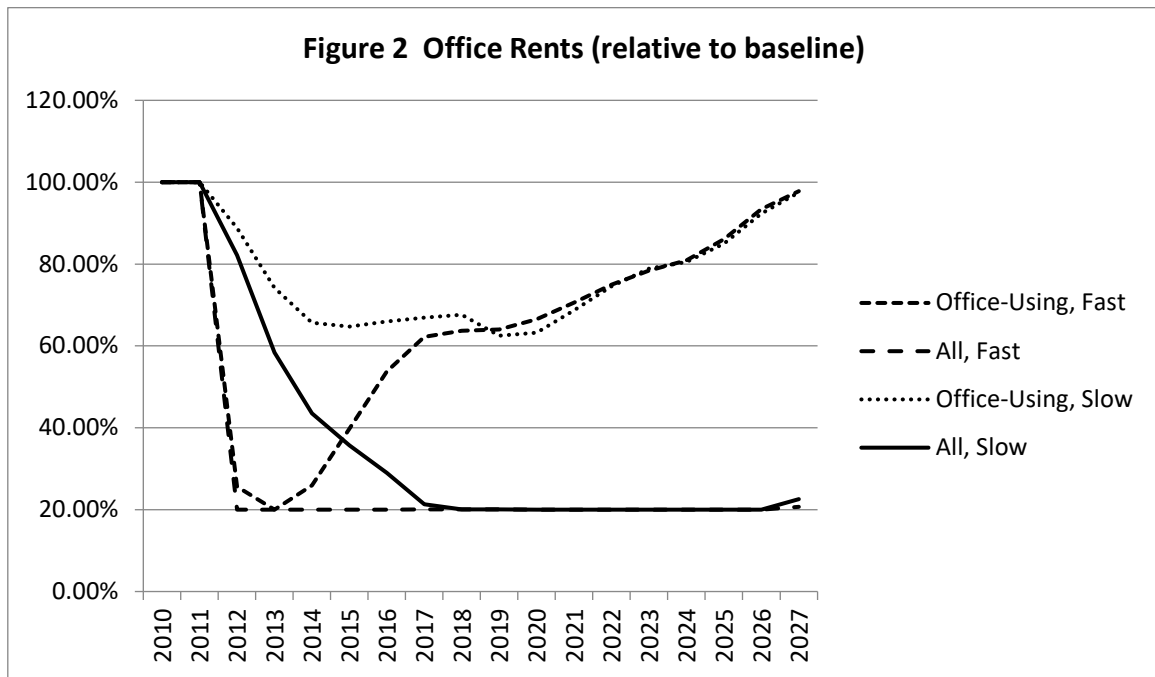
Figure 2 Office rents (Relative to baseline)

Figure 3 (below) shows the effect on vacant office space. In each simulation but the "mildest" (office-using sectors only with a slow transition) we see a dramatic increase in vacancy rates relative to the baseline vacancy rate of approximately 16.5%. However, in no simulation are these high vacancy rates indefinitely maintained. As the regional office market recovers, after a period of low rents and high vacancy rates, those low rents spur additional absorption while the combination of low rent and high vacancy strongly discourages construction. Vacancy rates "overshoot" the baseline 16.5% on the recovery in every simulation as construction is slow to pick up, but return to the baseline given enough time. In the two "office-using" simulations this requires approximately 20 years from the beginning of the initial transition to AWS, for the two "all" simulations even more time is required.

Figure 3 Vacant Office Space (relative to baseline)
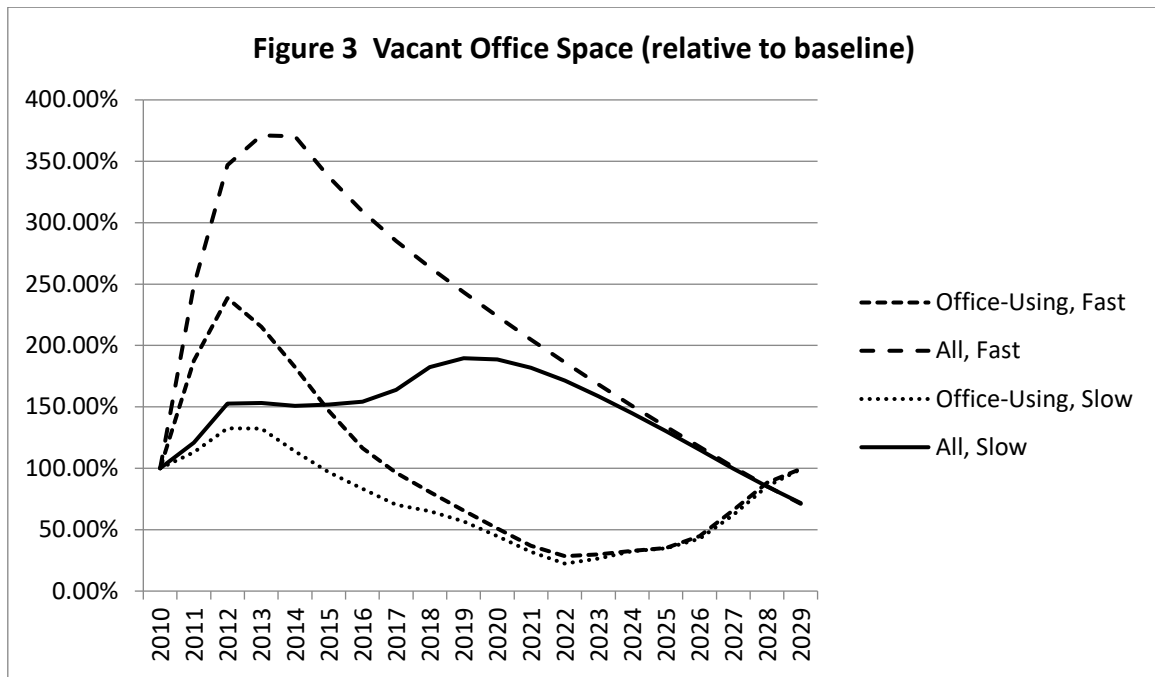
Figure 3 Vacant office space (Relative to baseline)

Figure 4 Impact of AWS on Total Employment
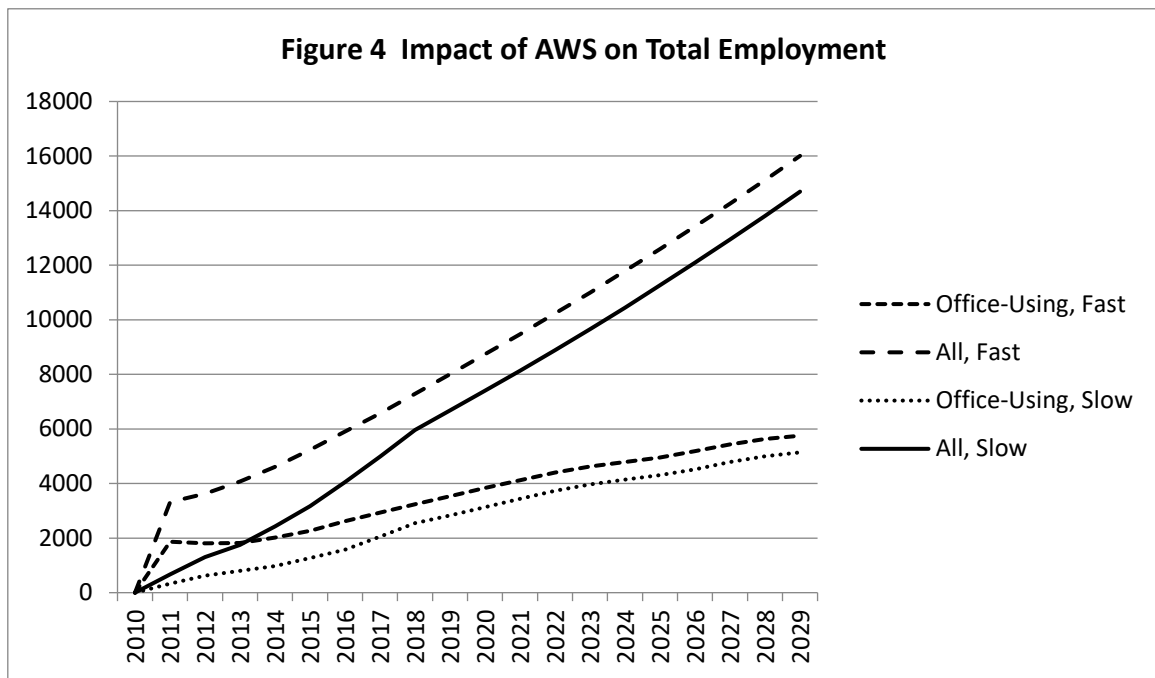
Figure 4 Impact of AWS on total employment

After 10 years, most of the construction boom has run its course and the impact on property values and rents for non-office property types will dissipate. Figure 4 (above) shows the increase in total employment in the state due to the productivity enhancing effects of the transition to AWS. Increases in job creation are significantly more pronounced in the pair of simulations in which all sectors transition to AWS rather than only primary office-using sectors. In part this and the increased impact on total output in Figure 5 (below) can be explained by the dramatic decrease in office rents which further lower the cost of doing business in the state. Once rents have returned to normal levels in the two office-using simulations the impacts on real output begin to slowly diminish.

Figure 5 Impact of AWS on Real Gross State Product
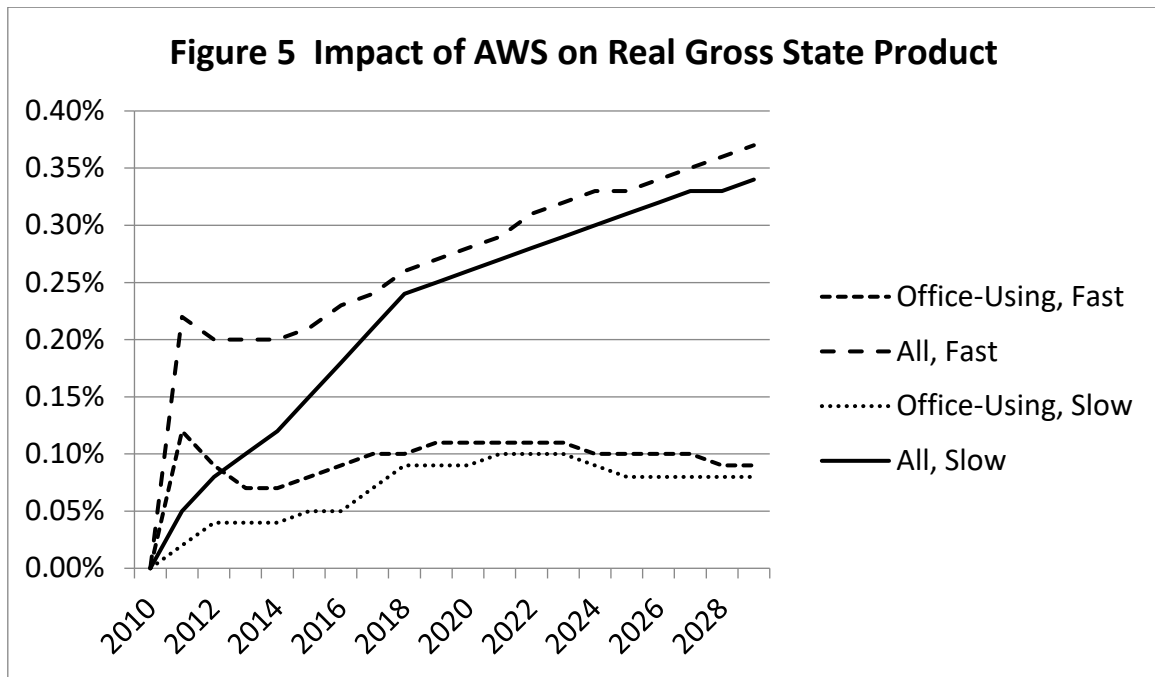
Figure 5 Impact of AWS on real gross state product

Figure 6 Impact of AWS on Total Investment Spending (All Capital Types, $2010)
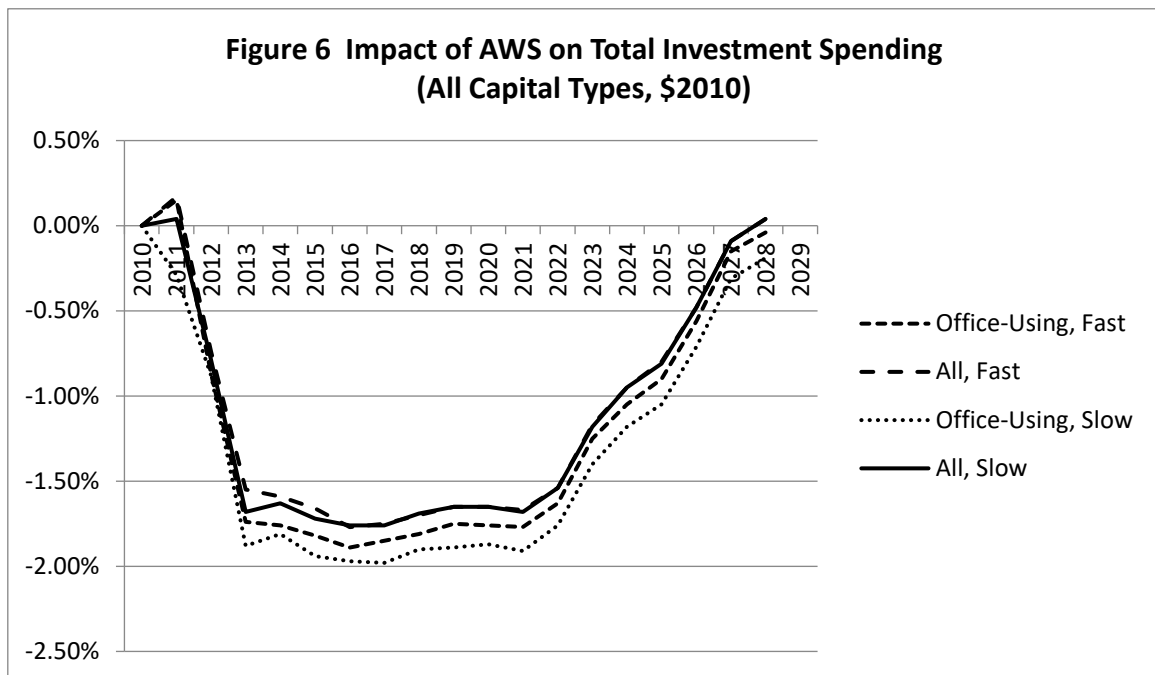
Figure 6 Impact of AWS on total investment spending (All capital types, $2010)

As shown in Figure 7, though the change in business "technology" increases gross state product and leads to the creation of jobs, property tax revenues fall due to the sharp reduction in assessed valuation of office properties. After 20 years, when regional property markets have stabilized, at least in the less extreme "office-using" simulations, the net negative impact on property tax revenues comes to approximately 0.7% or 1.3% of total property tax revenues – relative to 2010 revenues of approximately $5.8 billion. The loss in office property tax revenues on office buildings more than offsets increased revenues from taxes on other property types. This result could be at least partly due to factors unique to the state of Colorado, which depends disproportionately on property taxes levied on commercial property due to the Gallagher Amendment to the state constitution in 1982 limiting property tax increases on residential property. Property tax revenues slowly recover, as office rents/values rise over time and increased investment in other property

types increases the tax base but the new steady state which regional property markets approach is one with less real property than would otherwise have existed.
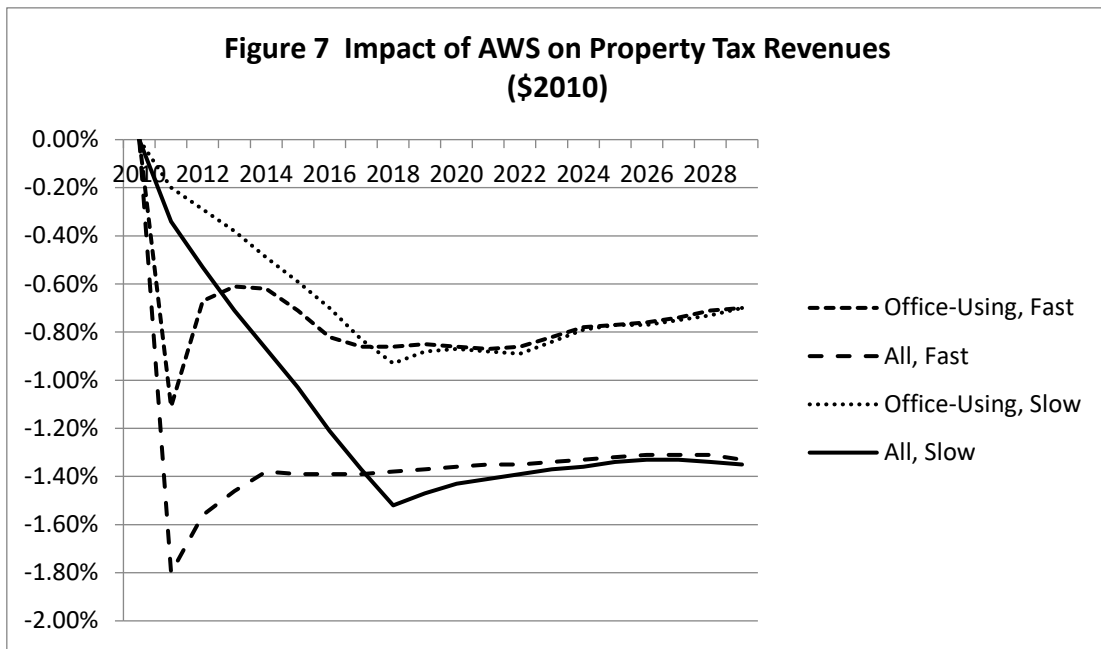
Figure 7 Impact of AWS on property tax revenues ($2010)

As shown in Figure 8 (below), in all simulations the negative impact on local government finances of reduced property tax revenues more than offsets any revenue gains from other taxes and fees. Property tax revenues represent approximately 2/3 of local government revenues in the state of Colorado and approximately ¼ of combined state and local tax revenues. The State government is responsible for covering property tax revenue shortfalls for local school funding in the state of Colorado through the state general fund, so the impact on combined state and local revenues may be a more appropriate benchmark for state policy makers than state revenue alone.
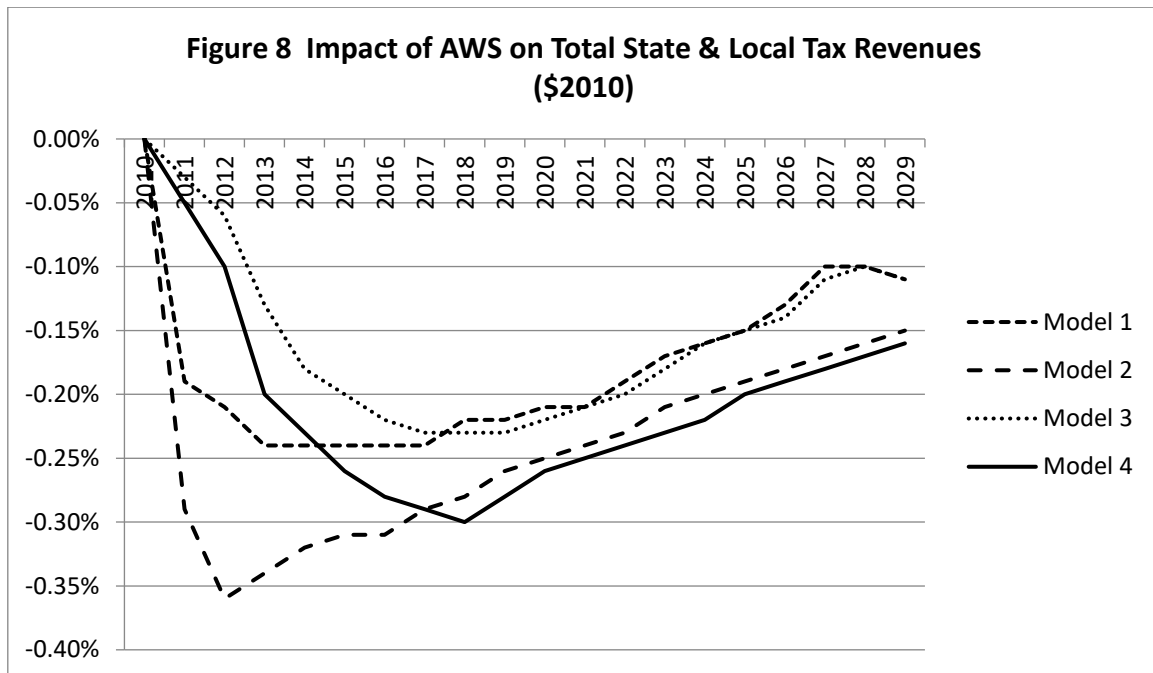
Figure 8 Impact of AWS on total state & local tax revenues ($2010)

5. Conclusion

A regional CGE model such as the Colorado Real Estate model is capable of providing theoretically sound estimates of the impacts of phenomena which input-output and econometric models may be unable to appropriately analyze. When applied to the question of the impacts of alternative workplace strategies such as telecommuting on local property markets and the local economy, estimates provided by the Colorado RE model suggest that the trend will be beneficial for output and employment growth. AWS is expected to spur investment in non-office property types, though increases in non-office commercial rents are expected to be short-lived. Property tax receipts are expected to fall overall due to the greatly diminished valuation of office properties. In the state of Colorado, in which the property tax burden falls disproportionately on the office sector, this fall in property tax revenues more than offsets increases in other tax revenues at all levels of state and local government.

The perfectly competitive market assumptions of most CGE models, including the CO-RE CGE model where real property is not concerned, are usually quite attractive compared to most feasible specifications with market imperfections such as those described in Willenbockel (2004), however the assumption that all markets clear appears untenable when dealing with property markets. The real world office vacancy rate is will display a non-zero average over any significant time horizon and shocks to either office demand or office supply can be expected to influence not only office rents and valuations but also the short-run vacancy rate (De Francesco, 2008). CoreNet Global, for example, suggested that AWS could result in 40% office vacancy rates even after 10 years if all office-using firms followed through on their stated plans to reduce square footage per worker (CoreNet Global, 2012). This is not far from the CO-RE model vacancy estimate for the same scenario, in which all firms in all sectors begin an immediate transition to AWS. In property markets, we should expect significant lags: an immediate shock to demand should result in a lagged impact on vacancies, which will result in a lagged impact on rents and values. This sluggish supply side response built into the Colorado RE CGE model. Although rents are sticky on the downside, the scale of the shock to office demand implied in the CoreNet projection is more than sufficient to cause large and rapid changes in rents.

Central to the results of these simulations is the sluggish adaptation of the office property market to sudden shocks to the demand for space, as we have seen recently. Rents do not adjust quickly, but equally sluggish adjustments to vacancies result in rents which remain depressed for quite some time. Although the overall economic impact of these reductions in the need for office space are positive, they necessitate an approach by managers and policymakers focused on facilitating adaptation in use of space, in more flexible contracts (Pajević, 2021) and in planning and regulation to reduce vacancy.

Acknowledgement:

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Appendix: Model Description

Capital Types (Source: U.S. Bureau of Economic Analysis, 2010)

Model Identifier	NIPA Categories
SingleResSF	
MultiResSF	
TechK	Mainframes, PCs, Printers, Terminals, Storage Devices, System Integrators, Prepackage Software, Custom Software, Own Account Software
OtherK	Communications, Nonelectro Medical Instruments, Electro Medical Instruments, Nonmedical Instruments, Photocopy and Related Equipment, Office and Accounting Equipment, Nuclear Fuel, Other Fabricate Metals, Household Furniture, Other Furniture, Household Appliances, Other Electrical, Other
MachineryK	Steam Engines, Internal Combustion Engines, Metalworking Machinery, Special Industrial Machinery, General Industrial Equipment, Other Agricultural Machinery, Farm Tractors, Other Construction Machinery, Mining and Oilfield Machinery, Service Industry Machinery
GridK	Electric, Transmission and Distribution
AutoK	Light Trucks (including utility vehicles), Other Trucks, Buses and Truck Trailers, Autos
OtherTransK	Aircraft, Ships and Boats, Railroad Equipment

OfficeSF	Office
MedicalSF	Hospitals, Special Care, Medical Buildings
WarehouseSF	Warehouses
MobileSF	Mobile Structures
RetailSF	Multimerchandise Shopping, Food and Beverage Establishments
ManufacturingSF	Manufacturing
InfrastructureSF	Electric, Gas, Petroleum Pipelines, Wind and Solar, Communication, Petroleum and Natural Gas, Mining, Air Transportation, Other Transportation, Other Railroad, Track Replacement, Local Transit Structures, Other Land Transportation, Water Supply, Sewage and Waste Disposal, Public Safety, Highway and Conservation and Development
ChurchSF	Religious
SchoolSF	Educational and Vocational
RecreationSF	Amusement and Recreation
HotelSF	Lodging
FarmSF	Farm

Variable and Parameter Abbreviations and Labels

RAH(1) through RAH(7) – Representative Average Household Income Levels 1 through 7
RAF – Representative Average Non-Local (Foreign) Household
Wh – Welfare level for household group h
Qh,d – Consumption of good d by household h
γh,d – proportion of household h's spending on Qh,d
MIGh – migration of household group h into the region
LSUPh – endogenous labor supply scalar for household group h
EMPt – total employment of office workers at time t
Rt – rent level at time t
R*t – Desired rent level at time t
Rt-1 rent level at time t-1
OCCSFt – Occupied square footage parameter at time t
OCCSF*t – Desired occupied square footage parameter at time t
OCCSFt-1 – Occupied square footage parameter at time t-1
Vacpert – Current vacancy rate
ABSORPTIONt – Absorption at time t, the change in occupied square footage
It – Current interest rate
St – Current stock of real property
CCIt-1 – Construction cost index at time t-1
VACANCYt – Total vacant stock at time t
Ct – Construction at time t
BGP – the Balanced Growth Path, the business-as-usual path in a dynamic simulation
GRO – the assumed growth rate of the economy along the BGP
SLUGP_Kt & SLUGP_K1t – model parameters to force Sluggish Price adjustment for capital at time t

Resume

Christopher Hannum is the Global Economics Programme Director and an Assistant Professor of Economics based at UCA's Khorog Campus. He holds a Ph.D. and MA degrees in Economics from Colorado State University in the United States, as well as a BA in History from Michigan State University. Dr Hannum has more than 10 years of teaching experience in economics. Before joining UCA, he taught at Istanbul Technical University in Turkey for six years as an Assistant Professor of Economics, and at Colorado State University for four years as an Instructor. He has taught a variety of courses, both in-person and online, including Economics, Principles of Microeconomics, Intermediate Microeconomics, International Trade, Environmental Economics, Urban Economics, Managerial Economics, Financial Markets and Institutions, Research Methods I, and Research Methods II at undergraduate and graduate levels. He has academic and research interests in the integration of technology and data science into the economics curriculum, applied policy modelling, and the analysis of property markets.

An integrated and inclusive methodology for municipal resilience against multiple crises

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Abstract

This article seeks to explore flexible approaches to integrating resilience into urban governance. With this perspective, it evaluates the transformation of RESLOG- Türkiye Project's resilience assessment methodology, developed to access local governments' resilience against Syrian migration, into a holistic approach to access the impacts of 6th February earthquakes on local governments. The article gives background information about the project and the resilience assessment method, then explains in detail the earthquake adjusted version and elaborates its implementation over the case study conducted for Mersin Metropolitan Municipality.

Keywords: municipal resilience, resilience assessment, RESLOG, Mersin

1. Introduction

Resilience has been a key term of urban planning and governance for decades, mainly describing the capacity of a system to absorb shocks, adapt to changing situations and rebuild (Lewis, 2020). The resilience approach (or resilience thinking) proved to be useful in urban planning and governance, especially in the context of disaster preparedness and response, when integrated to planning of urban systems with a wholistic approach comprising ecology, built environment, economy and society (Mehmood, 2016). However, it is not only disaster-response. In the complexity of today's world, resilience thinking has become a key planning and governance approach to respond to multiple challenges (Ascott & Kenny, 2019).

Consider the case of climate change. It poses multiple challenges to human societies, first coming as the increase in the frequency and severity of natural disasters, including rise of sea levels, floods, tornadoes and droughts (Desouza & Flanery, 2013). As these become the norm rather than an exception, they trigger other shocks such as climate migration, destruction of crops, famine, collapse of energy and transport networks, etc. (Warner, 2010). On top of this, one can add other natural and man-made shocks, such as strong earthquakes, war and political instability, oil leaks, air pollution, nuclear disasters, and so on.

Hence, being resilient, which, in a nutshell, means being prepared and having the capacity to respond to multiple shocks, adapt to the changing conditions and thriving in the new context, inevitably becomes an integral part of urban governance and planning. It does not only mean disaster preparedness but being able to survive in a world where city governments continuously face multiple shocks.

An important aspect of resilience planning is its flexibility. While it is possible to take a wholistic approach and integrate resilience in comprehensive urban master plans, it is also possible to focus

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on an organization (e.g. a local government) and improve its resilience against a specific shock (Revel, 2018). This article introduces the resilience assessment methodology (Gültaşlı et al., 2021a) developed by the RESLOG- Türkiye Project in the context of increasing Turkish local governments' resilience in the face of Syrian migration crisis. This is an example of the second type of resilience planning, focusing on organizational improvement. However, the local governments, who were trying to cope with the Syrian migration crisis since 2015, were hit by Covid-19 Pandemic in 2020-21 and some of them were severely damaged by the devastating Kahramanmaraş and Hatay earthquakes in the beginning of 2023.

Municipalities had to face these multiple shocks and adapt to changing context. Two of these municipalities (Mersin and Kahramanmaraş Metropolitan Municipalities), with the support of the RESLOG- Türkiye Project adapted the resilience assessment methodology in the context of earthquake and migration for this purpose. These experiments opened a new window on using flexible approaches to urban resilience that can be adjusted and adapted to changing situations emerging from multiple shocks.

The article proceeds with introducing the RESLOG Resilience Assessment Methodology and its context. The following chapter elaborates how this methodology is adapted to the changing context when these cities were hit by the earthquake. The last chapter discusses the perspectives on using flexible assessment methodologies to increase the resilience of local governments in the face of multiple crises.

2. The RESLOG-Türkiye Project and the Resilience Assessment Methodology

Resilience in Local Governance[1] (RESLOG) is funded by the Swedish International Development Cooperation Agency (SIDA) and implemented in two countries, that have faced serious challenges from the migration resulting from the crisis in Syria: Türkiye and Lebanon. In both countries, the project focuses on local governments rather than the refugees. It aims to strengthen municipal resilience in the face of Syrian migration, which in turn is expected to result with improved and inclusive municipal services that increase the quality of life of all.

The project started in 2019, when the number of Syrian refugees in Türkiye reached to its peak. They were settled in urban areas, striving to integrate to a new country and a new life and use municipal services, ranging from waste collection to culture and social support. Some municipalities faced a rapid population increase (a shock) reaching hundreds of thousands in many cities, that disrupted their capacities to provide adequate services.
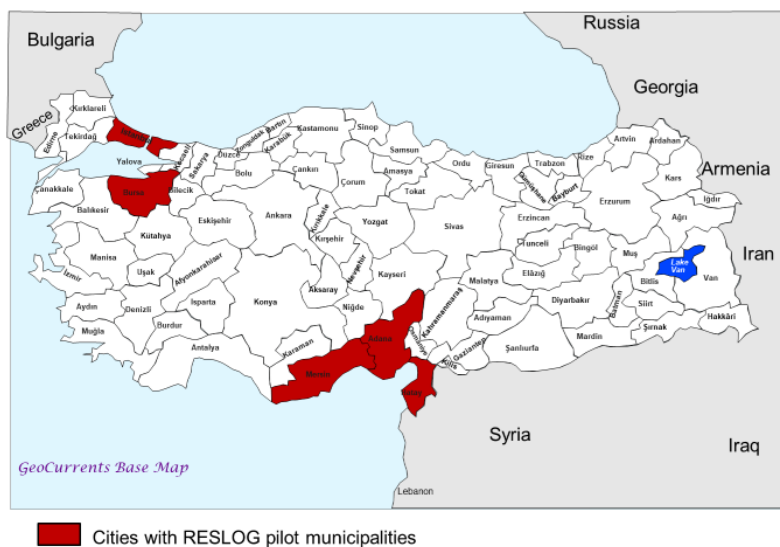
Figure 1 Cities with Reslog municipalities

The Türkiye component of the project (RESLOG- Türkiye) started by developing a resilience assessment methodology to analyze the impact of severe migration on municipality services (Gültaşlı et al., 2021a). For this purpose, based on the Turkish Municipal Law and the international experience of migration receiving cities, 39 municipal service areas are identified. These comprise all the municipal works and services that might be affected from the Syrian migration and additional service areas that could have emerged to respond the migration (such as receiving immigrants). Then municipalities' related departments were asked to assess how their work has been affected in these service areas after the start of Syrian migration over a scale of 1 to 5. A second question was how successful they were in responding to these impacts (e.g. ability to allocate staff and space to meet the additional demands in health services). Third, a basic checks and balances analysis was performed to analyze in which service areas the municipality can meet the demands, hence is resilient and where resilience is relatively low. This resilience assessment leads to identification of priority areas for intervention: service areas that underperform the most are selected as priority areas. Finally, the goals, strategies and actions are identified for priority areas to complete the MMP (Gültaşlı et al., 2021b).
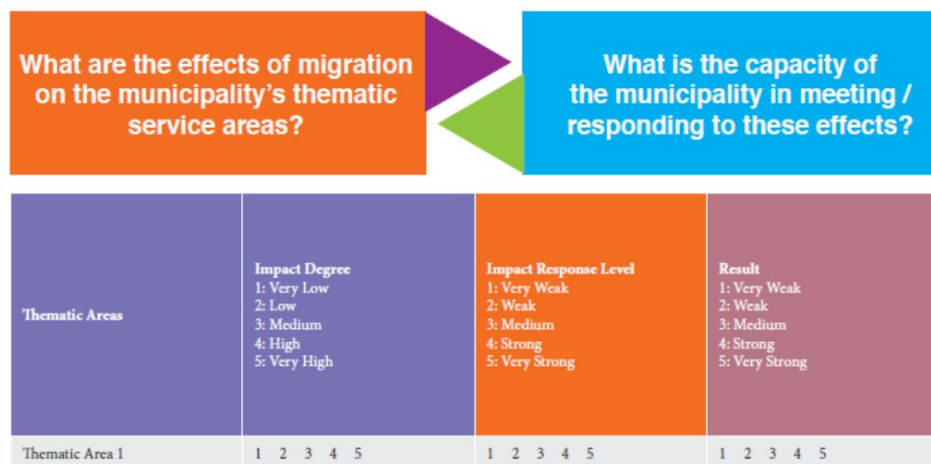
Figure 2 The main steps of RESLOG resilience assessment methodologies

This structure is an example of organizational level resilience planning. It has a specific focus, based on two key questions. Resilience of whom (local governments in Türkiye), and resilience against what (Syrian migration). The implementation of this methodology resulted with development of Migration Master Plans in 13 municipalities in Türkiye, which in turn resulted in development of target-oriented interventions to increase municipal resilience and provide inclusive services in these cities.

When the devastating earthquakes hit the Southern cities of Türkiye in February 2023, (including Hatay, Kahramanmaraş and Gaziantep), RESLOG- Türkiye municipalities re-utilized the resilience assessment tool, this time in a different context. Based on the resilience assessment and migration master planning experience, with the support of RESLOG- Türkiye, the methodology was revised to cover two shocks together: migration and the earthquake. The following chapter explores how the resilience method, developed in the context of migration evolved to cover multiple and interrelated shocks.

3. Adaptation of the Resilience Assessment Method to the Earthquake Context

In February 2023, three consecutive earthquakes hit the same region of Türkiye. The first two were in Kahramanmaraş, in the same day (06 February) with the magnitude of 7.7 and 7.6 Mw, On 20 February a third earthquake with magnitude 6.4 Mw hit Hatay. Their effect was immensive. At least 48.000 people died in the region comprising of 11 cities and more than halve a million of buildings were damaged (Presidency of Strategy and Budget, 2023). Kahramanmaraş, Osmaniye and Hatay were RESLOG- Türkiye project municipalities that were hit most severely from the

earthquake. There was not severe destruction in Mersin, another RESLOG municipality, however being in the vicinity of the region, the city received enormous migration from the earthquake area.

Figure 3 The cities affected by the 6 February earthquakes (Source: https://www.trthaber.com/haber/turkiye/kahramanmarasta-74-buyuklugunde-deprem-76-kisi-yasamini-yitirdi-743723.html)

More than 14 million citizens and 1.8 million Syrians under temporary protection live in the region. According to IOM, 2.7 million were displaced after the earthquakes (IOM, 2023). Following the emergency response, including search and rescue, providing immediate humanitarian aid and shelter during the first months, local governments shift their interests to recovery and adaptation to the new situation, including assessing the impact of earthquakes to their organizational structure. Although the timeframe did not allow for a comprehensive planning process, the RESLOG resilience assessment framework was quickly adapted to the needs of municipalities.

The Earthquake Component of the RESLOG- Türkiye was developed in response to this need. It was shaped with the idea of contributing to the community-based inclusive recovery process, with the aim of increasing the adaptation and transformation capacities of municipalities and defining the most urgent investment priorities. The resilience assessment methodology was adjusted to the new situation.

The new methodology was developed to consider multiple shocks (earthquake and migration in this case) and implemented in two versions. For 9 cities, it was implemented in a limited way to consider the social services of municipalities and for two cities (Mersin and Kahramanmaraş) it covered all municipal service areas. This differentiation had practical reasons, the timeframe for RESLOG technical support to municipalities was limited and did not allow to conduct a full assessment in all cities. Kahramanmaraş and Mersin Metropolitan Municipalities were chosen on the basis that they represent the direct and indirect effects of the earthquake.

The remainder of this chapter will describe the method of the adapted version of the resilience assessment methodology and briefly review how it was implemented in Kahramanmaraş and Mersin.

3.1. Adjusting Resilience Assessment in the Face of Migration to Multiple Shocks

The new methodology has four main steps, Impact Assessment and Response Analysis; Target Groups' Needs-Assessment; Determination of Investment Priorities; and Financial Assessment.

Impact Assessment and Response Analysis

Impact assessment and response analysis includes 3 sub-analyses. The first is the "Impact Assessment" study, which helps to understand how and to what extent all urban services provided by the municipality are affected by the 6 February earthquakes. The second is the "Impact Response Analysis," which measures the capacity of the Municipality to respond and react to these impacts.

The third is the "Resilience Development Analysis." These steps follow the same resilience assessment method, developed in the context of migration and described above.

Through the Impact Assessment and Response Analysis, the municipality's urban service-delivery capacity, including its institutional structure, has been comprehensively analyzed in different thematic areas and on the basis of different target groups. In each thematic area, a retrospective analysis was conducted for all activities carried out by the municipality in the post-earthquake period. In the process of regaining and/or improving service functions, priorities have been identified. The analysis provided a basis for self-assessment of the municipality's organizational structure, service infrastructure, and the range of urban service areas provided by the municipality. The Impact Assessments and Response Analyses were conducted in the form of face-to-face interviews with Municipality officials, and served to identify the areas where the Municipality is weak or strong, where it has high resilience, or where it needs to improve.

Target Groups' Needs-Assessment

Within the framework of the Service Beneficiaries Needs-Assessment Analysis, focus group meetings were held with the main social groups benefiting from urban services. Within the scope of the analysis, face-to-face interviews were also conducted with representatives of local non-governmental organizations (NGOs) and national and international relief and empowerment organizations. The project group worked closely with local partners and networks to identify the relevant stakeholders in each city. Focus-group meetings and key-informant interviews provided a platform for stakeholders to share their views and demands regarding the urban services and infrastructure across the Municipality.

Target Groups' Needs-Assessment was done in the form of focus group meetings, organized for women, youth, persons with disabilities, and refugees. Information about how the earthquake service beneficiaries' current needs, and post-earthquake service expectations was discussed and assessments of the municipality's service areas were evaluated during the meetings. The information received has guided the definition of medium- and long-term inclusive recovery initiatives and investment priorities and scopes in the service areas of the municipality. Needs-analyses for the target groups of children, retirees, and the elderly were conducted through focus-group meetings and interviews with advocacy groups and/or representatives of civil-society organizations.

Determination of Investment Priorities

The determination of Investment Priorities was performed in two stages. First, a study on "Matching of Supply-Demand Findings" was carried out to compare services that are considered necessary to be developed by the Municipality (supply-side assessments) with the demands of service beneficiaries (demand-side assessments) and to identify overlapping issues. These desktop studies have been effective in defining the framework of initiatives and investments that will be the most effective, will ensure an inclusive recovery after the earthquake, meet service delivery with service demand, and accelerate the recovery process through investments.

The second stage of Determination of Investment Priorities is the "Verification and Prioritization Workshop." Municipality officials, focus-group meeting participants, representatives of civil-society organizations, representatives of advocacy groups and local government actors attended these workshops. The workshops, where validation and prioritization assessments of the findings were made, established the framework of investment priorities that will form the basis of financial analyses determined by consensus.

Financial Assessment

The Financial Assessment phase consists of three sub-stages. In the first stage, preliminary studies were carried out by project experts in line with the findings of the validation and prioritization workshops. In this context, in accordance with the findings of the workshop, a project

investment factsheet was developed to increase the efficiency of the interviews with municipal authorities.

In the second stage, interviews were conducted with municipal authorities. In these interviews, final assessments were made on the service demands and service-infrastructure needs raised in the workshops. Municipal focal points for the investment priorities and the functions to be undertaken were determined.

In the final stage, in line with all the evaluations, the investment-priority projects' final factsheets, which include the location of investment, urban service functions to be undertaken by implementing the investment, cost magnitudes of the investment, and other guiding information were prepared.

As a part of the resilience framework, the following principles were set to guide the priority identification process:

- Sustainability: Considering the long-term environmental, economic, and social impacts of investments, maximizing their positive impacts on future generations. Investments should serve more than one purpose, apply a multifunctional approach, and thus reduce environmental impacts, increase economic efficiency, and meet the needs of a wide range of users.
- Gender Equality: Taking gender equality as a basis in all stages of investments and ensure that investments contribute to everyone's, especially women and girls' access to equal rights and opportunities, equal representation, and participation.
- Participation: Ensuring the active participation of all relevant parties and especially different communities affected by the earthquake in the planning and implementation processes of investments and in developing projects in line with the needs and expectations of the parties.
- Accessibility and Inclusivity: Designing investments to facilitate access to services, places, and information for all individuals.
- Resilience Development: Investments should contribute not only to post-earthquake recovery but also to increasing the resilience of communities to unexpected events and shocks, including risk reduction and early warning. Investments should be able to adapt/adjust to evolving social, economic, and environmental conditions over time.
- Conflict Sensitivity: Designing investments in a way that does not trigger ethnic, religious, sectarian, class, and similar identity-based conflicts, and prioritizes practices that promote peace and social cohesion.
- Sensitivity to the Local Context: Shaping investments in line with the values and needs of different local cultures.

Overall, these steps aimed to contribute to the municipalities' planning processes and form the basis for the municipality to benefit from potential funds and external resources.

3.2. Implementation of Resilience Assessment in Mersin in the Context of Migration and Earthquake

This section, will present briefly, how the methodology was implemented in Mersin, for Mersin Metropolitan Municipality. This example is chosen as it is illustrative on implementing the resilience assessment methodology in the context of multiple shocks that do not destruct, but severely disrupt the functionality of the city.

In Mersin, the earthquakes did not cause any loss of life or property. The most obvious impact Mersin faced due to the earthquake is migration. Mersin was one of the primary destinations for those living in the earthquake region and experienced a sudden and high wave of migration that was impossible to be prepared for. The city received a significant number of internally displaced persons, on top of more than 200.000 Syrian refugees already residing in the city. Mersin Metropolitan Municipality estimates the city's pre-earthquake population (~1.9 million) raised by

half and reached to almost 2.6 million. While a large part of this extra population is expected to return to their hometown when being able to reach to a temporary or permanent shelter, a significant part is expected to remain in the city, too. In both cases, the metropolitan government faced the challenge of providing shelter and basic services; as well as developing resilience to respond to massive migration that occurred twice in the past 10 years.

Many of the people who migrated to Mersin after the earthquakes preferred to settle with their relatives who had already been residing in the city. However, a significant population with housing problems needed to be provided with services.

All facilities with accommodation infrastructure, all service infrastructures that can be transformed into temporary accommodation areas and second-housing areas were used for this purpose. During the process, several services, especially food, were provided to all groups who needed temporary shelter and could not enter their homes.

In this context, the updated resilience assessment methodology was used to identify the most affected municipal service areas, the immediate responses and suggestions for improvement based on the needs assessment and focus group discussions.

Municipal Service Area: Organizational Structure

Impact

- In the first days after the earthquake, Mersin Metropolitan Municipality slowed down or suspended all non-emergency services and deployed its personnel to take part in relieving the chaos in the city and neighboring centers.
- The municipality rotated its personnel to help the devastated areas. As a result, fewer personnel were available to meet the increased workload in the city.
- Municipality officials stated that they were not prepared for a disaster of this scale. It was stated that the burden brought by the increase in population caused them to take part in jobs that they are not specialized in.
- Thanks to the Migration Master Planning experience acquired within the scope of the RESLOG- Türkiye project, social services were able to adapt to the post-earthquake migration in a short time.
- Many budget items, including for social services, were subject to mandatory changes due to the earthquake.
- Because a significant portion of the municipal budget was allocated to the works carried out in those regions severely affected by the earthquake, neither the infrastructure investments the city needed nor its equipment requirements could be met.

Response

- The municipality building had been found to be weak before the earthquake and had been evacuated and moved to a new location. This prevented major disruptions in service delivery after the earthquake.
- Before the earthquake, preparations were made for the establishment of the Department of Earthquake Risk Management and Urban Recovery, and the Disaster Coordination Centre started to work on disaster preparedness, emergency response, sheltering, and reconstruction. In this process, a scientific and advisory board consisting of academicians and experts was formed. Citizen participation was ensured by organising workshops. This facilitated the management of the post-earthquake process.
- On the first day of the earthquake, Mersin Metropolitan Municipality established a Crisis Centre, which ensured the coordination of all municipal departments.
- Information on municipal services was provided via social media and billboards, while cooperation was ensured with mukhtars and local staff.

Proposals for Improved Resilience

- A comprehensive action plan for disaster situations is needed.
- It is necessary to improve the data storage and processing capacity of the Disaster Coordination Centre and to establish a Safe House and Cloud Systems where city data can be stored without suffering damage.

Urban Infrastructure and Environment

Impact

- The earthquake showed that there are problems in storing large quantities of aid materials.
- The city draws 72% of its water from the Berdan River and the rest from approximately 1000 different surface and groundwater sources. In addition to meeting the increase in water demand, maintaining water quality is a significant challenge for the municipality. The costs of providing high-quality and uninterrupted service have also increased significantly with the increase in demand.
- Although, he city's wastewater infrastructure was prepared to meet the demand of 2030 population projections, the projected population has already been reached because of the post-earthquake increase in inhabitants. The installation of packaged treatment systems in settlements with seasonal increase has been an important solution for the sudden population increase after the earthquakes, even if the need for these systems has further increased since then.
- There was a 15.6% increase in the amount of solid waste with the arrival of the earthquake-affected population.

Response

- Municipality experts started to analyze the social-housing models of various countries to understand and respond to housing problems caused by population growth.
- In order to meet the city's increasing water demand, all facilities were operated at maximum capacity. Changes in investment priorities were added to the agenda in order not to reflect price differences to the public.

Proposals for Improved Resilience

- Waste management has become a major problem after the earthquakes. It is beneficial to increase package treatment systems especially in wastewater management.
- The following approaches for ensuring effective utilization of drinking and utility water resources should be put into practice:
- Installation of infrastructure for utilizing discharge water, especially for irrigation purposes;
- Strengthening the infrastructure for the elimination of leakage-loss problems;
- Strengthening the effective management of the infrastructure system by transferring it to a GIS (Geographical Information Systems) environment.

Urban Services

Impact

- Following the earthquakes, it was observed that the existing gathering areas were insufficient. It was observed that people who went to the beach in panic did not know where to go in light of the tsunami risk warning. It was understood that this situation caused new conflicts.

Response

- After the earthquakes, services such as showers and laundry were provided with the support of the private sector.
- Efforts have been initiated to raise awareness on the use of bicycles as the main means of urban transport and to persuade employers to encourage their employees in this direction.

Proposals for Improved Resilience

- Municipal officials stated that to be more prepared for disasters, municipal staff and the public should be informed and trained to deal with disasters.
- In disasters such as the floods and forest fires experienced in the city, the fire brigade has inadequate personnel and equipment. This situation has also affected the response process and needs improvement.
- Although there has been no demolition in Mersin due to the earthquakes, the need to analyse the risk of destruction has emerged. Urban macro-form that does not develop according to climatic characteristics leads to infrastructure problems, floods, and inundations. Especially with the increase in the effects of climate change, planning should prioritise a focus on events such as floods, inundations, mass movements, rockfalls, and forest fires.
- Regarding the port and airport-connection roads, municipal works should be carried out only after consideration of not only seasonal increases but also disasters and other risks. In this context, either a ring road should be constructed or alternative solutions should be investigated.

Economic Development

Impact

- After the emergency relief and response period, qualified craftsmen and labourers working in Mersin went to the earthquake zone. This situation revealed the fact that various jobs, including electrical work and welding that were required in Mersin had to be performed mostly by migrants.
- It has been observed in post-earthquake Mersin that migrants largely have met the need for intermediate labour, but it is understood that this situation has also raised the issues of precarious employment, low income, and unregistered work.

Response

- Mersin Metropolitan Municipality has been working to meet the employment needs of the post-earthquake population and to improve the employment environment for the city's residents.
- Vocational Training Centres offer various courses to city residents of all ages. These courses have also been opened to the earthquake-affected population.

Proposals for Improved Resilience

- Tradesmen have difficulties in finding intermediate staff, especially apprentices to work as cobblers, while florists and plumbers are unavailable. On the other hand, courses such as cookery and pastry-making receive more applications than their capacity. To meet the increasing need for intermediate staff after the earthquakes, vocational training should be expanded/developed in the needy areas.

Social Development

Impact

- In Mersin, there are various municipal centres that provide services to all target groups. Among these, neighbourhood centres, therapy centres, reading rooms, and guesthouse service centres stand out. These centres were used as a focal point for meeting basic needs after the earthquakes.
- The municipality provides personal-care services for those in need in remote districts. The need for this service has increased in the post-earthquake period.
- Children's workshops organised by the municipality provide services such as daycare centres, kindergartens, and science workshops. Although these workshops were not

affected by the earthquakes, there has been an increase in demand and need due to the population increase.

- In Mersin, the municipality has services for young people; these include youth camps, reading halls, laundry cafes, student dormitories, scholarship support, support courses for formal education, health seminars, nature walks, and psychological counselling. Although these activities were not physically affected by the earthquakes, they were heavily used due to the population increase afterwards, and services in some units were suspended.

Response

- Round-the-clock reading halls serving tea and coffee have been put into service to respond to the need for shelter and relaxation areas during the earthquakes.
- Following the emergency response and relief process, morale-building concerts and theatre performances were held in the city. A concert by Hatay Civilisations Choir was organised, the proceeds of which were donated to the disaster victims.
- The municipality science bus, which is used to organise the science workshops for children, was used for activities in the areas where earthquake victims stayed.
- The health seminars programme prepared for children before the earthquakes was changed, with a focus on hygiene and sanitation.
- During the emergency relief and response period, municipality's camping area and dormitory units were used to meet the shelter needs of those affected by the earthquakes. Laundry cafes, where students could wash clothes and spend time free of charge, were also opened for the use of these disaster victims. In this process, the increasing need for equipment and consumables was met from the municipal budget.

Proposals for Improved Resilience

- Cultural centres in the city are being planned as large-scale areas. However, there is also a need for cultural centres at neighbourhood scale.
- The establishment of an inclusive and multilingual post-disaster counselling centre will be effective in solving the problems faced by disaster victims.
- Parks and coastlines are used effectively by all users, not only as open green spaces but also for sociocultural, sport activities, and various other events and festivals. Arrangements are needed to ensure the multifunctional and flexible use of these areas.
- Multipurpose social centres that can provide social and cultural activities, health screening, awareness-raising training on various issues such as violence prevention and psychosocial support services should be expanded.
- In Mersin, where many foreign nationals live, integration between migrants and local people is limited. Activities should be carried out to support mutual harmonisation. Municipal services should be multilingual and provided with an inclusive perspective.

Roadmap for Mersin Urban Service Functionality

In all participatory evaluations carried out in Mersin, it is observed that different target groups have different service expectations and that service demands have increased with the surge in population. Meeting the multifaceted effects and needs created by the rapidly increasing population and cultural diversification in Mersin is important in terms of comprehensive urban recovery.

The information obtained from participatory meetings and face-to-face interviews was used in determining Mersin's investment priorities. All investments proposals resulting from the resilience assessment were consulted on with the municipal authorities. Some of the investments had been programmed or already initiated. These were eliminated and the final priority list was established.

The remaining investment priorities focus on areas that will contribute to the social recovery process, eliminate critical urban service infrastructure deficiencies, elevate the efficiency and effectiveness of urban services, prepare the ground for ensuring environmental sustainability and

protecting public health, create a coordination structure, enhance operational capabilities, develop institutional service capacity, and create a basis for holistic and integrated evaluation.

In total 9 investment proposals were completed, including justifications for the project in terms of increasing municipality and/or city resilience, strategic factors for success, details on project location, area, building functions and rough budgets required form investment implementation.

Below is a selection of these investment priorities, to give an idea on resilience assessment results.

- The Mersin Disaster Affairs Department Organisation and Coordination Centre

The Centre will be the first step in the establishment of a resilience campus. It will coordinate municipal responses to disasters in the future, including storing emergency materials and keeping safe critical data. It will strengthen the organizational capacity of the municipality to respond to multiple shocks.

- Children and Youth Camp

The Children and Youth Camp, through its social, cultural, and recreational activities, will especially and primarily contribute to increasing the access of vulnerable groups to such opportunities and improve their quality of life. The camp will also be ready to provide services in times of disaster and/or risk, using its multifunctional infrastructure.

- Installation of Advanced Treatment Units for Mezitli Wastewater Treatment Plant

The advanced treatment units will be used for treating wastewater for agricultural purposes The investment will be an important step for achieving water sufficiency, which has become a critical issue as the population increases. It will contribute to effective use of water resources, food security and safety, and developing the total resilience of Mersin.

4. Conclusion

This article seeks to demonstrate how flexible approaches to urban resilience can be adapted to multiple shocks and contribute to strengthening the urban governance processes in a city. The focus was on resilience of municipal management, hence on increasing organizational capacity and resilience of local governments that face multiple shocks. This focus also makes the resilience assessment a generalizable approach. A local government's capacity to provide services can be vulnerable to multiple shocks. Local governments can benefit from this analytical framework and tool for systematic assessment to assess the impacts of multiple shocks to their services.

The methodological adaptation was based on transforming the resilience assessment methodology developed to strengthen municipal resilience against Syrian migration to respond to multiple shocks/ challenges caused by the 6 February earthquakes. The key change was not only to shift the context from migration to earthquake, but also to initiate a city-wide, participatory decision-making process.

While defining investment priorities for community-based inclusive recovery, a wide range of target groups were defined, and interviews were conducted using various methods considering local sensitivities. During this process, interviews with municipal authorities, focus group meetings with city residents representing different social service target groups, interviews with local, national and international civil society organizations contributing to the post-earthquake recovery process were conducted, and views with local government stakeholders were exchanged. Verification and prioritization workshops, to which all target groups were invited, were used as an effective practice in making joint decisions based on consensus and defining investments that would accelerate the recovery process.

The emerging priorities reflect the results of participatory dialogues and showcase the importance of participation to decision making. In this way, 'unexpected' actions could be

integrated to decision making. The investment priority on building of the Children and Youth Camp is an illustrative example. Although it may not seem like a project directly related to responding to shocks and crises, the participatory dialogues revealed that such centers take crucial roles in immediate response to shocks by transforming their functions for emerging needs, and later to provide key services to particular social groups, hence increase social resilience.

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Resume

Ervin Sezgin has a PhD in urban and regional planning from Istanbul Technical University. He taught at the same university at masters and undergraduate levels between 2014 and 2018. Meanwhile, he served as urban governance and planning specialist for UN Habitat, the Turkish Ministry of Environment and Urbanism, development agencies and local governments in Turkey. As a part of his work, Ervin prepared various technical and policy advice reports and wrote academic research papers. He is a team member of the Resilience in Local Governance (RESLOG) Project, which is applied in collaboration with Swedish Association of Local Authorities and Regions (SKR) and the Union of Municipalities of Turkey, Marmara Municipalities Union and Çukurova Municipalities' Union. His publications and professional interests focus on international migration, urban governance and regional policies and politics.

Burcu Özüpak-Güleç the Country Representative of SALAR I and Project Manager for RESLOG, graduated from Mimar Sinan University and earned master's degrees from Marmara University and Mimar Sinan University. She completed postgraduate studies at Kent University, UK. Burcu has made significant contributions to planning and local policymaking, coordinating Istanbul's Regional Plans and directing the Istanbul Vision 2050 Strategy Document. She has expertise in participatory processes, governance, sustainable and inclusive development, local economic development, migration policies, and local governments, with over 19 years of experience in urban planning, development, and governance projects.

Ms. Sezin Üskent is a development & governance expert with 25 years of experience, has worked on various international projects funded by EU, UN, SIDA, and World Bank in Turkey. Her expertise includes decentralized development policy planning, governance, strategic planning, social policies, and citizen involvement. She has contributed to projects such as Turkey's first Twinning Project, setting up Development Agencies, and preparing strategic plans for socio-economic integration. Sezin has collaborated with ministries, municipalities, development agencies, NGOs, and universities, and has supported citizen assemblies and platforms. She holds an MSc in International Urban Planning and a Bachelor's in City and Regional Planning.

Metehan Gultasli is a freelance consultant/urban planner, having 20 years of experience working for central/local level public institutions, international organizations and international development consultancy companies. His expertise covers a wide array of economic and social development topics, including strategic planning, good governance, public engagement and participatory decision-making, public-CSO cooperation, gender equality and gender-responsive budgeting (GRB), institutional capacity assessment, development of migration policies and resilience planning, community-based sustainable tourism and urban regeneration, urban planning and development of accessibility policies and programs targeting persons with restricted mobility.

Embracing the slow life: Assessing the performance of Turkey's slow cities in promoting sustainable urban resilience

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Abstract

This study examines and interprets the position of a slow city, or "Cittaslow", within sustainable urban planning that was caused by the adverse effects of globalisation, the Industrial Revolution and modernism. "Cittaslow" in Turkey is evaluated based on slow city projects, and the senses of each city, taking into account the current situation of sustainable urban planning. It defines and analyses sustainable urban planning throughout time, and processes sustainability as a term in various approaches. Slow city membership criteria were analyzed for the selected 7 slow cities in Turkey and the results were presented. Throughout these evaluations and suggestions, it is observed that sustainable urban planning and the Cittaslow movement are parallel to each other regarding urban life indicators. Finally, it is concluded that by integrating the criteria of Cittaslow into the cities, the Cittaslow movement can be implemented as a local, sustainable city development model.

Keywords: slow city, cittaslow, sustainable urban planning, slow movement, slow cities in Turkey

1. Introduction

While human beings live on earth, they also constantly fight, try to establish balance, and strive to be harmonious. Humankind has struggled with nature since its existence and has always wanted to shape nature in accordance with its wishes. The world and cities, which are, today, rapidly shaped and transformed by globalisation and global warming, have become places where many architectural issues are examined. In parallel with many technological developments, the world has faced environmental disasters such as population growth and the accompanying environmental pollution, reduction of forest areas and natural resources, increase in toxic waste, global warming and damage to the ozone layer. The continuation of human existence, i.e. sustainability, is possible with the correct use of earth resources, measures taken against environmental pollution, and proper architectural and urban design and policies. 'Sustainability' and 'sustainable urban planning' are a set of activities that have been examined for years, handled from many different perspectives, and aim to 'benefit people and the environment'. The concept of sustainability gains more meaning with the organisation of states, governments and non-governmental organisations as well as the significant impact of public awareness.

The slow city movement is an association of cities that refuse to be one of the cities which have emerged with globalisation and become uniform and want to preserve their local identity and characteristics. The concept of slow city, which adopts the concept of sustainable urban planning and sustainable development as a policy, emphasises that the environment, urban infrastructure, and economic and social order should be formed in a sustainable way.

Sustainability is defined as "ensuring the long-term survival of socially shaped relationships between society and nature" (Tosun, 1996). All studies on the concept of sustainability emphasise

that economic, ecological, and social sustainability are independent but complementary components, and that the issue should be examined under these three headings with a holistic approach in order to achieve sustainable development goals. A sustainable future is possible when ecological, social, economic and architectural sustainability is achieved all together.

Today, 2 per cent of the earth's surface is covered by urban areas and people living in cities constitute 75 per cent of the world's population. With the acceleration of urbanisation worldwide, cities' number, population and complexity have also increased. According to the United Nations publications, there are over 8 billion people living in the world (UNPF, 2024). Rapid population growth in cities leads to dense construction and reduction of green areas, increasing energy consumption, intensifies environmental pollution and toxic waste generation, as well as accelerating climate change.

In the rapidly developing world order after the Industrial Revolution, people's lifestyles have also started to change rapidly. Especially people living in big city centres have been directed to work more, live faster and consume faster. In cities where the concept of time is more important, eating habits have also changed from traditional family tables to an urban form in which fast eating situations occur. Human beings feel the need for a slower and more environmentally friendly lifestyle in the fast-paced urban environments that do not meet their needs in terms of environment and quality of life. The philosophy of slowness, which forms the basis of the concept of the slow city, is based on the philosophy of using the moment and time effectively, not slowing down. The Slow Movement is a social movement that criticises fast modern life and advocates socio-cultural progress that will transform and change the speed and consumption patterns of the age in different parts of life (such as eating habits, economic order, social relations, etc.). With the increase in the use of machinery, the foods consumed started to turn into long-lasting shelf products, and the quality of the foods consumed also started to decrease. As a common result of all these; the concept of 'fast food', which has developed in this direction due to its fast preparation and fast service, is a modern world problem that has been accepted by all scientific circles and spread all over the world, as it is a wrong diet and harmful to health. With the chain reaction of all these reasons, the search for a healthy environment and a healthy life has emerged, and scientific circles and many health organizations have organized congresses to raise awareness of this culture. Thus, the slow food manifesto was published and the components of slow food movements were determined.

Thus, the understanding of sustainable urban planning must be based not only on profit and economic benefit, but also on environmentally sensitive and humanist values. Human scale, car-free transport, diversity, healthy housing, workplaces and public facilities are the main components required for a sustainable city. Cities that continue their ecological activities locally create their own internal potential and are the practical equivalent of sustainable development. The 'self-sufficient city' model, which is selected as a sustainable city model over the existing city models, stands out ecologically compared to other models while pointing to the concept of a slow city in a more developed way compared to city layouts within the scope of sustainable urban planning.

Cittaslow (Slow City) is an association of municipalities founded in Italy in 1999 and centred in Orvieto. The Slow City movement has members in more than 300 cities from 36 countries around the world, including 25 cities in Turkey (Cittaslow Türkiye, 2024). The growth of the Slow Movement and its influence on many disciplines formed the basis for the formation of the concept of Cittaslow. The purpose of the establishment of the Slow City movement is to prevent the standardisation and uniformisation that emerge as a result of globalisation by protecting the identities of cities. The Association advocates that the management styles of cities should be in a developing structure by giving importance to local architectural identity, local food, traditions/customs, artisans and craftsmen. These values that need to be protected are tried to be ensured through the criteria established by the Union for member cities. The criteria have also been developed to create and

maintain sustainable cities, advocating the use of environmentally friendly, renewable energy and improving urban quality.

The argument of this study is based on a comparative analysis of the current situation of the slow city concept in Turkey. The research was conducted through collection of data for the selected slow cities in Turkey and comparatively evaluating the results in terms of application rates.

2. Literature Review

Knox (2005) emphasized the importance of theoretical knowledge by examining the relationship between urban design and the social deconstruction of space. It is focused on how globalization and Slow Urban movement affect the pace of life, routine encounters and shared experiences of urban environments. Pink (2009) also examined the importance of smaller urban contexts for the comparative analysis of contemporary urban social movements. For this purpose, she analyzed the Cittàslow movement and investigated how local concerns related to larger environmental problems contribute to the processes of social change. Examining the research and practice challenges in achieving sustainable cities, Williams (2009) emphasized the importance of understanding diverse visions of urbanism and the interplay between social and technical solutions for sustainable urban development. She argued that it is necessary to move beyond the "one-size-fits-all model" approach to appreciate the multiplicity of potential futures. Ball (2015) reviewed the development and principles of the Cittaslow movement by analyzing its growth, membership criteria, and the balance it seeks between preserving local uniqueness and embracing new technologies. She concluded that while the movement promotes a sustainable, slow lifestyle, it also faces challenges in maintaining the uniqueness of participating towns while integrating ideas from diverse cultures. Farelnik and Stanowicka (2016) examined the characteristics of two development concepts for modern cities (smart city and slow city) and explored the potential to combine them into a "smart slow city" model. They suggested that this combination could lead to cities prioritizing residents' quality of life while utilizing modern technological solutions, as part of the Cittaslow network.

Pink (2007) examined the sensory aspects of Slow Food movements and slow living in the Cittàslow, emphasizing that they focus on sensory pleasure and long-term pleasure as an alternative to the frenzy of modern fast life. In this study, it has been investigated how routine and creative sensory practices shape the concept of a "sensory city" through Aylsham's Cittàslow events and projects as case studies. Mayer and Knox (2009) conducted a comprehensive analysis of the Slow City movement by examining case studies from Italy, Germany, and the UK, employing a set of 54 action-oriented criteria. They concluded that these towns effectively implement sustainable urban development practices, enhancing community quality of life by preserving local traditions and fostering a relaxed pace of life. Carp (2012) conducted an extensive analysis of the Slow Movement by examining case studies in the United States, focusing on Slow Food and Cittaslow networks and their impact on social-ecological resilience. The study concluded that these networks increase local and global sustainability by successfully integrating environmental responsibility with community participation. Farelnik (2020) conducted a study on development opportunities of small cities in Poland, particularly in the fields of tourism and urban promotion through cooperation within the Cittaslow network. This cooperation transforms city competition into effective collaboration, offering a chance to create unique development models for small cities. Batyk et.al. (2021) conducted a qualitative and quantitative analysis of the Polish Cittaslow Network using various statistical methods and data sources to evaluate renewable energy deployment. They concluded that renewable energy support is low, mainly due to urgent social and economic problems, and has not significantly improved the quality of life in these municipalities.

Keskin (2012) conducted a literature review to explore the Cittaslow (Slow City) approach as a unique perspective on sustainable urbanization. He commented that understanding the criteria for becoming a Slow City and the movement's historical and global context helps promote sustainable urban development. Deniz (2017) evaluated the Slow City (Cittaslow) model, which serves sustainable tourism by preserving environmental and cultural values and encouraging localism. He

concluded that slow cities are necessary to promote self-sufficient, socially engaging communities that benefit from technology and branding for sustainable development. Özür (2016) studied the context of urban geography and locality within the slow city/Cittaslow movement in Turkey and proposed a new settlement approach to bring innovation and change to urban planning. Çıtak and Özmen (2016) conducted field research through participant observation and in-depth interviews in 9 slow cities in Turkey. They concluded that while the Cittaslow brand increases tourist numbers, it challenges the "slow" nature of these cities, suggesting sustainable tourism strategies to protect environmental and cultural values. Koç and Baz (2020) adopted a descriptive approach to study the Cittaslow movement in Turkey, to determine the cities that meet or adapt to the criteria of the slow movement. They concluded that understanding and applying these criteria can open Turkish slow cities with rich historical and cultural heritage to the world, enhancing local and visitor quality of life. Erdogan (2016) conducted interviews at the center of Gökçeada to evaluate local perceptions and expectations about the Cittaslow phenomenon. She concluded that the residents were knowledgeable about the concept and positively considered Gokceada's designation as a Cittaslow due to the advantages it provided. Kocaman (2020) examined the intersection of smart city and slow city characteristics, focusing in particular on Gökçeada, the only Cittaslow island in the world. He has proposed smart city applications that will improve urban life without compromising slow city features and aim to make residents' lives easier.

3. Methodology

In this study, 7 slow cities were selected along with Seferihisar, which is the first member out of 25 slow cities in Turkey. These cities are Seferihisar, Taraklı, Yalvaç, Vize, Gökçeada, Yenipazar and Halfeti. Membership criteria and application rates have been determined based on the data collected from municipalities and city applications. In the documents examined according to membership criteria, which criteria were applied and which were met were compiled. Then, the application rates of membership criteria in slow cities were calculated and the analysis results were presented in tables and comparative graphs. Finally, recommendations have been developed for criteria that are non-applied.

3.1. Slow City Membership Criteria

Slow city membership criteria is generally analysed under 7 main headings (Cittaslow Türkiye, 2024). The criteria addressed under each heading are considered mandatory criteria, perspective criteria or other criteria (non-mandatory criteria).

Energy and environmental policies; slow city criteria basically cover the criteria necessary for urban life (parks and green areas, renewable energy, transport, recycling, etc.). The features that are important in forming the foundations of the concept of sustainability and increasing the city's living standards have been established under these criteria. Cities that meet these criteria are strong candidates for membership.

Infrastructure policies include criteria that increase the livability level of cities and add value to the city in terms of architectural comfort (alternative mobility, cycle paths, street furniture, etc.).

Quality of urban life policies are the criteria that add vision to the city and ensure that the conditions necessary for the continuation of membership are on solid ground. These criteria support the concept of a sustainable city by giving identity to the city or by enabling the existing architectural identity to stand out (requalification and reuse of marginal areas, cable network city - fibre optics, wireless, etc.).

Agricultural, touristic and artisan policies are the criteria that protect the environment and the welfare of the local people (prohibiting the use of GMOs in agriculture, increasing the value of working techniques and traditional crafts, etc.), observe the existence of a society that is sensitive to natural areas, and form the basis of sustainable development. It constitutes the main principles of the Slow Food movement, which gave birth to the philosophy of slow city.

Policies for hospitality, awareness and training are necessary criteria for adopting the philosophy of slow city to the public, starting the movement from the grassroots and promoting the city (good welcome, increasing awareness of operators and traders, transparency of offers and practised prices, clear visibility of tariffs, etc.). Cities that fulfil these criteria have an advantage in the membership process.

Social cohesion refers to a peaceful, comfortable, and socially solidarity-oriented lifestyle for city dwellers (integration of disabled people, poverty, minorities discriminated, etc.).

Partnerships; It covers all activities related to the Slow Food philosophy, which forms the basis and starting point of the concept of Slow City (collaboration with other organizations promoting natural and traditional food, etc.)

Figure 1 shows the method steps of the study. As a first step, the criteria for Slow City Membership were briefly defined. Next, the slow cities in Turkey were listed and the slow cities selected from them were analyzed. The implemented criteria and the relevant rates were determined based on the data collected from the municipalities and the city's applications. Then, the analysis results were evaluated by calculating the application rates of the membership criteria in slow cities. Finally, recommendations were developed for the criteria that were not applied.
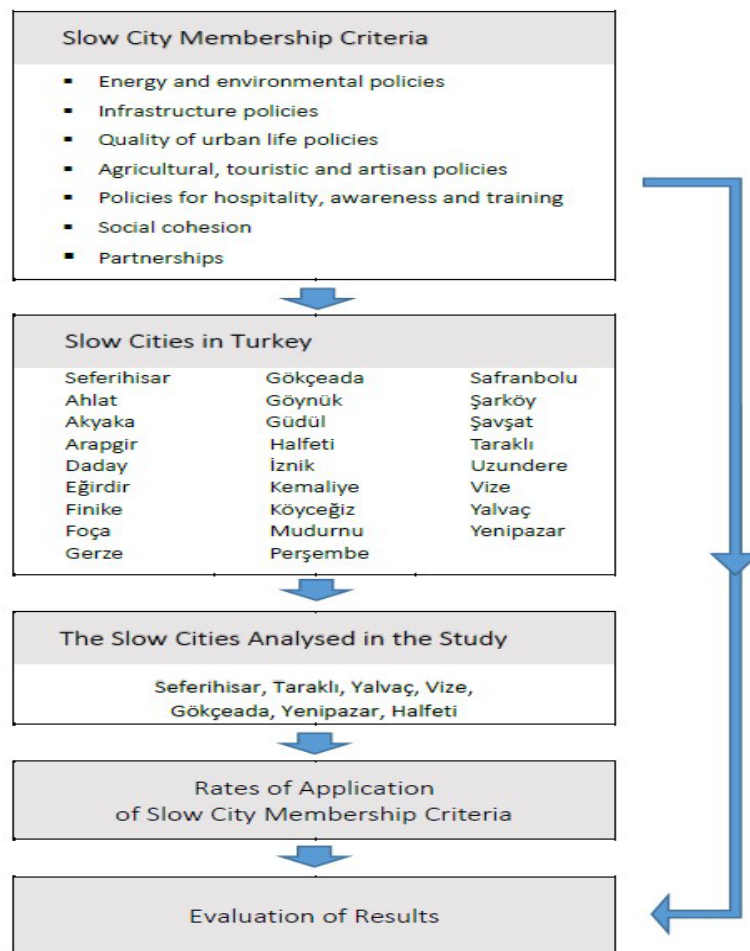
Figure 1 The steps of the method

3.2. Slow Cities in Turkey

Since Seferihisar is the first slow city of Turkey, other cities have also been approved by Seferihisar. After Seferihisar, Ahlat, Akyaka, Arapgir, Daday, Eğirdir, Finike, Foça, Gerze, Gökçeada, Göynük, Güdül, Halfeti, İznik, Kemaliye, Köyceğiz, Mudurnu, Perşembe, Safranbolu, Şarköy, Şavşat, Taraklı, Uzundere, Vize, Yalvaç and Yenipazar were accepted to membership, respectively. Although

the Slow City membership of Taraklı was withdrawn, it is also included in the study. The map of Turkey's slow cities is as shown in Figure 2.
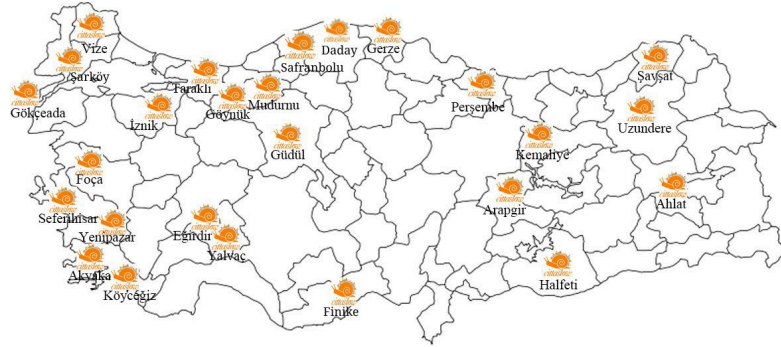
Figure 2 Slow cities in Turkey

In this study, Seferihisar, Taraklı, Yalvaç, Vize, Gökçeada, Yenipazar and Halfeti (Table 1), which are among the first resident cities in Turkey, were analysed in terms of the implemented membership application criteria.

Table 1 The Studied Slow Cities in Turkey (Cittaslow Türkiye, 2024; Enuygun, 2024)

3.3. Analyses

Data on membership criteria were collected from municipalities and city applications, and the membership criteria of cities were examined. As a result of the analysis study, the applied and non-applied criteria are shown in Table 2. In the table, the cities where the criteria for slow city membership were applied are marked in grey (Aydoğan, 2015).

Table 2 Examination of Slow City Membership Criteria (Aydoğan, 2015)

(▨ Applied criteria ☐ Non-applied criteria)

		SLOW CITY MEMBERSHIP CRITERIA	SEFERIHISAR	TARAKLI	YALVAÇ	VIZE	GÖKÇEADA	YENIPAZAR	HALFETI
1. Energy and Environmental Policies	1	Documentation that air cleanliness is within the parameters specified by law	▨	▨		▨			
	2	Documentation of water cleanliness within the parameters specified by law	▨	▨			▨		
	3	Comparison of public drinking water consumption with the national average	▨						
	4	Collection of municipal solid waste by separation	▨	▨	▨	▨	▨	▨	▨
	5	Supporting industrial and domestic composting	▨	▨	▨	▨	▨	▨	▨
	6	Availability of wastewater treatment plant for urban or collective sewerage	▨	▨	▨	▨	▨	▨	▨
	7	Energy saving in buildings and public areas	▨	▨	▨				
	8	Public energy production from renewable energy sources	▨	▨	▨	▨			
	9	Reduction of visual pollution and traffic noise	▨					▨	▨
	10	Reducing public light pollution	▨	▨					
	11	Electric energy consumption per household	▨				▨		
	12	Biodiversity conservation	▨	▨			▨		
2. Infrastructure Policies	1	Efficient cycle paths connected to public buildings	▨		▨				
	2	Comparison of existing bicycle lanes with vehicle lanes in terms of kilometres							
	3	Bicycle parking spaces at transfer centres such as metro and bus stops	▨						
	4	Eco transport planning as an alternative to private car use	▨						
	5	Removal of architectural barriers for the disabled	▨	▨	▨		▨		
	6	Family life and initiatives for pregnant women	▨						
	7	Confirmed accessibility to health services	▨	▨	▨	▨	▨	▨	▨
	8	Sustainable distribution of goods in urban centres							
	9	Proportion of city dwellers working outside the city							
3. Quality of Urban Life Policies	1	Planning for urban resilience	▨	▨	▨	▨	▨	▨	▨
	2	Programmes for the enhancement of urban values, increasing the value of city centres and public buildings	▨	▨	▨	▨	▨	▨	▨
	3	Improvement and/or creation of social green areas by using productive plants and fruit trees	▨	▨	▨	▨	▨	▨	▨
	4	Increasing urban liveability	▨	▨	▨	▨	▨	▨	▨
	5	Re-evaluation and utilisation of marginal areas	▨	▨	▨	▨	▨	▨	▨
	6	Utilising information and communication technologies in the development of interactive services for citizens and tourists	▨	▨	▨	▨	▨	▨	▨
	7	Establishing a service desk for sustainable architecture	▨		▨	▨			
	8	The city has an internet network	▨	▨	▨	▨	▨	▨	▨
	9	Monitoring and reduction of pollutants	▨	▨					
	10	Development of teleworking							
	11	Promotion of personal sustainable urban planning	▨	▨		▨			
	12	Supporting social infrastructure	▨	▨	▨	▨	▨	▨	▨
	13	Promotion of public sustainable urban planning	▨	▨					
	14	Utilisation of useful green areas in the city with productive plants	▨		▨	▨	▨	▨	▨

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			SEFERIHISAR	TARAKLI	YALVAÇ	VIZE	GÖKÇEADA	YENIPAZAR	HALFETI
	16	Creating spaces for the commercialisation of local products	■	■	■	■	■	■	■
	17	Amount of concrete used in green areas							

		SLOW CITY MEMBERSHIP CRITERIA	SEFERIHISAR	TARAKLI	YALVAÇ	VIZE	GÖKÇEADA	YENIPAZAR	HALFETI
4. Agricultural, Touristic and Artisan Policies	1	Development of agroecology	■		■		■		■
	2	Protection of handmade and labelled or branded artisan products	■	■	■	■	■	■	■
	3	Increasing the value of traditional work techniques and crafts	■	■	■	■	■	■	■
	4	Increasing the value of rural areas by increasing the access of rural residents to services	■	■	■		■		■
	5	Use of local and, if possible, organic products in public restaurants (school canteens, soup kitchens, etc.)	■	■	■	■	■		■
	6	Provide flavour training for personal and catering use and encourage the use of organic local products where possible	■	■	■	■	■		■
	7	Protecting local and traditional cultural activities and increasing their value	■	■	■	■	■	■	■
	8	Increasing hotel capacities	■		■	■		■	
	9	Banning the use of GMOs in agriculture	■		■	■		■	
	10	The existence of new ideas for development plans for the use of land previously used for agriculture	■		■		■		■
5. Policies for Hospitality, Awareness and	1	Good welcome	■	■	■	■	■	■	■
	2	Raising awareness of tradesmen and operators	■	■	■	■	■	■	■
	3	Existence of slow routes	■	■	■	■	■	■	■
	4	Adoption of active techniques to ensure bottom-up participation in important managerial decisions	■		■		■	■	
	5	Continuous training of trainers, managers and staff on Cittaslow themes	■		■		■	■	
	6	Health trainings		■		■	■		
	7	To provide systematic and permanent education to local people about the meaning of Cittaslow	■	■		■	■		
	8	Active presence of associations working with local government on Cittaslow	■	■	■	■	■		
	9	Supporting Cittaslow campaigns	■	■	■	■	■	■	
	10	Use of the Cittaslow logo on the website and letterhead	■	■	■	■	■	■	
6. Social Cohesion	1	Work against discrimination against minorities	■	■	■	■	■	■	
	2	People with different ethnic origins living in the same neighbourhood	■	■	■	■	■	■	
	3	Integration of persons with disabilities	■		■		■	■	
	4	Supporting childcare	■		■		■	■	
	5	Employment status of the young generation	■		■		■		
	6	Poverty	■		■		■		■
	7	Existence of social partnerships/civil society organisations	■	■	■	■	■	■	
	8	Integration of different cultures	■	■		■	■		
	9	Participation in politics		■		■	■		
	10	Municipality's investment in public housing	■	■	■	■			
7. Partnerships	1	Support for Slowfood activities and campaigns	■	■	■	■	■	■	
	2	Supporting natural and traditional foods through Slowfood or other organisations	■		■	■	■		
	3	Supporting twinning projects and co-operating with developing countries to develop Cittaslow and Slowfood philosophies in a way that will also ensure their dissemination	■	■	■	■	■	■	

3.4. Rates of Application of Slow City Membership Criteria

The evaluation were made according to the rates determined using the applied membership criteria presented in Table 2. For each criterion, calculations were made based on the ratio of the

requirements met to the total number of requirements. The graph in Figure 3 shows comparative rates for each criterion for the selected slow cities in Turkey.
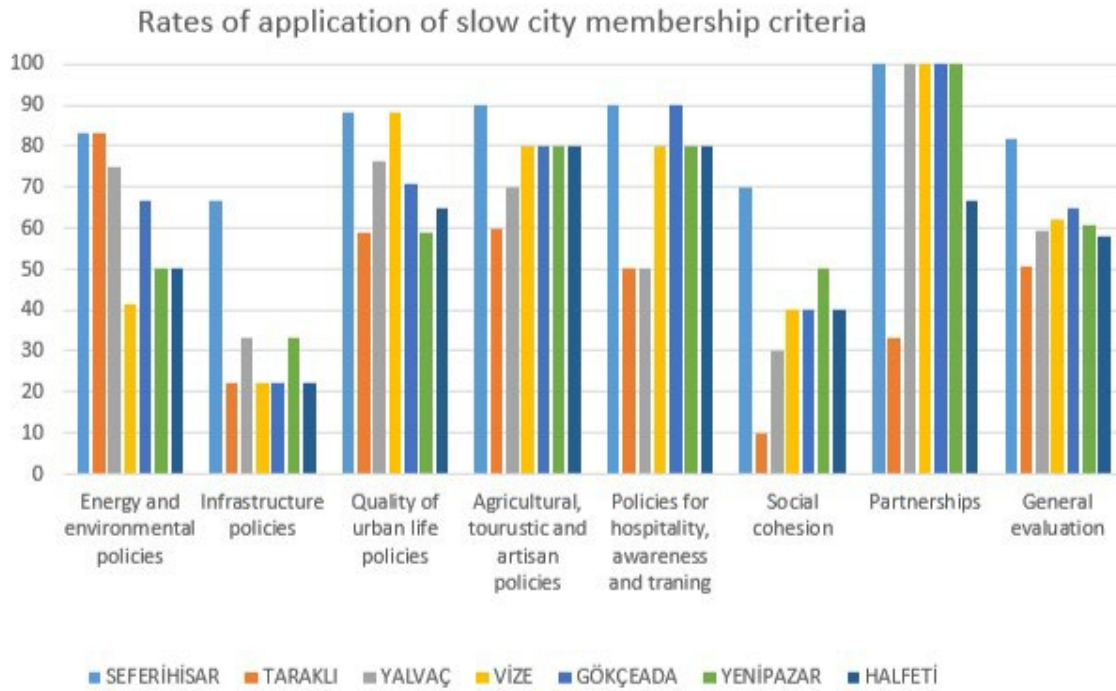
Figure 3 Rates of application of slow city membership criteria (Aydoğan, 2015)

3.5. Result and Discussion

According to Table 2 and Figure 3, the results show that the town that best fulfils the criteria for the membership of slow city in Turkey is Seferihisar, which is Turkey's first slow city, and it is of great importance in terms of setting an example and pioneering the other cities. Seferihisar's work on the environment, infrastructure and urban quality of life policies, which are the criteria that most support the concept of sustainable architecture among the criteria for membership as a resident city, are in the best condition compared to other cities. It is clearly seen that the fulfilment rates of other criteria are also above the average.

Although the town Taraklı is at the same level as Seferihisar in terms of energy and environmental criteria, it exhibited a weak situation that needs to be improved within the scope of infrastructure works. Its work on the quality of urban life is also above average, but can be improved. In the criteria related to social cohesion and partnerships, the town's percentages are low and need to be improved. In general, it has the lowest values in terms of meeting the criteria.

The town Yalvaç was found to be quite good regarding energy and environmental and quality of urban life criteria. However, it is well below the average in terms of infrastructure and social cohesion criteria.

The town Vize exhibited a very weak performance on energy, environmental, and infrastructure policies, but was above average in other criteria.

Gökçeada is the town with the highest overall percentage of meeting the criteria after Seferihisar. Gökçeada's work on the criteria was found to be open to improvement and positive in terms of cooperation with universities and institutions. However, Gökçeada's work on infrastructure was noted as below average.

Although the town Yenipazar was one of the first inhabited cities, its work is at an average level and needs to be developed. Projects related to the environment, infrastructure, and quality of urban life should also be developed.

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Halfeti town fulfills the criteria above average. As a new member of the slow city, its infrastructure work is at a low level.

When a general assessment was made in terms of Slow City membership criteria, the following results were reached (Aydoğan, & Akşit, 2016):

- **In terms of energy and environmental policies;**

It has been observed that Seferihisar has a more professional approach to the criteria compared to other towns, there are many projects regarding the use of renewable energy in the town. It has one of the largest solar power plants in Turkey and solar energy is widely used in outdoor lighting. Comprehensive studies are carried out on issues such as energy efficiency training. The number of Blue Flag beaches, symbolising safety and cleanliness, is quite high. Taraklı town has natural features in air, water and soil quality since there is no industrialisation. The use of renewable energy is in the form of obtaining hot water from solar energy and is at the local level. In Yalvaç town, in order to prevent environmental pollution within the scope of sustainable development, in addition to the treatment plant with chemical and biological treatment functions, a solid waste facility has been established and gas and electricity production is provided. In the Vize town, renewable energy is used at the local level in the form of obtaining hot water from solar energy. Gökçeada is the world's first and only slow island. In addition to solar energy, it is also a slow city that uses wind energy intensively. In the Yenipazar town, environmental policies are at the local level, such as the municipality's incentives for waste collection and sorting. However, it has a wastewater treatment plant, which is not available even in larger non-quiet towns. Halfeti is one of the weakest towns in terms of energy and environmental policies; activities are at the local level, such as signage regulation and light pollution measures. Although its potential is very high, the utilisation of solar energy is very low.

- **In terms of infrastructure policies;**

Seferihisar carries out studies on surveying and restoration in the town, and excavations are carried out in the ancient city of Teos. There are municipal projects such as making public buildings suitable for disabled use, bicycle paths, and pedestrianisation. Taraklı town has a good level of protection of historical values. There are registered examples of civil architecture and natural cultural assets, and local materials are used in the survey and restoration works. Yalvaç town is a slow city that preserves its urban texture with its museums and streets with historical houses. There are also green area arrangements and registered plane trees. In the Vize town, urban design and development projects have been carried out in archaeological sites, and emphasis is placed on the use of green areas and arrangements for disabled people. Gökçeada is a town that attaches importance to protecting historical and cultural sites and encourages cycling in the island. In Yenipazar and Halfeti, infrastructure policies are at a more local level, and in Halfeti, the coastline with urban protected areas is protected.

- **In terms of quality of urban life policies;**

Seferihisar attaches importance to thermal tourism and ensures that the water-cooled in hot water springs is used in greenhouses. The town has technological quality and noise pollution standards. Taraklı provides technological network services at the local level. Yalvaç utilises public contribution in landscaping and has established a city information system. Vize provides technological local network services, especially for students; intercity traffic has been taken out of the town. In Gökçeada, there are voluntary incentives for bioregional architecture and greenhouses have been established for growing flowers and plants. Within the scope of colour regulation, houses are painted with natural white whitewash or left as stone facades. In Halfeti, colour regulation has also been done in the buildings, but together with Yenipazar, it is in a situation that needs to be developed in urban life policies.

- **In terms of agricultural, touristic and artisan policies,**

In this criteria, Turkey's cities are at a very good level in terms of utilising their potential. All of them are committed to protecting their existing local values and encouraging tradesmen and the public to sustainable development.

Seferihisar has branded its Satsuma, encourages organic agriculture, and established a cooperative with local producers. It has established vegetable gardens in schools, local markets and seasonal cycle awareness in practice. Taraklı also supports local production and entrepreneurs are trained. Yalvaç has been declared an Eco-Agricultural Zone and stands out in animal husbandry, livestock breeding, fruit growing and organic agriculture. Organic beekeeping is being developed in Vize, and training on local old professions is provided. Gastronomic culture in Gökçeada is at a very good level in terms of the continuity and diversity of local product production activities. Yenipazar is significantly good in producing products such as olives, olive oil, figs, honey and chestnuts with local producers and supports women's manual labour. Halfeti is at a level that needs to improve in this criteria, but craftsmen are supported and organic vegetable and fruit growing is encouraged.

- **In terms of hospitality, awareness and training policies;**

Seferihisar has established a City Council and established protocols with universities to raise awareness as a pioneering slow city. Taraklı, Yalvaç and Vize have established touristic routes to develop tourism. The facilities are sufficient and functional. Unlike other cities, Gökçeada emphasises agro-tourism in the training given to the people of the town. In Halfeti, pension and hotel reception training has been emphasised and routes of historical and natural places have been created. Yenipazar has provided foreign language training to the municipality staff in cooperation with tourism and is in need of improvement in this criteria.

- **In terms of social cohesion;**

In all slow cities, social assistance activities are available in all areas within the scope of cooperation with municipalities based on volunteerism. However, Seferihisar has emphasised the importance of the slow city at the level of consciousness by establishing a children's municipality within the scope of a UNICEF-supported child-friendly city. The municipality carries out projects with tradesmen and organises fairs, courses, and training activities. All other cities are at the local level that need to be developed.

- **In terms of partnerships;**

These criteria is extremely important as 'slow food' forms the basis of the concept of 'Slow City'. Cities can highlight the flavours specific to their traditional cuisine and try to carry these flavours into the future. Taraklı and Halfeti are at a level where they need to improve themselves in this criteria.

4. Conclusions

All seven slow cities examined have high realization rates in terms of agriculture, tourism, artisan policies and partnerships. In contrast, the values in infrastructure and social cohesion are lower compared to other criteria. The cities have very high values in local production, which is crucial for sustainable development. To enhance their visibility, they place importance on branding and promotional activities, especially in tourism. Although, their realization rates in urban life quality, energy and environment, hospitality, awareness, and training policies are quite good, it is important to pay more attention to these areas.

Cultural heritage and traditional architecture is generally seen to be effective in slow cities in Turkey, however, no sufficiently detailed study has been observed on slow city concept in urban planning related issues. Urban comfort criteria such as environment, infrastructure and urban life policy in slow cities should be addressed with longer-term projects. The methods for providing the criteria of slow cities should be provided with more forward-looking and radical solutions. In order to make cities more accessible, they need to be improved in terms of infrastructure and urban

planning. Apart from sustainable social life, sustainable criteria should also be followed in building design and construction stages which is essential for sustainable urban planning in the future.

The increase in the number of member cities has led to an increase in the number of candidate cities. Although the concept of Slow City is a new concept in Turkey, efforts to involve cities in membership are ongoing and the number of cities willing and candidate for membership is increasing. The movement that started in the town Seferihisar is an example to other cities and local municipalities as a sustainable and local development model. The Slow City formation in Turkey has significant potential in terms of revealing the historical heritage of other cities, emphasizing the architectural urban identity and creating sustainable pilot cities where renewable energy sources are used.

Note

This article was produced from a master's thesis (*Sürdürülebilir Mimarlıkta Sakin şehir (Cittaslow) Yaklaşımı*) Graduate School, Istanbul Technical University.

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Resume

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A tale of Aliaga: Transformation from a farm to an industrial hub

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Abstract

Industrialization processes and policies change and transform settlements socially, economically, and spatially within capitalist production relations. This change and transformation also changed the hierarchy and gradation system between settlements, described as urban systems. In this context, Aliağa is an important settlement in İzmir, the third largest metropolis in Türkiye. It has been referred to as an industrial zone since the 1960s and has strategic importance as a national and international import and export port. While it was a rural settlement where farm and farm workers lived, it has been transformed into a settlement where macro-scale investment decisions such as special industrial zones, organized industrial zones, industrial areas, energy conversion facilities, thermal power plants, ports, railways, and highways are located. While this process is still dynamic, it has become an important settlement chosen by large capital integrated into international production and value chain networks. While industrial areas have increased more than 3-fold in the district between 1990 and 2018, capital accumulation continues to accelerate with new investment decisions. Today, the fact that it hosts the country's largest foreign-capital companies (PETKİM, TÜPRAŞ, HABAŞ, SOCAR, NEMPORT, STAR Refinery, etc.) and that the ship dismantling facilities, which are the only ship recycling facilities in the country, are located here, carries the district to an important position. When examined in terms of İzmir cargo regimes in 2020 (export, import, cabotage, and transit), the district, hosting one of the country's most significant ports with a dominant share of 75.1%, has gained prominence and undergone a rapid process of change and transformation. This study analyses the historicity of the industrialization, capital concentration, and spatial transformation processes of Aliağa district using qualitative (examination of studies on the historicity of Aliağa) and quantitative data-based (ISO 1000 company ranking, satellite images, plan studies) methods. It analyses the "growth" adventure of a village settlement that has a population of over 100 thousand at the end of 70 years and has become an industrial city with industrial zones, ports, and energy infrastructures, and the growth process initiated by public investments guided by development plans, which accelerated and transformed with the impetus of private sector investments, by analysing the periodic development of capital accumulation and industrialization dynamics. This study differs from the literature by analysing the spatiality of capital accumulation cycles and contributes to the literature by analysing how the tendency of capital accumulation affects its spatial change and transformation in the example of Aliağa district.

Keywords: Aliaga-Izmir, capital concentration, industrialization, transformation of space

1. Introduction

Capital accumulation creates and organizes itself as a national industrial policy in the construction processes of nation-states (Harvey, 2008). It ensures the determination and fixation of population, borders, and resources with the tools of the nation-state. Capitalist production relations fix commodity production and capital cycles in space through industry and factories. For this reason, industrialization processes and policies are of critical importance in the self-reproduction and restructuring of the nation-state (Harvey, 2008). The concentration of industry in certain areas within the nation-state through investment decisions corresponds to the social,

economic, and spatial restructuring of capitalist production relations within the nation-state and the change in the position of settlements, which are the centres of capital accumulation, within the hierarchy of settlement systems (Das, 2017).

The change in the position of some settlements in urban systems and settlement hierarchy is a unique example of the restructuring of the capital accumulation of a nation-state that became late capitalist, inherent in Türkiye's transformation from an empire to a republic. As a country that structured and organized its production relations and institutions extremely late and quickly compared to other capitalist countries, it accelerated its capital accumulation in a short time. The restructuring process that was initiated, especially after the Republic caused the position of some settlements in the settlement system to change. The system, which was based on the redistribution of the wealth accumulated throughout the country, turned a settlement that was previously a small village or town into a capital and production centre all around the country. After the war, especially with Keynesian welfare state policies, industrial investments made by the state in Anatolia in Türkiye for industrial development caused few Anatolian cities' rapid growth and transformation. Settlements such as Karabük, Kayseri, İzmit, Alpullu, and Nazilli can be given as important examples of settlements that developed because of investments made by the state within the framework of industrial policies. The geography of Anatolia has many settlements that have undergone change and transformation in this way (Altaytaş, 2020; Kopuz, 2017; Sadri, 2020).

In the pre-Republican period, it was a settlement with a farm and rural structures where the workers lived. Today, Aliağa hosts large-scale industrial establishments with important international networks, ports, and an organized industrial zone. It is an industrial center that provides serious inputs to the Turkish economy. This transformation is undoubtedly important and is one of the areas where a nation-state that has become late capitalist can change and transform space and settlements with its industrial policies. The nation-state is an effective and important breaking point in separating space and borders. When it is considered that capitalism has established its existence on the fixation of production to space, it organizes and develops by intertwining the concepts of nation-state and national industry. The capital accumulation, industrialization, and spatial transformation path of the Aliağa district emerges as an example of Türkiye's modernization and capitalism. In the process, Aliağa settlement has transformed from a rural settlement that makes a living from agriculture into an urban settlement with a population of around 105 thousand as of 2023 (TURKSTAT, 2024) as a result of investment programs for the industry based on petrochemicals and its derivatives and upper-scale planning decisions such as iron and steel industry, which are among the roles assigned to settlements in the nation-state structuring processes mentioned above. Two of the five oil refineries in Türkiye (İzmit, Batman, İzmir, Kırıkkale, and Aliağa Star Refinery), Star Refinery and İzmir Refinery, are in Aliağa (Figure 1). Clearly, the iron and steel industry investments are concentrated in Marmara and Western Black Sea Regions, and only in İzmir in the Aegean Region. It is seen that almost all the iron and steel industry in İzmir is in Aliağa (Çebitaş, Ege, Aliağa, HABAŞ, İzmir, Kar-demir, Kılıçlar, Özkan, and Sider iron and steel industry) (Figure 1).

Within the scope of this study, the transformation of Aliağa from the past to the present and its development paths for the future were monitored through large capital investments and their effects, by revealing them with literature research, satellite images, planning processes, and investment decisions. The second part of the study presents the capital accumulation and concentration process (industrialization process) of Türkiye, following the explanation of the capital accumulation and concentration process in the first part. Next, the study will explain how Aliağa, the area of focus, has evolved within the context of capital accumulation and concentration, and how significant capital investments have influenced the city and its spatial development.
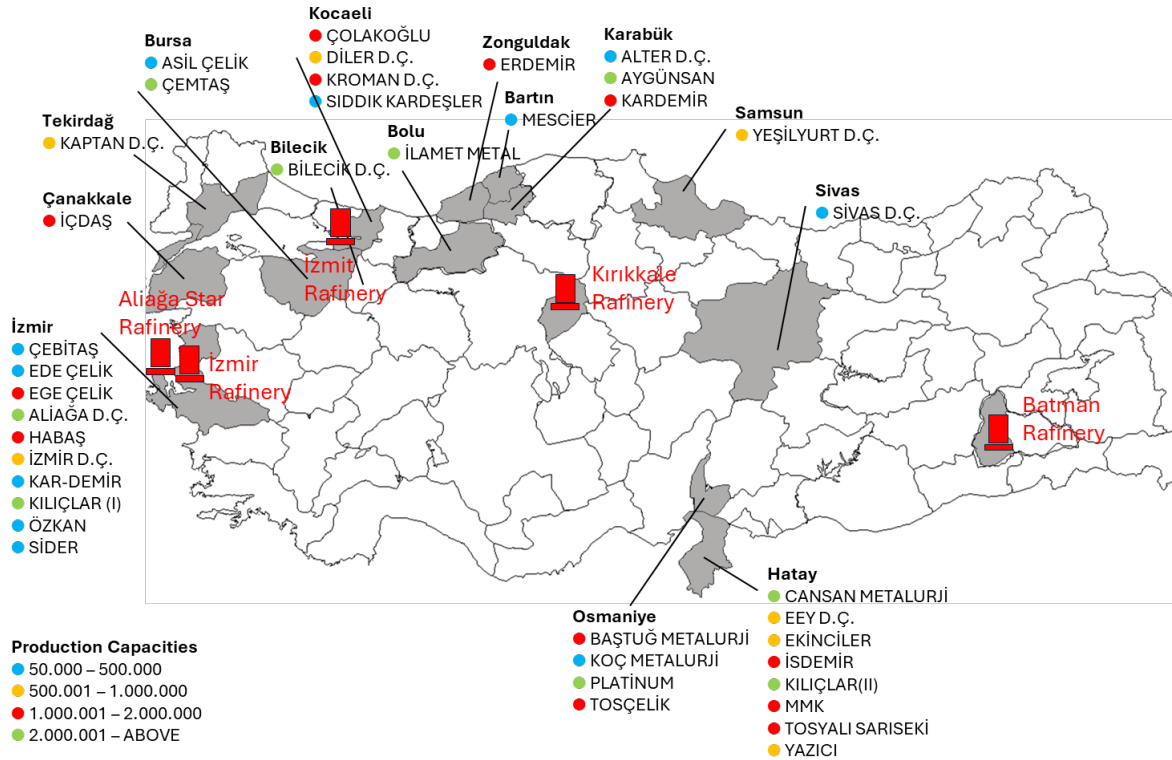
Figure 1 Distribution of refineries and iron and steel production companies in Türkiye (Turkish Steel Producers Association, 2024)

2. Hierarchical Urban Systems, Spatial Concentration Process, and Dynamics of Capital

The hierarchical urban systems approach studies settlements of distinct functions and sizes, analysing the economic, social, and spatial patterns they contain. It also describes the system formed by these patterns and the hierarchical structure they create. Historically, the accumulation of surplus products, population, and labour force in settlements varies based on the economic, social, and spatial dynamics within them. Furthermore, the capital accumulation process in settlements also involves dynamic restructuring. In this context, the central places theory is often employed as a key analytical tool to understand the formation and transformation of settlement systems (Christaller, 1980; Lösch, 1954).

On the other hand, Evolutionary Economic Geography (EEG) explains the growth of a region and its change in the hierarchical system with the effects of past economic activities, local capabilities, and investment processes (Boschma, 2017). According to this approach, investments are not only an external intervention, but also an internal drive fed by the region's past experiences, social networks, and institutional structures. The past investments and development processes, which are linked to path dependency and the evolution of local capacities lead to the economic structure of the regions. Investments increase the technological capacity of the region, strengthen local economic diversity, and integrate the region into national and transnational economic network structures. In this context, there are studies in the literature that address the restructuring of cities and regions regarding the processes of integration of small-scale cities into industrial production networks and reveal the trend (Saidi et al., 2024).

Evolutionary economic geography also emphasizes the impact of investments on regional hierarchy (Meijers, 2007). Local capacities of regions (human capital, capital accumulation, technical infrastructure, sectoral diversity, sectoral forward and backward linkages, innovation capacity) shape regional competition, growth, and development. Peripheral regions that are attached to strong centres can also dominate regional development and reach a level where they can compete with the centre in certain areas. This process transforms the regional hierarchy and ensures that local economies change over time because of an evolutionary process. Investments

restructure the region by triggering economic growth, innovation, and adaptation processes (Balland et al., 2017).

There are studies in the international literature on how refinery and complementary sectors, which stand out in Aliağa's development drive, shape regional restructuring, and these studies analyse the practices of industries in changing and transforming locations. For example, the transformation capacity of refineries in the Netherlands and Europe (Pinder & Husain, 1987), the spatiality of refinery and petrochemical industry in Europe (Molle & Wever, 1984), the regional development dynamics caused by the petrochemical industry in Norway (Reiersen, 1978), and the rapid regional development provided by the oil economy in Indonesia (Hill, 1992).

The spatial accumulation of capital through industry the transformation of space resulting from the concentration of capital in certain places and the change of the "position" of settlements within hierarchical urban systems are issues that have been discussed for a long time in the planning and economic geography literature. The expressed process is dynamic and restructures itself intrinsically in the changing tendency of the dominant paradigm that determines the relevant policies. Therefore, although the process of changing the position of a settlement within the hierarchical urban systems of capital accumulation and industrialization policies discussed within the scope of this study is based on classical accumulation discussions, it also reveals its importance as a process shaped by local dynamics.

There are two main approaches to explaining the spatial concentration of capital and the formation and evolution of hierarchical urban systems (Erdem & Kılıç, 2024). One comes from Marxist geography, the other from economic geography. From a Marxist perspective (Das, 2017; Harvey, 2008; Smith, 2008), capital accumulation is a fundamental process in which capital naturally concentrates in certain places to accelerate production and increase surplus production. In capitalist economies, capitals tend to cluster in certain cities and regions to access advanced production resources, high-quality raw materials, affordable labor, innovative production techniques, and cutting-edge technology. The pursuit of profit maximization through faster production and reduced costs is the main factor behind the unequal regional distribution of capital (Das, 2017; Harvey, 2008). As a result, industries, companies, and capital tend to concentrate in national production centers (Balland et al., 2017; Boschma, 2017).

In contrast, economic geography emphasizes spatial characteristics. The clustering of firms and capital is largely influenced by spatial factors such as transportation infrastructure, organizational capability, human capital, and the type and extent of existing capitalism (Storper, 1997). Some regions naturally have more favorable spatial characteristics, while others lack the resources to develop them because these characteristics are fixed and difficult to replicate. These assets lead to market dynamics that concentrate firms in certain areas, creating significant regional disparities across nations. The economic changes in Aliağa illustrate aspects of both theories, where large public investments have stimulated the growth of the local economy and attracted related industries, further developing the region's economy and attracting additional investment.

3. Izmir-Aliaga's Evolution from Rural Settlement to Capital Hub and Its Spatial Implications

3.1. Study Area, Purpose, Scope and Method

This study focuses on the Aliağa district of İzmir, which is the westernmost province of Türkiye and the third province with the highest income and population. Aliağa is an important settlement located on the seaside with strong sea, highway, railway, and air transportation connections, located about 60 km away from the metropolitan city centre of İzmir. It has become a significant center of attraction for industrial investments since the 1960s. Aliağa has infrastructures requiring large capital such as special industrial zones, organized industrial zones, industrial areas, energy conversion facilities, thermal power plants, ports, railways, and highways. As of 2023, it has a population of 105 thousand and due to the industrial areas and other areas requiring intensive employment, its day and night population varies, and the daytime population increases to 200

thousand with those coming to work in the industrial area from the surrounding provinces and villages (Aliaga Municipality, 2020). The number of workers transported from the surrounding settlements and the Izmir metropolitan center by the city shuttles and railways and the Izmir Suburban System (IZBAN) constitutes the difference between day and night (Aliaga Municipality, 2020). While such a high density of daily displacements causes Aliağa to be a settlement serving a much larger population than it has, it also reveals the social, economic, and spatial importance of the district.

Within the scope of the study, the industrialization process of the district was examined in an integrated manner using the Internet and printed sources, and the spatial transformation process was examined using raster satellite imagery data. While the urbanization and industrialization process of Aliağa was revealed by examining the literature sources related to Aliağa, information and documents regarding upper-scale plan decisions and future investment decisions were compiled. Within the scope of the study, spatial development and change status were determined using satellite images at 5-year intervals during the period 1975-2024. Satellite images were obtained from the LANDSAT USGS platform (Appendix 1).

3.2. Iindustrialisation Process and Capital Accumulation Dynamics in Aliaga District

The decision to establish a refinery and petrochemical industry in Aliağa district in the II. and III. development plans, and later its designation as an industrial sub-region, and the location selection of the iron and steel sector in the IV. The Development Plan paved the way for industrial development in Aliağa district. The selection of Aliağa paved the way for the transfer of capital accumulated throughout the country through public investments to Aliağa, triggering industrialization, increasing capital accumulation with the development of complementary sectors, and the economic, social, and spatial change and transformation of an agricultural settlement in parallel with the capital accumulation dynamics. The specific selection of refinery and petrochemical industry was the determinant of the intensive location selection of the chemical industry and chemical-related sectors in Aliağa. Between 1965 and 1970, Petrochemical Inc. (PETKİM) was established in the Yarımca region of İzmit, which was determined as one of the industrial bases of Türkiye, and factories to produce Ethylene, Polyethylene, Chlor Alkali, VCM, and PVC were completed. II. In line with the decision taken in the development plan, the foundations of PETKİM's Aliağa facility were laid in the next investment period of 1971-1975, and LDPE, HDPE, PP, and ACN factories started to operate. In 1983, the Aliağa refinery was combined with the other three refineries established in Türkiye, namely İzmit, Batman, and Kırıkkale refineries, and gathered under the name of Turkish Petroleum Refineries (TÜPRAŞ) (Figure 1).

While refineries and petrochemical industries were initially established by the public sector due to their high capital requirements during Türkiye's capitalization process, they were privatized following neoliberal policies after 2000. With the privatization, TÜPRAŞ refineries started to operate under Koç Holding, one of the major capitalist groups of Türkiye. Other enterprises affiliated with PETKİM were transferred to SOCAR&Turcas Joint Venture Group, an Azerbaijani public enterprise, within the scope of privatization in 2008. In 2011, SOCAR laid the foundation for the establishment of its refinery facility, and the first oil was processed by STAR Refinery in 2018. The area where PETKİM and SOCAR are located was declared as Türkiye's first "Special Industrial Zone" by Presidential Decree No. 190 (Kılıçer & Peker, 2019) and in addition to refining and crude oil processing, it operates in the fields of discharge and storage with SOCAR Storage, port management with SOCAR Terminal and renewable energy with PETKIM RES. As of 2018, two refineries are operating in the Aliağa district, and 2023, STAR Refinery became the 3rd largest company in Türkiye in the list of Türkiye's top 500 industrial enterprises published by ISO. PETKİM, also located in Aliağa, is ranked 30th and İzmir Demir Çelik is ranked 49th. This process significantly reveals the size of the capital and capital accumulation concentrated in the Aliağa district with privatizations and the investments made by the companies after privatizations.

Before privatization, PETKİM and TÜPRAŞ, which were public companies and were established on the peninsula in the west of the district, had a production and capital accumulation cycle based on the processing of crude oil received from oil tankers docked at their ports and the presentation of fuel oil and different petroleum products to the domestic market, whereas in the post-privatization process, there are two different private refineries in Aliağa and similarly, the crude oil coming to the facilities through the ports is processed and the presentation of fuel oil and different petroleum products to the domestic and foreign markets is ensured (Figure 2). After the crude oil coming to the enterprises in Aliağa by sea is processed, it is presented to the domestic market by road and railway.

With privatization, the development of the chemical sector in the Aliağa district was triggered and to meet and regulate the increasing demands, the Aliağa Chemical Specialization and Mixed Organized Industrial Zone (ALOSBİ) was established in 1997. Its proximity to the highway and ports made the OIZ an attraction point for companies and the OIZ, where large parcels for the chemical sector were filled, reached an occupancy rate of 90% (Table 1).
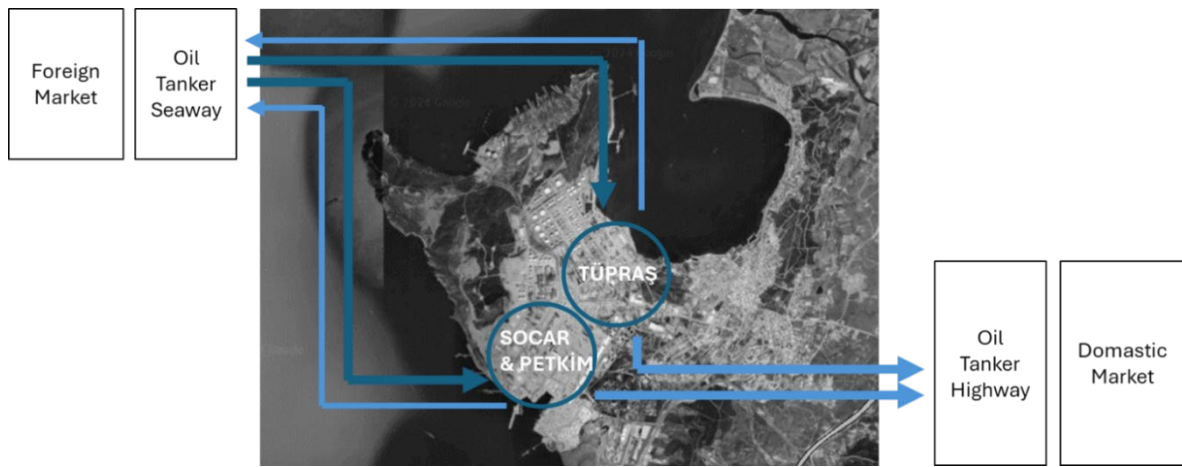
Figure 2 Petrochemical production and capital accumulation cycle in Aliaga district

Table 1 Details of Chemical OIZs by Province in Türkiye

Province	OSB Title	OSB Area (Hectare)	Total Number of Parcels	Number of Parcels Allocated	Number of Parcels to be Allocated	Number of Parcels in Production	Number of Parcels Under Construction
İstanbul	İstanbul Tuzla Kimya Sanayicileri	74	164	164	0	164	0
İzmir	Aliağa Kimya İhtisas ve Karma	922	310	257	53	117	119
Kocaeli	Kocaeli Gebze V(Kimya) İhtisas	245	72	72	0	39	25
Yalova	Yalova Kompozit ve Kimya İhtisas	118	13	12	1	10	0

Another determinant as important as the refinery is the transfer of capital to Aliağa district for scrap recycling and transportation for the chemical industry and Machinery and Chemical Industry (MKE) under the guidance of the IV. Development Plan, again through public investments. It would not be wrong to say that these two decisions are the most important decisions in the process of transforming Aliağa district into today's industrial city identity. Following the establishment of the refinery, private industrial investments were made in the chemical industry, and the sector was developed with private investments in the field of scrap recycling and transportation (Aliaga Chamber of Commerce, 2024).

In addition to MKE, different companies from the iron and steel sector based on scrap recycling were established in Aliağa district during the process. Ship dismantling facilities were established to provide raw material supply through a model based on the dismantling of large ships that had completed their service life or whose restoration was ineffective, and the processing of the steel obtained from the ships and re-offering them to the domestic or foreign market. In 1965, Kılıçlar Ship Dismantling Enterprise was established at the tip of the peninsula where PETKIM is located, this area was then chosen by different ship dismantling companies and provided raw materials to be processed for the iron and steel sector. In 1975, the coastal area between Taşlıburun and Ilıcaburun in the Arap Çiftlik district of İzmir province was declared as the Ship Dismantling Area by the decision of the Council of Ministers.

In parallel with the development of the refinery, it was observed that new iron and steel processing facilities were also established in Aliağa district, where the iron and steel sector developed. Kardemir Çelik, which carries out production based on the processing of scrap iron and steel into iron and steel products called rolled sheet or billet steel, was established in 1998, İzmir Demir Çelik in 1975, LEYAL Recycling in 1980, Ege Çelik in 1986, HABAŞ Iron and Steel Industry in 1987 and Kocaer Demir Çelik in 1996. All these establishments chose a location near the Horozgediği village, which makes a living from agriculture, on the road connecting Nemrut Bay to the Aliağa-İzmir highway in the south of Aliağa district.

Nemrut Bay has a critical importance in the location selection of the relevant iron and steel companies. In addition to the scrap iron and steel collected domestically and the iron and steel obtained from ship-breaking facilities, the iron and steel collected from other countries were brought to the special ports in Nemrut Bay by cargo ships, transported by road to iron and steel processing facilities, processed and processed iron and steel transported by road to the domestic market or to ports for foreign markets, which resulted in a production and capital accumulation cycle. It was also observed that container ports were also chosen in the region during the process. The iron and steel production cycle, in which scrap iron and steel are processed into liquid steel and then offered to the market as rolled sheet and billet steel, is visualized in Figure 3.
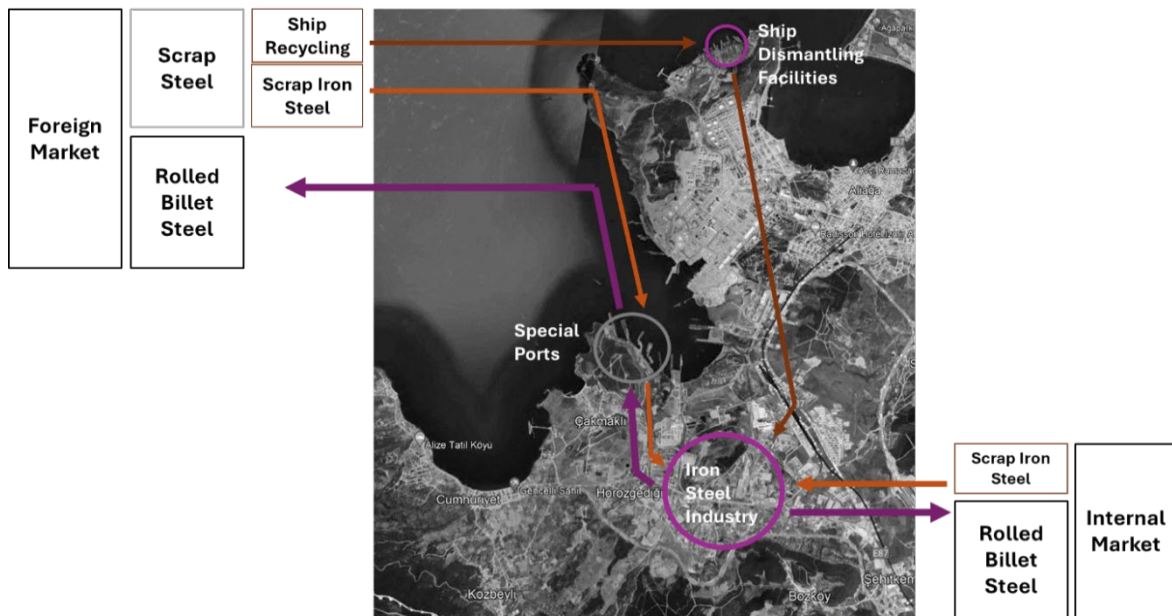
Figure 3 Production and capital accumulation cycle of the iron and steel sector in Aliaga district

The development of the iron and steel sector in the region has led to the establishment of natural gas energy conversion businesses and thermal power plant businesses in the region to meet the energy needs of the iron and steel sector, as the process of converting scrap iron and steel into liquid steel requires a high amount of energy. The presence of businesses requiring intensive electricity use in the region and the increase in their numbers throughout history have paved the

way for energy companies to choose locations in the region. In addition, it is seen that renewable energy investments are being made in the region due to the high wind and solar potential in the region (İZKA, 2012).

When Table 1 is examined, it is seen that other investment decisions have also chosen the area in the process, especially with the arrival of the petrochemical industry in Aliağa district. Decisions regarding transportation and technical infrastructure have been investments primarily investments in the area along with the development of the industry. It has been observed that port activities have developed specifically for import and export because there are international foreign capital investments. Subsequently, the presence of leading companies in the sector here has made the area a canter of attraction especially for small-scale industrial companies, and therefore it has been seen that industrial areas and organized industrial zones have also quickly chosen a place in the area in the process. With the gradual growth of the area and its becoming an important industrial zone nationwide, the area was declared a special industrial zone with the Presidential Decree published in the Official Gazette dated 14.11.2023 and numbered 32369 (Resmi Gazete, 2023).

Table 2 Evolution of Key Macro-Scale Investment Decisions in Aliaga Over the Years

	1975	1980	1985	1990	2000	2005	2010	2015	2023
Petrochemicals	x	x	x	x	x	x	x	x	x
Refinery	x	x	x	x	x	x	x	x	x
Aliağa Gulf Breakwater Number	1	2	2	3	4	4	4	4	4
Refinery Port		1	2	2	2	2	2	2	5
Iron Steel Port		2	3	5	5	6	6	7	7
Iron Steel Factory	2	2	3	5	10	10	10	10	10
Nemrut Gulf Breakwater Number		3	5	7	8	8	10	10	14
Ship Breaking				x	x	x	x	x	x
OSB						x	x	x	x
ÖEB									x
Highway								x	x
Highway								x	x

These macro-scale investment decisions made in the area over approximately 40 years have also significantly affected the spatial change of Aliağa. Table 2 shows the places located in Aliağa district that are on the list of Türkiye's top 1000 industrial establishments published every year by the Istanbul Chamber of Industry. As can be seen, 16 of the companies in the top 1000 industrial establishments of Türkiye are in the Aliağa district. The presence of 16 large industrial establishments in one district reveals the importance of the area where capital is concentrated. Among these industrial establishments, there are STAR Refinery, which is ranked 3rd in direct sales within Türkiye, Petkim Petrochemicals, which is ranked 30th, as well as industrial establishments such as Kar-El Demir, which is ranked 996th. When Table 3 is examined, it is also noteworthy that 10 of the establishments in Aliağa that are among the ISO 1000 are among the top 500 (ISO, 2023).

Table 4 shows the sectoral distribution of companies located in Aliağa district according to TOBB data. Consistent with the framework provided above, it is seen that the largest number of companies operate in the chemical industry, metal industry, and fabricated metal products manufacturing sectors. The leading companies in the field have determined which sector the district will develop in and have attracted small-scale industrial investments, especially those that provide input to the chemical industry, metal industry, and fabricated metal products industry and want to benefit from the market niches of large companies in this area (TOBB, 2023).

Table 3 Industrial Enterprises in the Aliaga District Among the Top 1000 in Turkey (ISO, 2023)

Companies	2023	2022	2021	Sector
STAR Refinery	3	2	3	Petroleum Products Industry
Petkim Petrokimya	30	25	15	Basic Chemical Industry
İzmir Demir Çelik	49	42	37	Iron and Steel Basic Metal Industry
Abalıoğlu Yağ	93	66	66	Foodstuff Industry
Ravago Petrokimya	106	84	76	Basic Chemical Industry
Kocaer Çelik	118	92	102	Iron and Steel Basic Metal Industry
Özkan Demir Çelik	201	134	97	Iron and Steel Basic Metal Industry
İzdemir Enerji Elektrik	262	146	398	Electrical Sector
Akdeniz Chemson Kimya	263	275	259	Basic Chemical Industry
Sun Chemical Matbaa	366	372	400	Other Chemical Products Industry
Eltaş Transformatör	528	625	721	Electrical Machinery, Appliances and Devices Industry
Opet Fuchs Madeni Yağ	573	602	657	Petroleum Products Industry
Atik Metal Sanayi ve A.Ş.	597	623	-	Basic Metal Industry Other Than Iron and Steel
Agromey Gıda	627	549	-	Foodstuff Industry
Ege Seramik	678	472	-	Pottery, Pottery, Tile, Porcelain Industry
Kar-El Demir	996	845	766	Iron and Steel Basic Metal Industry

For this reason, it is also seen that the district has significant clustering potential due to the concentration in these sectors. Of course, it was declared an industrial sub-region in the 1960s and it is seen that companies from different sectors have chosen to locate in Aliağa as a settlement where capital accumulation is constantly concentrated. Aliağa district is very close to Bakırçay plain, one of the fertile plains of the Aegean region, and there is a high density of agricultural production in its hinterland. In this context, it is seen that food industry companies constitute 8% of the companies located in Aliağa. Moreover, as a region with high agricultural quality and a livelihood from agriculture from the past to the present, the fact that companies still operating in this sector are seen in the area is an important indicator of this. Another sector with a high number of companies is the waste reclamation and recovery sector with 7.8%, again consistent with the framework given above. The capital transfer to Aliağa district in the period of 1965-2024 is as discussed above. Because the private sector does not have the capital accumulation required to establish and operate enterprises such as PETKİM and TÜPRAŞ inherent in the late capitalist development of Türkiye and due to industrialization policies based on national capital, investments requiring large amounts of capital were made through public means. Although capital transfer through public means in Türkiye is not specific to Aliağa alone, it can be said that capital transfer was made relatively later, especially when the Public Economic Enterprises (KİT) established in the 1930s and 1940s are considered. After the declaration of the Republic, the welfare produced throughout the country within the process of westernization and capitalization of the economic and social pattern was continued by assigning different functions to different regions of Türkiye.

The 1st Development Plan and the XII. During the 60 years encompassing the development plan, the development plans and the private capital dynamics that emerged afterward increased the population of Aliağa district from 17 thousand in 1985 to 25 thousand in 1990, 57 thousand in 2000, 65 thousand in 2010, and 105 thousand in 2023. While the population increase was 44% with an increase of approximately 8 thousand between 1985-1990, the population increased by more than 100% between 1990-2000, the population increased by 8 thousand between 2000-2010 and the district population increased by approximately 60% with an increase of 40 thousand between 2010-2023. The rapid growth trend created by neoliberal policies after 2000 can be read in the population of Aliağa. It transformed a "settlement" consisting of rural structures where a farm and employees lived into an urban settlement where the most profitable businesses of Türkiye are located with

transfers made through public and private capital. Some of the businesses requiring large capital established in Aliağa settlement throughout history are presented in Figure 4.

Table 4 Sector-wise Distribution of Companies in Aliaga District (TOBB, 2023)

Sector	Number	%
Plant and Animal Production	3	1,07%
Coal and Lignite Mining	4	1,42%
Natural Gas Extraction	2	0,71%
Mining and Quarrying	17	6,05%
Food Products Manufacturing	23	8,19%
Textile Products Manufacturing	4	1,42%
Paper Products Manufacturing	4	1,42%
Coal and Petroleum Products Manufacturing	16	5,69%
Chemical Products Manufacturing	44	15,66%
Rubber and Plastic Manufacturing	8	2,85%
Non-Metallic Mineral Product Manufacturing	15	5,34%
Basic Metal Industry	37	13,17%
Fabricated Metal Products Manufacturing	30	10,68%
Electrical Equipment Manufacturing	4	1,42%
Machinery and Equipment Manufacturing	19	6,76%
Trailer Manufacturing	4	1,42%
Furniture Manufacturing	2	0,71%
Electricity, Gas, Steam, and Air Conditioning System Production and Distribution	10	3,56%
Waste Reclamation and Recycling	22	7,83%
Office Management and Business Support Activities	13	4,63%
Total	281	100

Capital transfer to Aliağa district is still ongoing and it would not be wrong to say that transportation investments will accelerate the relevant capital transfer process. While investment decisions requiring large amounts of capital continue to be realized through both public and private capital, it has been determined that there are also investment decisions that will accelerate capital accumulation in the district but have not yet entered into force.

3.3. Spatial Development Process of Aliaga

While Aliağa was a rural settlement based on agriculture until the 1970s, the fact that the settlement was determined by Ankara as an industrial sub-region of İzmir province in the 1st, 2nd, and 3rd development plans within its history was the trigger for the change and transformation process that would take place in Aliağa settlement (Figure 5). The economic structure of the settlement began to change, and it became an industrial canter with important industrial investments established in the 1970s. The fact that the canter assigned the mission of being a sub-region where industrial production would be carried out on a country scale to a settlement whose economic and social pattern was previously based on farming and fishing activities reveals the importance of the economic, social, and spatial transformation that will take place.

As of 1960, Türkiye entered a planned development process within the framework of the prepared II. Development Plan, a decision was made to establish a refinery in the Aliağa district, but this decision was cancelled due to objections. The refinery decision was finalized in the III. Development Plan and Aliağa was accepted as the industrial sub-region of İzmir. Another upper-scale decision that would affect Aliağa district becoming an industrial city was the selection of the location of the industry in Aliağa for the processing of scrap iron and steel in rolling mills and conversion into liquid steel in the IV. Development Plan.

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)

(j)

(k)

Figure 4 Industrial establishments in Aliaga district. Chemical sector; a) STAR Refinery (Anadolu Ajansı, 2024), b - c) Tüpraş (Global, 2020), d) Petkim (CGTNTURK, 2024), e) İnaltaş, ship dismantling sector (Deniz Haber, 2024); f) Kılıçlar

(Kılıçlar, 2024), food sector; g) Bunge (Bunge, 2024), h) Abalıoğlu (Abalıoğlu, 2024), iron and steel sector; i) İzmir Demir Çelik (İzdemir, 2024), k) HABAŞ (HABAŞ, 2023)
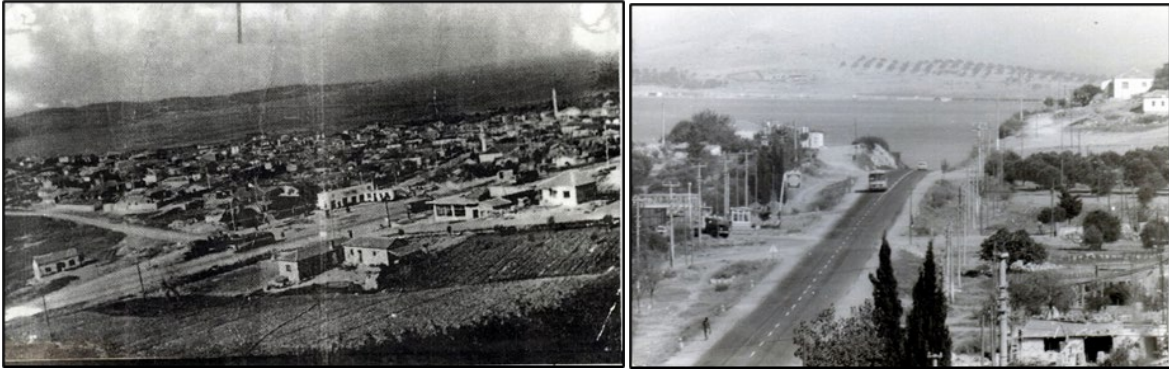
Figure 5 Aliaga before industrialization and capital accumulation processes (Şahin, 2020)

One of the important factors in Aliağa being accepted as the industrial sub-region of İzmir was related to the allocation of the south of İzmir to tourism activities and the allocation of industrial investments to the north of İzmir. The decision to plan a refinery is cancelled II. The plan led to the start of industrialization initiatives in Aliağa and Dönmezler Cotton-Gin Factory became the first industrial establishment established in 1960. It is not surprising that the first industrial establishment was for the processing of agricultural products, considering the agricultural pattern of Aliağa. According to the 1961 Constitution, the settlement was accepted as a "Heavy Industry Zone" (Aliağa Chamber of Commerce; n.d.), and with the provision of electrical infrastructure in the region in 1963, industrialization accelerated, and the foundations of the refinery were laid between 1965-1967. Following the electrical infrastructure, water infrastructure was also provided to the region in 1967. Thus, the settlement began to gain an industrial-oriented economic character from the 1970s onwards. The 1/1000 scale city plans prepared by Ahmet Yavuz in 1960 and Haluk Berksan in 1968 considered Aliağa as a relatively small settlement that was expected to develop through agricultural and tourism potentials, and therefore the plans lagged behind Aliağa's industrialization process and development dynamics. After Aliağa was planned as an industrial city in the 2nd Development Plan, the population in the city increased, and urbanization problems began to emerge. This situation manifested itself as infrastructure and housing problems. This trend accelerated with the construction of a metallurgy industry-based facility near Nemrut to recycle scrap obtained by the Machinery and Chemical Industry, and the establishment of TÜPRAŞ, then PETKIM, Petrol Ofisi, and liquefied gas storage and filling facility, ship dismantling, paper factory, fertilizer industry, and iron and steel factories.

Due to the inadequacy of the plans and the increase in shantytown areas, a new urban plan on a scale of 1/1000 was prepared by the Bank of Provinces in 1975. In the new plan prepared, the population was predicted to be 60,000 and the main development direction of the city was determined as the south. A multi-story settlement was arranged to prevent shantytown settlements. Due to the population movements and urbanization dynamics created by the industrialization process of the Aliağa district, the plan prepared by the Bank of Provinces also remained inadequate during the process.

According to Kibrit (2003), the criticisms of the report prepared by Gazi University Urban and Regional Planning Department regarding the 1/1000 scale plan prepared by the Bank of Provinces are as follows: "It did not fully solve the housing need, the Petkim housing area and the Slum Prevention Zone (SPZ) plan was rationally divided by the State Railways facilities, the terminal, and small industrial areas were within the borders of the SPZ, therefore implementation problems occurred, there were multi-story buildings in commercial areas, the unity of order was not ensured on the islands, the area between the SPZ ... In Aliağa, shanty houses that developed in different locations were tried to be prevented with shanty house prevention zones (İZTO, 1998; Kibrit, 2003) to prepare Aliağa for urbanization trends and the transformation of shanty house areas, a new zoning plan was prepared by Baran İdil in 1987, which foresaw a population of 300,000 for 2005,

and additional zoning plans were made to the prepared plan in 1991, 1992, 1994 and 1997. The İzmir-Manisa Planning Region 1/100,000 Scale Environmental Development Plan (EDP) (Figure 6), which was approved with the Ministry Approval dated 23/06/2014 and numbered 9948 and is in force, and the 1/25,000 scale Zoning Plan for İzmir Northern Region, a sub-region that also includes the Aliağa district, was prepared by İzmir Metropolitan Municipality in 2018 (Figure 7).

When the upper-scale plan decisions are examined specifically for Aliağa; it is observed that the settlement has developed especially as an industrial centre when looking at the province of İzmir in general, these industrial areas continue on important archaeological sites (Kyme ancient city, etc.) in the north and especially in the south, and the OIZ area has chosen a place on agricultural and forest areas in the north. In addition to the existing residential areas, it is seen that the development of residential areas also tends to develop by fringing of agricultural and forest areas, especially along the north-south line, around the industrial areas. In addition to this development, it is seen that the railway route has been developed with an additional connection to the east of the industrial area to serve the industrial areas, and at the same time, it supports the development of the area with highway and main transportation connections. As can be seen in the upper-scale plan decisions, Aliağa continues its development as an important industrial city of İzmir. In parallel with this, it is observed that the land use decisions required by the industrial areas and new industrial areas are also included in the plans. In 2020, a 1/1000 scale implementation zoning plan was prepared by the İMPO Planning Bureau.

The population predicted by the zoning plan prepared for 2035 is 103 thousand. It is seen that urban work areas (industrial services) are selected in the areas around industrial areas in the plan. It is seen that Aliağa has undergone significant change and transformation over the years with macro-scale investment decisions and spatial planning processes. While the city is rapidly spreading towards the peripheries, it is observed that industrial investment decisions and sectors that will serve the industrial area have chosen places in the periphery in parallel. Again, it is seen that residential and commercial areas have increased rapidly within the city in parallel with industrial investment decisions. Table 5 shows the change and size of land classes in the Aliağa district according to Corine's data. Figure 8 shows the spatial transformation of Aliağa district with 5-year satellite images between 1975-2024. According to Corine data, the number of industrial areas has increased more than 3 times between 1990-2018 (CORINE, 2018). Considering that industrial investments are risky and costly to establish due to dynamics such as intensive capital accumulation, suitable area, labour force, and transportation opportunities, the fact that industrial areas have increased more than 3-fold in 30 years indicates a remarkable increase. The increase in ports is as remarkable as the increase in industrial areas. The port areas, which were 65 hectares in 1990, increased to 160 hectares according to 2018 data. Although Corine's data is not definitive, it provides important information about the industrial development trend of Aliağa district.

As a result, it is observed that the settlement has developed with fragmented and additional zoning plans with areas such as industrial zones, industrial areas, and ship dismantling areas, while the lack of a holistic plan for the whole of Aliağa has brought with it many spatial problems such as transportation problems, lack of equipment areas, and construction problems. Since planning practices follow investments, it is not possible to talk about urban development created by the prosperity created by rapid industrialization in Aliağa. Industrial areas that have shown irregular development have been surrounded by urban areas with rapid urbanization, and due to the lack of public abandonment in factories built on cadastral parcels that have not been implemented, this has caused both the lack of public equipment areas in industrial areas and the development of factories receiving service from cadastral roads located between cadastral parcels and congested transportation systems. On the other hand, air quality and soil pollution measurements carried out in Aliağa reveal pollution and low quality of life in urban areas and rural areas located at the periphery of urban areas.
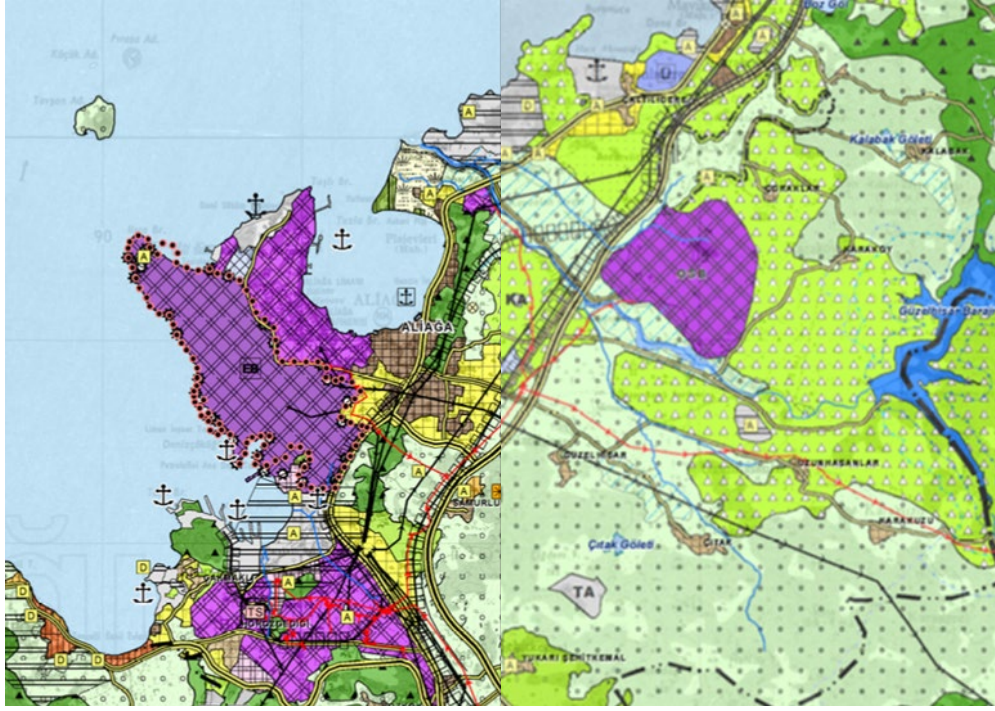
Figure 6 Izmir-Manisa Planning Region 1/100,000 Scale Environmental Plan (ÇŞB, 2015)
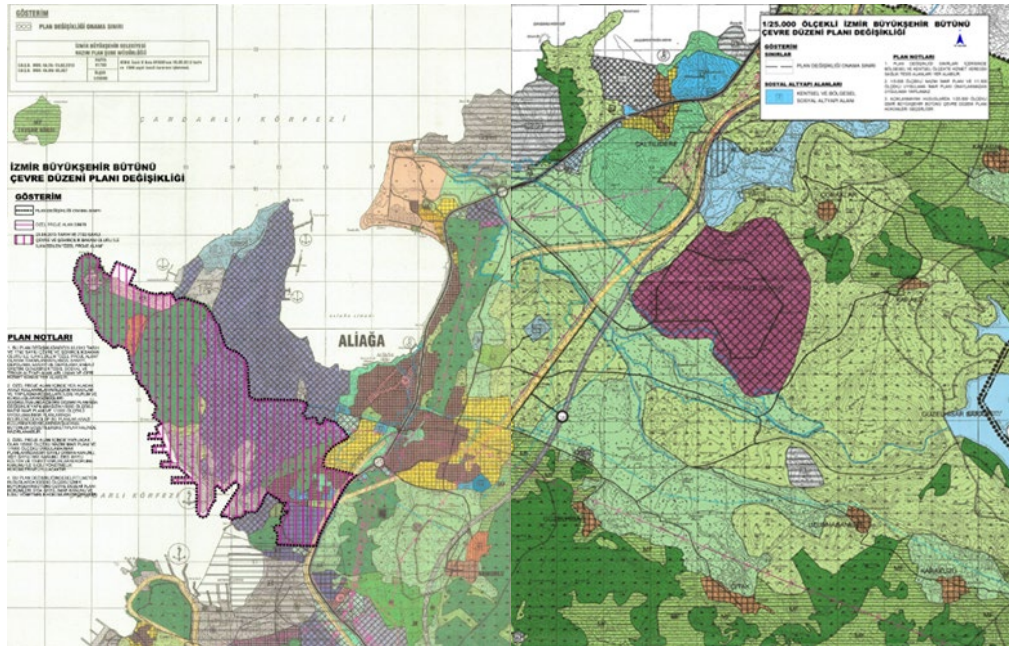
Figure 7 1/25,000 Scale Izmir North Region Zoning Plan (IMM, 2007)

Although it is stated that the proximity of the protected areas in Aliağa to industrial areas restricts capital concentration, that industrial facilities cannot be established in parcels where excavations are not carried out, and that construction activities cannot be carried out at the speed desired by capital due to the extension of excavation processes, when the spatial development process and investment activities of the city are examined, it is seen that the city has developed and expanded rapidly in approximately 50 years.

Table 5 Land Classes and Sizes (ha) of Aliaga District According to Corine Data by Year (CORINE, 2018)

	1990	%	2000	%	2006	%	2012	%	2018	%
Discrete City Structure	705	0,008	1.359	0,014	1.750	0,019	1.510	0,017	1.560	0,018
Industry	850	0,010	1.417	0,015	1.998	0,022	2.700	0,031	2.939	0,034

Mining Areas	32	0,000	50	0,001	195	0,002	225	0,003	410	0,005
Ports	65	0,001	74	0,001	77	0,001	133	0,002	160	0,002
Construction Area	65	0,001	0	0,000	100	0,001	131	0,001	138	0,002
Agricultural Area	34.950	0,397	40.103	0,426	41.714	0,458	40.184	0,458	39.910	0,457
Forest Areas	51.373	0,584	51.044	0,543	45.219	0,497	42.927	0,489	42.283	0,484

3.4. Pending Investment Decisions for Aliaga District and Their Potential Impacts

The concentration of capital in a certain area is specific to capitalist production relations, and Aliağa district is an important region that attracts the attention of capital due to its proximity to transportation connections and its location 80 km from a centre such as İzmir, where approximately 4 million people live in the metropolitan area and approximately 10 million people live in the hinterland. In addition to the growth trends of the companies located in the Aliağa district, new investment decisions that will start operating in the region will trigger the increase in the capital, population, and labour density in the region. For this reason, the existence of investment decisions that are in the investment process but not yet in operation is also gaining importance within the scope of the study. Not only the industrial sector but also technical infrastructure and other sector investments that have an important share in the development of the industrial sector are gaining importance. When the investments made in the industrial sector are examined, in addition to the OSB currently operating in the Aliağa district, the establishment of the Aliağa Bağyurdu Special Organized Industrial Zone by Matlı company continues. It was established in 2021 in an area of 135 hectares and zoning plan studies are ongoing.

Although there is no direct industrial investment, there are also investment decisions regarding the infrastructure owned by industrial enterprises. Aliağa Fertilizer Industry, which was established in 1974 and operates in the chemical industry sector, has grown by investing in fertilizer production and pier facilities in 2022 (Ege Gübre, 2022). When transportation investments are examined, the İZBAN investment (Hürriyet, 2019) and the Northern Aegean Highway investments, which are aimed at accelerating the circulation of freight, passengers, and capital with the settlements located in the north of Aliağa district, continue. Although it is not included as an investment decision directly in the Aliağa district, both railway and highway investments have the potential to enable significant capital mobility in terms of providing a connection to the Çandarlı port, which is located close to Aliağa in Bergama district, and the Free Zone, where an investment decision was made in an area very close to Çandarlı port (Hürriyet, 2019). Another investment decision with development potential and clustering in the Aliağa district is the decision regarding the energy sector. There is a need for high amounts of energy use in the capital production accumulated in Aliağa. ENKA natural gas power plant became the fifth largest power plant in Türkiye and the largest in İzmir as of 2017 (Aliaga Chamber of Commerce, 2024).

In this context, companies from the iron and steel sector make energy investments to meet their own energy needs and to prevent disruptions in the main network from affecting production. Besides, the İzdemir Energy Production Power Plant facility based on imported coal was put into operation in the Horozgediği neighbourhood in 2013 and it is stated that the construction of the 2nd unit is ongoing (İzdemir, 2024). Similarly, the natural gas conversion facility of HABAŞ, which operates in the iron and steel sector, increased its capacity in 2022 (HABAŞ, 2023). Aliağa and especially Bergama districts stand out as the areas where renewable energy investments, RES investments, are focused. PETKİM RES, which operates with the installation of 17 turbines by PETKİM in Aliağa district, was completed in 2017. The last investment made in Aliağa district is the Kalabak Dam (General Directorate of State Hydraulic Works, 2021).
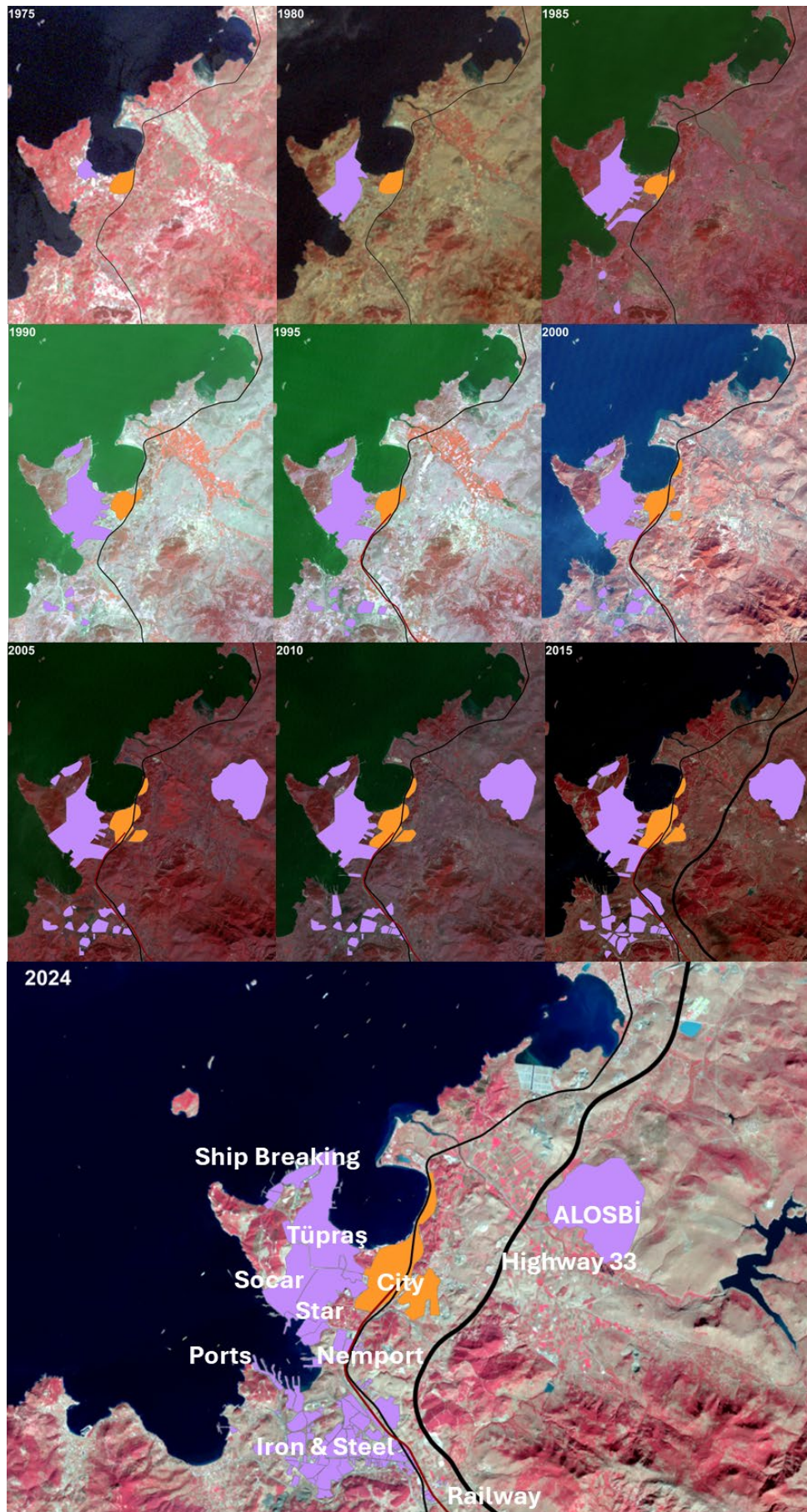
Figure 8 Spatial development process of Aliaga district and industrial areas by years

Irrigation of 970 acres of land will be provided, and it is aimed to provide approximately 1.5 million TL of additional income to the regional producer annually with the irrigated agriculture to be carried out in the region (General Directorate of State Hydraulic Works, 2021). When the new investment decisions for Aliağa are examined, it is seen that Aliağa is developing by its industrial identity. The investments made trigger the development of Aliağa as an industrial city and show that it will become one of the most important industrial centres in the country in the process.

4. Discussion and Conclusions

While the forms of intervention in space changed in line with the increasing competition conditions within the framework of changing and developing industrial policies, especially after the Second World War, the changes and transformations in space began to be explained by the changes and transformations in production processes (Karataş, 2006a, 2006b). Especially large-scale industrial investments affected the development of space, and multinational investment companies also chose locations in transnational areas to provide the raw materials, labour force, etc. they needed by crossing national borders, which caused the industrial geography to change and develop. While the areas chosen by industrial investments grew and changed rapidly, they also started to change and transform the settlement in the area they were in rapidly. This change had a significant impact both on the socio-economic structure of the city and on its spatial development. Especially the settlements chosen by large-scale foreign capital investments underwent a much faster change compared to other areas, and this process created significant changes in the identity of the city, causing it to be remembered and identified with the industrial sector it hosted.

Aliağa district was one of the settlements most affected by this change, especially within the framework of neoliberal policies after 1970, and in the process, the settlement lost its agricultural identity and transformed into an important industrial centre. The location of the district, being a coastal settlement and especially being an important port point for maritime trade accelerated this process, while the settlement gained the identity of an industrial city.

The planning decisions that would support the development of agriculture and tourism before 1970 changed with the area being selected for industrial investment, and the city turned into an important industrial city with heavy industry. Especially macro-scale investment decisions (large industrial companies, OIZ, port, road, railway, energy, etc.) changed the spatial structure as well as the economic structure of the city. In particular, the concentration of large-scale industrial companies transformed Aliağa district into an important industrial centre not only in the city but also regionally and even nationally. 8000 people are employed in the Aliağa Organized Industrial Zone. The total number of people working in Star Refinery, Pet-Kim, and İzmir Iron and Steel Industry alone is approximately 10,000. With the declaration of an industrial zone, the services in the city have been transformed into services needed by industry and have affected land use decisions. While residential areas in the settlement have developed rapidly, it is seen that transportation and technical infrastructure have also changed in favour of industry in this process. The development of the highway and important highways in Aliağa district in this process and the development of the train line needed by the large-scale investments established subsequently via the İZBAN route to the industrial area have been an important factor in the change of the city's macroform. It is observed that large-scale investment decisions have developed further in certain sectors of the industry, in the field of energy and the fields of transportation and technical infrastructure during the process and that this process has had an accelerating effect on the growth and development of the city. While this process has caused the city to gradually lose its agricultural quality and become a completely industrial city, it has also increased the pressure on fertile agricultural areas during the process. In parallel with this, industrial investments and subsequently residential areas have started to develop in fertile agricultural areas. This has caused significant losses in areas with high agricultural quality (Figure 8). The land use type of the city is industry, trade, technical infrastructure, storage and port activities, etc. While it is changing towards usage

types such as agricultural land, meadow, and pastureland, etc., it has caused a decrease in areas such as agricultural land, meadow and pastureland, etc. with the evolution in this process.

GLC FCS Classes

Rainfed cropland	Evergreen shrubland
Herbaceous cover cropland	Deciduous shrubland
Tree or shrub cover (Orchard) cropland	Grassland
Irrigated cropland	Lichens and mosses
Open evergreen broadleaved forest	Sparse vegetation (fc<0.15)
Closed evergreen broadleaved forest	Sparse shrubland (fc<0.15)
Open deciduous broadleaved forest (0.15<fc<0.4)	Sparse herbaceous (fc<0.15)
Closed deciduous broadleaved forest (fc>0.4)	Swamp
Open evergreen needle-leaved forest (0.15< fc <0.4)	Marsh
Closed evergreen needle-leaved forest (fc >0.4)	Flooded flat
Open deciduous needle-leaved forest (0.15< fc <0.4)	Saline
Closed deciduous needle-leaved forest (fc >0.4)	Mangrove
Open mixed leaf forest (broadleaved and needle-leaved)	Salt marsh
Closed mixed leaf forest (broadleaved and needle-leaved)	Tidal flat
Shrubland	Impervious surfaces

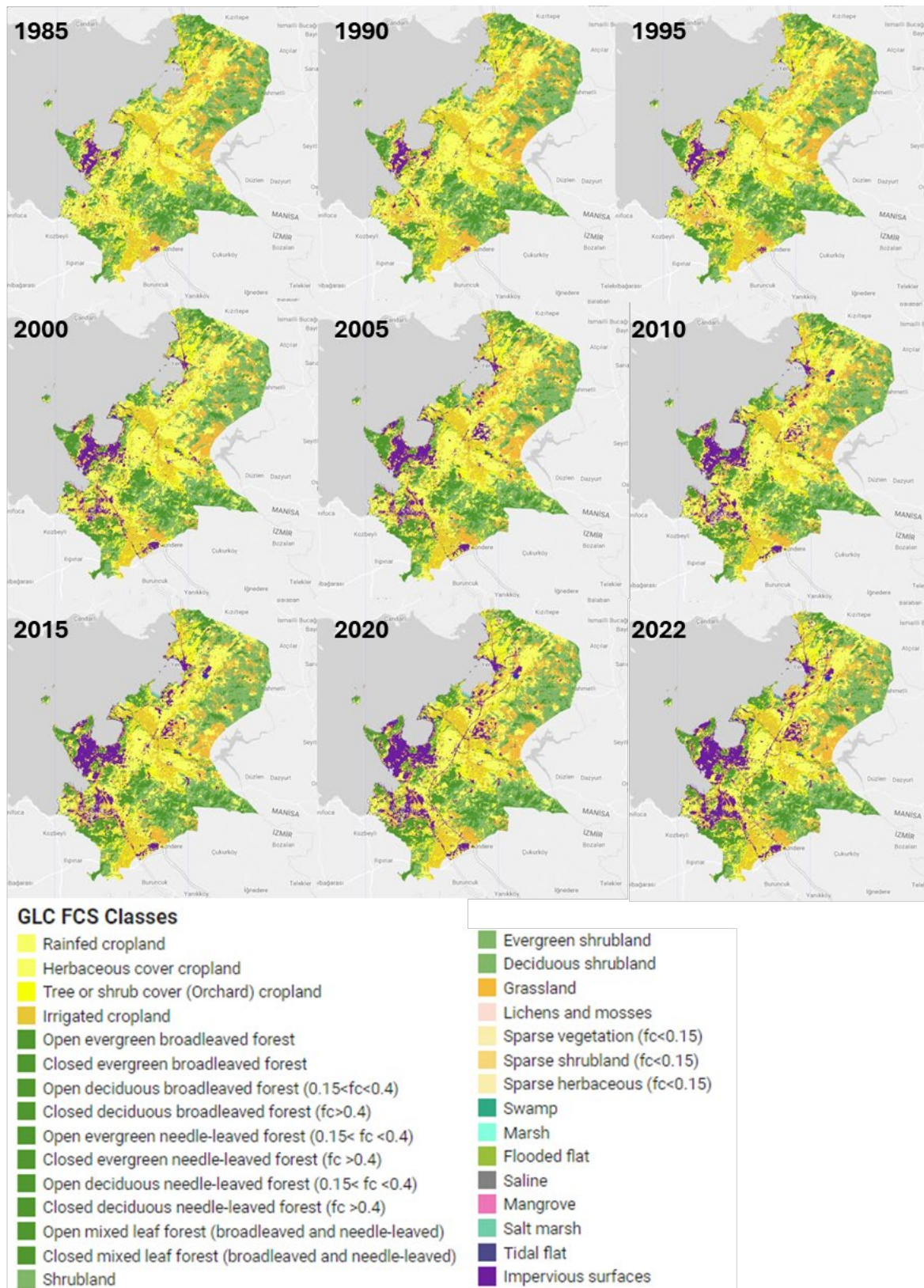**Figure 9** Change in land cover of Aliaga district according to years (Algorithms created by (Zhang et al., 2024))

The industrialization process is one of the most important factors that show the development dynamics of a city, region, and even a country. It is seen that the industrial and service sectors have an important share in developed settlements. Industrial cities develop rapidly in the process and

while they change, they also bring about significant changes in the spatial, economic, and social structure of the city. This study reveals the effects of capital concentration and industrialization in the change and transformation process of a settlement and the change in spatial processes. The following studies will be an important study to reveal how a city changes in the industrialization process and its effects in all aspects by investigating and presenting the change in the social and economic structure of the city in detail. The findings presented within the scope of this study will contribute and provide a basis for the studies to be carried out in this direction.

Undoubtedly, capital concentration and industrialization are dynamic processes. When the investment decisions that are not yet in operation for the Aliağa district are examined, it is seen that the investment decisions such as the special industrial zone, OIZ and new ports planned to be built in the Aliağa settlement will increase the capital concentration and industrialization tendencies. The fact that new energy investments are being made to meet the energy needs arising from the scale of the petrochemical, refinery, and iron and steel sectors provides insights into the future of Aliağa. The findings of this study are important for policymakers, decision-makers, bureaucrats, and civil society organizations, who have a say in the future of cities.

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Appendices

Appendix 1 – Satellite Images and Details
1975 - LM01_L1TP_195033_19750523_20200908
1980 - LM02_L1TP_195033_19791002_20210620
1985 - LT05_L1TP_181033_19840619_20200918
1990 - LT05_L1TP_181033_19890820_20200916
1995 - LT05_L1TP_181033_19960807_20200911
2000 - LE07_L1TP_181033_20001114_20211214
2005 - LT05_L2SP_181033_20061107_20200831
2010 - LT05_L2SP_181033_20091030_20200825
2015 - LC08_L1TP_181033_20151031_20200908
2024 - LC09_L1TP_181033_20231114_20231114

Resume

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The evolving landscape of Istanbul's coffee shops: Navigating disruption in a changing urban environment

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Abstract

During the final quarter of the last century, Istanbul experienced rapid population growth with increases in income, an expanded free trade economy, and the influence of greater globalization. Together, these stimulated an increase in the demands for new services. One of these demands was answered by an influx of coffee shop chains, and this effected both the growth patterns of traditional coffee houses and introduced a new lifestyle. Despite the closure of many businesses due to economic crises, coffee shops are increasing in number. This paper investigates the spatial distribution of coffee shops with respect to the socio-economic and demographic characteristics of several selected districts by using regression analysis. The number of coffee shops is taken as the dependent variable and the social life index and the proportion of the population aged over 65 are used as independent variables. These were chosen through an evaluation of several characteristics of the districts under discussion. According to the results, the location of coffee shops in Istanbul is affected more by a district's social life index and by the proportion of its population which is aged over 65 than the other characteristics of the districts. The impact of the multi-center development on the distribution of coffee shops is explained. the balanced distribution of coffee shops with respect to other small businesses is suggested for further research.

Keywords: coffee shops, third places, globalization, spatial distribution, Istanbul

1. Introduction

Coffee shops provide places for people to meet, relax and develop connections. However, the growing presence of coffee shops in the urban landscape has meant that they increasingly take on a wider range of roles, becoming spaces of both leisure and work—but also providing spaces of sociability in which people (Ferreira et al., 2021). Furthermore, prior studies strongly suggest that the intersection of global brands and local cultures produces cultural heterogeneity (Thompson, 2004). As a result of the growing demand for third places, the number of coffee shops is rapidly increasing, and these include local, international and heterogenic coffeehouse types. Already existent coffeehouse culture, together with a degree of envy for a western lifestyle has contributed to the success of both local and international coffee shop chains. In the Istanbul case, little research has been done to investigate the spatial distribution of these coffee shops. The present study concentrates on the relationships between the number of coffee shops and the socio-economic and demographic characteristics of the districts in Istanbul where they can be found. As an answer to the loneliness feelings in the growing cities, third places such as bars, restaurants, and coffee shops exist outside of home and work and host regular, voluntary, and informal gatherings of people who enjoy one another's company (Lofland, 1998). several researchers have found that loneliness often encourages consumers to form commercial friendships with employees in such service establishments (Goodwin, 1997; Goodwin & Lockshin, 1992).

There have been many studies into the growing emphasis given to these third places. Rosenbaum (2006) suggests that some consumers patronize third places to satisfy not only their

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consumption needs but also their needs for companionship and emotional support. These needs are prevalent in older consumers who often experience events that diminish the number of their relationships and who may turn to their 'commercial friendships' in third places for support. The data reveals that as the frequency with which consumers obtain companionship and emotional support from their commercial friendships increases, so too does their loyalty. Another study by Rosenbaum et al. (2007) introduces a theory that attempts to explain how deficits in social support motivate customers to replace lost social resources by forming relationships with customers and employees in commercial 'third places'. Their model supports the existence of a linkage between commercial social support and a customer's sense of attachment to a third place that provides it. The results reveal that customers obtain social support in a third place to the extent to which they lost it elsewhere. In essence, the third place functions as a remedy for the negative symptoms associated with isolation. Rosenbaum also demonstrated that third-place friendships, in general, are relatively weak social ties in terms of perceived closeness, which supports Granovetter's (1983) theory regarding their durability.

There are several reasons that can account for the loneliness that drives people to seek companionship in third places. One is the loss of a spouse; bereavement, divorce or separation may cause people to seek emotional support, companionship and instrumental support from their third-place relationships (Lofland, 1982). Another reason for loneliness is that people who experience a chronic illness or disability are susceptible to companionship losses (Gordon & Benishek, 1996). Moreover, retirees and empty nesters often face loneliness since retirement lessens the frequency with which people interact with co-workers, and thus may seek companionship in third places (Rosenbaum, 2006). for this purpose architectural space of the coffee shop is targeted to social interraction (Chadios, 2005).

Frequency of visits to a third place can be explained by satisfying consumers' desire for food and/or beverages, by fulfilling their need for a home type environment, or by offering a new lifestyle (Seamon, 1979). in addition, third places are not just another gathering place. there is a significant history associated with them as they have been places responsible for shaping world's history. the french and italian revolutions, for instance, started from coffee shops (Chadios, 2005). as another example, in london, some coffee shops were most closely associated with science and they were frequented by the members of the royal society.

Third places deliberately encourage inter-customer and inter-employee socialization and employ comfortable seating arrangements for this purpose (Waxman, 2006). Customers who seek support in third places and who visit these places on a regular basis include the elderly, the lonely and those belonging to marginalized groups. A key benefit that regular customers may receive from patronizing a third place is consistent access to their commercial friendship (Goodwin, 1997). There are also studies which demonstrate a strong positive association between gentrification and post-industrial policing (laniyonu (1918).

Although there are several studies (Greaves, 1653; Mikhail, 2007; Komecoglu, 2005; Karababa & Ger, 2011) that analysis the functions and the social and politic roles of the coffeehouses in Ottoman culture, studies into the modern coffee culture of Istanbul and its socio-economic aspects have been largely overlooked. since sociologists seem to take granted its location and characteritics of its environment as important factors for its significance (Chadios, 2005), the present paper is an attempt to rectify this situation through an investigation into the growth and location of coffee shops by considering the socio-economic and demographic characteristics of the districts in which they are found and their spatial distribution across Istanbul.

The organization of the paper is as follows: in section one, the general development of coffee shops and related reserch is given.the historical development of coffeehouses and transformation of their function in the urban structure under the influence of globalization is given in Istanbul in the second section. The regression analysis of the relationships between the number of coffee

shops and the characteristics of the various districts of Istanbul is given in the third section. The final section is devoted to a conclusion and suggestions for further research.

2. Background

In around 600-800, coffee was first used by Ethiopians and later spread to the Arap world. Around 1300, Yemen was the first country where coffee was first cultivated. In 1536, the Ottoman Turks conquered Yemen and shortly the coffee beans became a vital export through the Ottoman Empire. Then, the Dutch started to cultivate in Endonesia (Allen, 1999) and coffee use spread to Europe. In 16th century Istanbul, coffeehouses emerged as a principal part of the public sphere, as a channel and site of public communication, and as an arena linking the socio-cultural with the political (Ellis, 2011). At that time, rumor and gossip were the primary means of communication and of spreading news, especially in the semi-literate parts of society (Kapferer, 1990). Initially, there were attempts to ban coffee under religious state law because of its stimulating effect, but these were ineffective, and coffee became widely consumed (Komecoglu, 2005). According to Dufour (1685), during the period of Selim II (1566-74) and Murat III (1574-95) there were 600 coffeehouses in Istanbul. During his rule, Murat IV (1623-1640) imposed a very strict ban on coffeehouses in 1633 but following his death they were soon reestablished. In relation to that ban, in the 17th century, the first coffee shop was opened in London by a migrant from Istanbul, later in the other European countries (Chadios , 2005).

The major characteristics of coffeehouses as public places were that they included different social groups with different educational, economic and ethnic backgrounds but were restricted to male members of society (Dallaway, 1799; Salzmann, 2000). According to Perry (1743), coffeehouses (Fig. 1) were places frequented by people who had nothing to do other than to talk and pick up news. However, they sometimes became a literary forum where poets recited their poems and entered into discussions with the public (Hattox, 1996). Another visitor, a young Polish count, expressed his admiration for the diversity of topics and the politeness and the refinement in the coffeehouses of Istanbul (Potocki, 1999). During this time, coffeehouses played a remarkable role in the facilitation of public debate, and according to Chardin (1724) the degree of freedom of speech that was allowed in the coffeehouses of the Orient was unique. in addition, they were called 'school of the wise' because of people could learn and do many things in coffee shops.

Figure 1 A historical coffee shop in Istanbul in the 18th century (http://blog.milliyet.com.tr/kahvehane-kiraathane/Blog/?BlogNo=350843)

In the 19th century, coffeehouses continued to be social integration centers in Istanbul (Faroqhi, 1995). According to White (1845), the city had at least 2,500 coffeehouses, and these held not only literary, religious and political discussions, but also leisure activities such as games (chess and backgammon), performances, story-telling, puppet-shows, shadow plays, and music. According to

a European observer, the storytellers fulfilled almost the same function as the journalists in Europe (Juchereau de Saint-Denys, 1819). In Ottoman Istanbul, coffeehouse society played a significant role in the formation of the public sphere and in shaping the individuals within it (Komecoglu, 2005). During this period, a Westernization movement started as a result of the integration of the Ottoman Empire with the capitalist system which affected its social, economic and cultural life. While the growth in the number of traditional coffeehouses within local neighborhoods continued, Parisian and Viennese style coffeehouses were established in the higher income and more westernized neighborhoods of Beyoğlu (Dokmeci & Ciraci, 1999, 1988). Coffeehouses were frequented by authors, artists and other well-known people, and throughout the century, several well-known European authors visited Istanbul and described the cultural life to be found in the coffeehouses of different districts (Gautier, 1904; Loti, 1927; Nerval, 2002; De Amicis, 1938).

During the 20th century, the role of coffeehouses within society decreased due to technological developments in communication and entertainment, such as movie theaters and TV, and the overall modernization of the society. Traditional coffeehouses continue to exist, however, and these are usually locally owned, small-scale and independent establishments that are operated by people who seem to know everyone in their neighborhood. In addition, such coffeehouses are usually patronized by a group of regular customers who often transform them into their second homes, a practice that can also be witnessed in other countries (Oldenburg, 1990, 2001). During the first half of the century, authors continued to frequent the coffeehouses in Beyoğlu in order to discuss their literary subjects, while people from different professions came together in different coffeehouses at central locations to find work. After the 1950s, as a result of rapid urban growth, these coffeehouses became dispersed throughout the city.

According to a survey conducted in 1971, there were 5082 coffeehouses in Istanbul. Beyoğlu, which had been the Western style entertainment center in the city since the 19th century (Dokmeci & Ciraci, 1999), had the highest number of coffeehouses (1133). The districts at the periphery had fewer. For example, Beykoz was found to have 139 coffeehouses (Birsel, 2001). At that time, Kadikoy was ranked fourth in the list of coffeehouses, but nowadays it has the most. This is because it has become the most preferred district for higher income people due to the multi-center urban development that arose from the construction of the bridges over the Bosphorus and the construction of the peripheral highways (Dokmeci & Berkoz, 1994, 2000) (Fig. 2).

Figure 2 Coffee shops from Kadikoy, Istanbul

After the 1980s, Istanbul experienced a population growth from 8 million to 15 million. increasing number of high-rise housing buildings together with the impact of globalization caused the decline of traditional neighborhood life. The free time that people could now devote to entertainment increased the importance of third places, such as coffee shops. This development has been exploited by coffee shop chains, and these have been instrumental in modernizing the services offered by local coffeehouses. The number of establishments increased from 6,392 in 2011 to 7,958 in 2017 (Suzer, 2017), of which 500 belong to coffee shop chains. A similar growth pattern was observed in the number of restaurants (Ayatac & Dokmeci, 2017). Despite an economic crisis and closure of many businesses, the number of coffee shops is increasing, and because of their higher prices, they are mostly located in higher income neighborhoods.

Nowadays, coffee shops possess new multiple meanings for their customers, and are like laboratories in which new ways of experience can shape society (Hetherington, 1997). The new forms of sociability observed in coffee shops offer the customers the opportunity to establish friendships according to their level. according to Chadios (2005) there are six reasons that coffeeshops are unique and vital places within the city. sociologists analyse coffeeshops in order to understand the way people interact. artists and musicians use them to expend their social environment, historians emphasize their role on shaping world's history, politicians use them to increase their influence, urban planners and designers benefit from them to stimulate public life. therefore, research on coffee shops is within the interest of several groups.

3. Model

In this study, the relationship between the number of coffee shops and the characteristics of the districts that might offer suitable location choices were analyzed for the years 2012 and 2017. Data obtained from 20 districts was used in this study. Another 19 districts were considered, but it was not possible to obtain an accurate total of establishments within them. The distribution of coffee shops at the district level is as follows (Table 1, Figure 3).
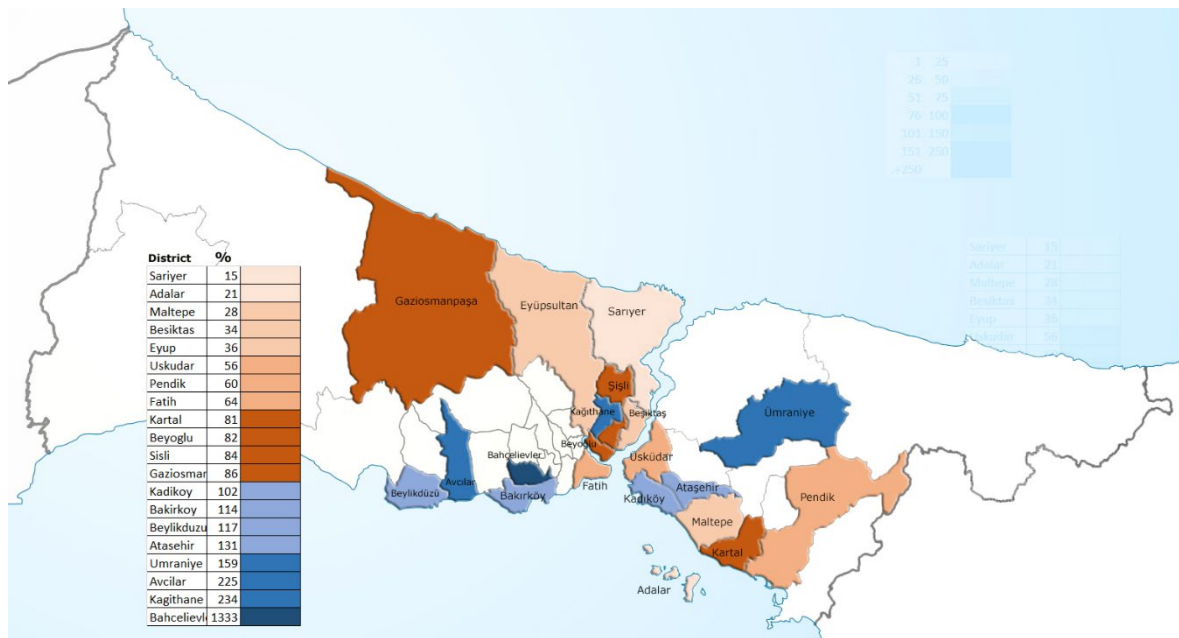
Figure 3 Location of 20 districts for which data were provided and growth of their numbers between 2012-2017

Table 1 Number of Coffee Shops, Their Growth Rates, Population Aged 65+, Social Life Index for the Years 2012, 2017 and 2022 in the 20 Districts

District	NCS_12	NCS_17	NCS_22	G_12-17	G_17-22	G_2012-22	P65_12	P65_17	P65_22	P65_23	SLI_12	SLI_17	SLI_22
Adalar	43	52	157	21	202	265	1986	2706	3700	3837	-0.78105	0.275	0.023
Atasehir	105	243	593	131	144	465	20158	29526	36895	38036	0.35748	0.375	0.281
Avcilar	83	270	390	225	44	370	17983	26065	32613	32985	-0.53981	0.6	-0.18
Bahcelievler	9	111	553	1333	398	6044	30615	39044	45420	45635	0.22614	0.275	0.012
Bakirkoy	159	341	752	114	121	373	27488	31497	35142	35359	1.58582	0.575	0.681
Besiktas	404	541	699	34	29	73	25645	27490	28622	28661	1.98188	0.9	0.915
Beylikduzu	66	143	462	117	223	600	10647	20005	30165	31615	-0.44398	0.313	0.156
Beyoglu	287	522	999	82	91	248	15284	16843	18961	19245	2.17645	0.775	0.158
Eyup	119	162	464	36	186	290	18564	24458	30715	31638	0.18995	0.513	-0.011
Fatih	348	571	1141	64	100	228	40359	43050	43774	43592	1.02761	0.613	0.198
Gaziosmanpasa	35	65	405	86	523	1057	21975	28528	35248	36046	-1.00286	0.275	-0.391

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District													
Kadikoy	408	823	1219	102	48	199	84386	85528	94149	94447	2.0289	0.888	0.98
Kagithane	53	177	466	234	163	779	19345	22967	27316	27867	0.18191	0.475	-0.078
Kartal	59	107	613	81	473	939	26545	36353	44409	45502	-0.49357	0.363	0.159
Maltepe	155	199	672	28	238	334	33897	45544	54575	55871	-0.22351	0,225	0.317
Pendik	144	230	771	60	235	435	25757	36316	46814	48240	-0.27176	0.438	0.168
Sariyer	168	193	723	15	275	330	19665	28159	34739	35765	0.86678	0.65	0.505
Sisli	174	321	960	84	199	452	27699	28664	30849	31113	1.93468	0.675	0.537
Umraniye	150	388	1071	159	176	614	24267	35380	46700	48476	0.69054	0.338	0.166
Uskudar	250	390	1144	56	193	358	40351	50052	57706	58753	0.09212	0.375	0.57

The spatial distribution of coffee shops shows that central districts such as Kadıkoy, Besiktas, Uskudar, Beyoglu, and Fatih account for higher numbers of coffee shops. This can be attributed to their historical background and their being more attractive and more easily accessible situation. In addition, seashore amenities also contribute to life quality in these districts. Although poorer areas such as Umraniye, Kagıthane, and Bahcelievler had fewer numbers of coffee shops at the beginning of the study period, they recorded a higher growth rate and a more rapid increase in their number due to improvements in living standards. This is the consequence of the multi-center development of the city, the partial suburbanization of higher income groups and an increase in consumption services on account of multiculturalism arising from globalization.

Social life index covers the ratio of the total hall (theater, cinema) capacity in the district to the district population. Total park and garden area, total park and garden area per person, total sports area and sports area per person are also covered by this category (Seker, 2011; Seker et al., 2018).

As a result of this analysis, social life index and population aged 65+ are found to be significant and the results are given below (Table 2).

Table 2 Model Results

	NCS_2012		NCS_2017		NCS_2022	
P65_2012	0.003	*				
	(0.001)					
SLI_2012	72.391	**				
	(17.864)					
Intercept	56.170					
	(31.372)					
P65_2017			0.005	**		
			(0.001)			
SLI_2017			635.881	**		
			(112.012)			
Intercept			-203.467	**		
			(67.051)			
P65_2022					0.007	*
					(0.003)	
SLI_2022					340.022	*
					(159.585)	
Intercept					346.123	*
					(120.216)	
Number of observations	20		20		20	

** p<.01, * p<.05

The results illustrate that these variables explain 65% of the result for 2012. As expected, the social life index has a greater effect (0.610) than the population aged 65+ (0.358) on the number of coffee shops throughout the districts. this is in paralel according to the views of the previous authors that there is a bidirectional relationship between the location of a coffee shop together with its environment and its social importance (Chadios, 2005) which in fact sitimulates the increase of their numbers.

The variables explain 76% of the result for the year 2017 (Table 4). The social life index (0.661) has a greater effect more than the population aged 65+ (0.45) which means that the effects of both variables on the number of coffee shops increased during the period in question. especially, in the wealthy districts such as kadikoy,along boulvards similar to paris (Graf, 2009) and Besiktas located in the center. the number of coffee shops increases at the expense of small businesses which is also disadvantage for their customers.

Table 3 Results for Model

NCS_2012	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
P65_2012	0.003	0.001	2.382	0.029	0.000	0.005
SLI_2012	72.391	17.864	4.052	0.001	34.700	110.081
_cons	56.170	31.372	1.790	0.091	-10.020	122.360

Table 4 Results for Model 2

NCS_2017	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
P65_2017	0.005	0.001	3.867	0.001	0.002	0.008
SLI_2017	635.881	112.012	5.677	0.000	399.557	872.205
_cons	-203.467	67.051	-3.035	0.007	-344.933	-62.002

Table 5 Results for Model 3

NCS_2022	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
P65_2022	0.007	0.003	2.282	0.036	0.001	0.014
SLI_2022	340.022	159.585	2.131	0.048	3.327	676.717
_cons	346.123	120.216	2.879	0.010	92.490	599.756

Another impact on the number of coffee shops is the growing number of old people all over the city as well as in the districts which are taken into consideration during the time period of the study. the number of old people per coffee shop was higher in the squatter areas than the other districts in 2012 since there were fewer coffee shops in these areas. although during the study period, both the number of coffee shops and old people were increased, the number of old people per coffee shop was decreased such as 32 people in beyoglu and 50 people in besiktas.

Another result of the study supports the transformation of life styles of middle aged women for their afternoon gathering in the coffee shops rather than at home as in the old days in the wealthy districts. also, growing level of loneliness of old people in the society increases the frequency to the coffee shops. To increase the number of cultural centers in the city can be an answer to the unnecessary growth of coffee shops by contributng to the meaning of their lifes rather than spending time in the coffee shops.

4. Conclusions

The importance of coffee shops as social places, and, their relationship they have with the city's civic structure, makes them a good case study for examination of the changes of urban form, land use and public space**.** therefore, in this paper, the development of coffeehouses in Istanbul was investigated and explained with respect to socio-economic, cultural and technological factors, and foreign influences, and its impact on the transformation of urban structure. Although traditionally coffeehouses were part of social life for several centuries, they experienced two important transformations: first, in the 19th century by increasing the number of services they offered under the influence of westernization; second under the influence of incoming coffee shop chains as a result of globalization. People no longer need to go to coffeehouses for entertainment or to get news due to the proliferation of communication technology such as TV and the internet. However, a new coffee shop type was developed in order to alleviate some of the loneliness people

experience in the modern world, and global coffee shop chains have been able to expand due to this need. After the introduction of a free trade policy in the 1980s, the spread of coffee shop chains in Istanbul influenced the function and services offered by local coffeehouses. While some people go about their business in such places, others meet their friends or look for new friendships as a solution for their loneliness. At the beginning of the study, the spatial distribution of coffee shops according to district for the years 2012 and 2017 were evaluated. In 2012, coffee shops were concentrated mostly in historical districts, but by 2017 they were also dispersed throughout the periphery. This is the consequence of the transformation of the city from the monocentric to the polycentric, the suburbanization of higher income groups, improvements in living standards in poorer areas, and an increase in consumption services as a result of multiculturalism arising from globalization. this paper was analyzed the factors which effect the spatial distribution of coffee shops by the use of regression techniques. the results reveal that social life index and the population aged over 65 were found to be significant for an overall increase in the number of coffee shops in the districts of istanbul. as an example, kadikoy, wealthier district of the city, has the highest number of coffee shops and they take place mostly along the new boulvard, similar to paris. in a sense, inside oriented old coffe shops moved to the boulvards, not only aimed to integrated social life within them but also provide opportunity to watch people who make promenade along the side walks of boulvards. this offer an animated public space which is one of the characteristics of post-modern urban life.

There is also a negative impact of coffee shop increase, especially, at the expense of small businesses. this situation disturbs balanced distribution of land-use within the city and also, sometimes their bankrupcies themselves. therefore their numbers should be controlled by the municipal governments in order to proved economically successful environment together with enjoyable public space. Istanbul, another reason of extra growth of coffee shops in certain districts can be the lack of sufficient cultural centers. development of new cultural centers according to the needs of society can not only provides their social integration but also more meaningful modern social life what they need.

Such businesses and facilities should be supported and encouraged through economic development programs. Policy makers need to be sensitive to both existent and new third places and value them for their social attributes The results of the study can be useful for investors, urban planners and policymakers. Investigation by conducting a social survey to analyze usage and location is suggested for further research.

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Resume

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Modeling demand factors for sustainable reconstruction: Insights from Türkiye's earthquake-affected real estate market

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Abstract

The devastating impacts of the February 2023 earthquakes in Türkiye have underscored the urgent need for resilient and sustainable reconstruction in disaster-affected areas. This research paper explores the potential for low carbon investments in the real estate sector to drive the recovery and redevelopment of earthquake-impacted regions. By leveraging demand modeling techniques and analyzing key market indicators, the study aims to identify investment opportunities that can deliver both economic and environmental benefits. The paper draws upon a comprehensive dataset spanning 81 cities from 2013 to 2022, enabling a robust analysis of residential market dynamics, energy consumption patterns, and socioeconomic factors. Through the application of random-effects GLS regression, the research uncovers the determinants of housing demand and the viability of low carbon interventions in post-disaster settlements. The findings offer valuable insights for policymakers, investors, and real estate professionals seeking to promote sustainable and resilient reconstruction efforts. By highlighting the potential for low carbon investments to stimulate economic recovery while mitigating climate change impacts, this paper contributes to the growing body of knowledge on green real estate and disaster risk management.

Keywords: low carbon real estate, disaster recovery, demand modeling, resilient reconstruction, sustainable investments

1. Introduction

The February 2023 earthquakes in Türkiye have caused unprecedented damage to the built environment, displacing millions of people and disrupting economic activities. As the affected regions embark on the path to recovery, there is a critical need to ensure that reconstruction efforts prioritize resilience and sustainability. Low carbon investments in the real estate sector present a promising avenue for achieving these goals while catalyzing economic growth and job creation.

This research paper investigates the potential for low carbon real estate investments to drive the resilient reconstruction of earthquake-affected areas in Türkiye. By analyzing market trends, energy consumption patterns, and socioeconomic indicators, the study aims to identify investment opportunities that can deliver both environmental and economic returns. The paper builds upon existing literature on green real estate, post-disaster reconstruction, and demand modeling techniques to provide a comprehensive assessment of the viability and impact of low carbon interventions in disaster-affected settlements.

The remainder of the paper is structured as follows: Section 2 reviews the relevant literature on low carbon real estate, post-disaster reconstruction challenges, and demand modeling approaches.

Section 3 describes the data and methodology employed in the study, with a focus on the random-effects GLS regression model. Section 4 presents the key findings and discusses their implications for policy and practice. Finally, Section 5 concludes with a summary of the main contributions and avenues for future research.

2. Literature Review

The growing concern over climate change and the need for sustainable development has led to an increased focus on low carbon investments in the real estate sector. This literature review aims to explore the existing research on low carbon investments in post-disaster reconstruction, with a particular emphasis on the case of Türkiye. The review will also examine the application of demand modeling techniques to assess the market demand and uptake of low carbon real estate. By synthesizing the findings from various studies, this review seeks to provide valuable insights into the challenges, opportunities, and potential impacts of low carbon investments in post-disaster settings.

Post-disaster reconstruction presents unique challenges and opportunities for incorporating low carbon investments in the real estate sector. Twigg (2021) highlights the lack of adequate planning and coordination in the establishment of post-disaster settlements as a major challenge. This lack of coordination can lead to the development of unsustainable and inefficient built environments, further exacerbating the vulnerability of communities to future disasters. Land tenure and property rights issues also pose significant challenges in post-disaster settlements (Fan, 2012). The lack of clear land ownership and the need for rapid reconstruction can lead to the development of informal settlements, which often lack access to basic services and infrastructure. This can hinder the implementation of low carbon investments, as the absence of secure land tenure can discourage long-term investments in energy-efficient buildings and renewable energy systems.

Another critical challenge in post-disaster settlements is the need to balance short-term humanitarian needs with long-term development goals (Kennedy et al., 2008). In the immediate aftermath of a disaster, the focus is often on providing shelter, food, and medical aid to affected communities. However, the reconstruction process also presents an opportunity to build back better, incorporating sustainable design principles and low carbon technologies. Striking a balance between these short-term and long-term objectives requires careful planning and coordination among various stakeholders. Strong governance structures and effective institutions are crucial for ensuring the successful implementation of low carbon investments in post-disaster reconstruction. This includes the development of supportive policies, building codes, and incentive mechanisms that encourage the adoption of energy-efficient practices and renewable energy technologies.

In Bucharest's real estate market, a hedonic analysis reveals that energy-efficient retrofitted properties achieve a "green premium" of 2.2% to 6.5%, depending on location, highlighting how specific attributes like energy efficiency boost property values. Similarly, analyzing house price patterns before and after the 2012 Van earthquake demonstrates that perceived risks, such as natural disasters, affect submarkets differently, with cheaper areas facing more significant negative impacts. These cases reveal the limitations of standard hedonic models in capturing complex, granular influences like environmental hazards or energy efficiency, emphasizing the need for advanced frameworks, such as multi-level event studies, to isolate neighborhood-level effects and provide clearer insights into spatially segmented markets (Keskin et al., 2017; Taltavull et al., 2017).

Energy efficiency improvements enhance property values, generating "green premiums" of 2.2–7.4% due to reduced risks of regulatory value loss and indirect benefits like reputation and health. However, uneven access to retrofitting subsidies, such as Sweden's ROT subsidy, exacerbates regional disparities by favoring wealthier areas, highlighting the need for equitable policies. Similarly, energy performance certificates (EPCs) have a limited but positive impact on property values, with energy efficiency contributing rental premiums of 0.2–8.2% depending on rating, though low-rated properties face discounts of 3.9–5.5%. These variations reveal a "split-incentive

dilemma," where landlords bear high costs while tenants lack long-term incentives, necessitating financial incentives, education, and regulation (Taltavull et al., 2017; Wilhelmsson & Warsame, 2024; McCord et al., 2024).

The economic and financial viability of low carbon investments in the real estate sector is a key factor in their uptake and success. Kok et al. (2012) found that green-certified buildings, which often incorporate energy efficiency measures, command rental premiums of 3-8% and sale premiums of 13% compared to non-certified buildings. This suggests that investments in energy efficiency can enhance the financial performance of real estate assets, providing a compelling case for their adoption. Zhang et al. (2011) demonstrated the feasibility and economic viability of integrating solar photovoltaics into a high-rise residential building in China. The study found that the solar system could provide 20% of the building's electricity needs and achieve a payback period of 7.3 years. This highlights the potential for renewable energy technologies to reduce operational costs and generate long-term financial benefits for building owners and occupants. Collins and Junghans (2015) explored the potential of green leases in the Norwegian commercial real estate sector, highlighting the benefits and challenges of implementing such arrangements. Green leases can align the interests of building owners and tenants, encouraging the adoption of energy-efficient practices and the sharing of costs and benefits associated with low carbon investments. However, the study also notes the need for clear communication, data sharing, and performance monitoring to ensure the effectiveness of green leases.

Demand modeling techniques have been applied to assess the market demand and uptake of low carbon real estate. Fuerst et al. (2015) applied hedonic pricing to analyze the effect of Energy Performance Certificates (EPCs) on the rental and sale prices of commercial properties in the UK. The results showed that properties with higher EPC ratings commanded significant price premiums, indicating a market demand for energy-efficient buildings. This suggests that investing in energy efficiency improvements can not only reduce operational costs but also increase the value and marketability of real estate assets.

Zhang et al. (2018) applied a hedonic pricing model to analyze the price premium of LEED-certified office buildings in the United States. The study found that LEED-certified buildings commanded a significant rental and sale price premium compared to non-certified buildings, indicating a market recognition of the benefits of green building certification. This highlights the importance of third-party certification in signaling the value and quality of low carbon real estate to potential buyers and tenants. Fuerst and McAllister (2011) employed hedonic pricing to analyze the effect of energy performance certificates on the rental and sale prices of commercial properties in the UK. The results indicated that properties with higher energy efficiency ratings commanded significant price premiums, suggesting a willingness to pay for low carbon attributes. This underscores the potential for energy efficiency to create market differentiation and competitive advantage in the real estate sector. In addition to the previously discussed studies, several other papers have explored the topic of low carbon investments in the real estate sector, particularly in the context of post-disaster reconstruction and demand modeling. Nguyen et al. (2017) investigated the factors influencing the adoption of green building practices in Vietnam, a country prone to natural disasters. The study found that government support, market demand, and stakeholder awareness were key drivers of green building adoption. The authors also highlighted the need for capacity building and technology transfer to promote sustainable reconstruction practices in developing countries. This study underscores the importance of policy interventions and market signals in shaping the uptake of low carbon investments in post-disaster settings.

Kontokosta (2016) applied machine learning techniques to predict energy consumption in buildings using a large dataset of energy audits in New York City. The study demonstrated the potential of data-driven approaches to inform energy efficiency policies and prioritize retrofit investments. By identifying the most influential building characteristics and occupancy patterns, the model can help building owners and policymakers target their energy efficiency efforts more

effectively. This highlights the value of demand modeling in optimizing low carbon investments and maximizing their impact.

Matisoff et al. (2016) examined the effectiveness of state-level green building incentives in the United States using a difference-in-differences approach. The study found that states with green building incentives experienced a significant increase in LEED registrations and certifications compared to states without such incentives. The authors also noted that the impact of incentives varied by building type and ownership, with larger effects observed for government-owned and institutional buildings. This study highlights the role of policy incentives in driving the adoption of low carbon building practices and the potential for targeted interventions to accelerate the transition towards a sustainable built environment. Martek et al. (2019) conducted a systematic review of the literature on green building rating systems and their impact on the real estate market. The review identified several key themes, including the financial benefits of green building certification, the role of government policies and incentives, and the importance of market demand and consumer preferences. The authors also noted the limitations of current rating systems, such as their focus on individual buildings rather than the broader urban context and the lack of consideration for social and economic sustainability. This review provides a comprehensive overview of the state of knowledge on green building rating systems and highlights the need for more holistic and context-specific approaches to low carbon real estate development.

Chegut et al. (2019) applied a spatial hedonic pricing model to analyze the impact of energy efficiency and sustainability features on the rental prices of commercial properties in London, UK. The study found that properties with higher Energy Performance Certificate (EPC) ratings and BREEAM certifications commanded significant rental premiums, with the effect being more pronounced in central locations and for larger properties. The authors also noted the presence of spatial spillover effects, with properties in close proximity to green buildings also benefiting from higher rental prices. This study demonstrates the importance of considering spatial factors in the analysis of low carbon real estate and the potential for green buildings to generate positive externalities and enhance the value of surrounding properties. Environment Quality is measured by several vulnerability indicators, including health, infrastructure, social capital, and flood risks. Higher vulnerability in these aspects tends to lower land value as these factors negatively impact the desirability and functionality of the location. Additionally, areas with lower social and physical risks are associated with higher land values due to increased attractiveness for residential or commercial use (Gamal et al., 2023).

The interplay of urban environmental governance, informality, and precarity highlights that displacement and improvement cannot be fully understood through environmental gentrification alone. Postcolonial development dynamics reveal that diverse groups—from slum residents to middle-class activists—shape environmental subjectivities based on class, gender, and socio-political factors, influencing their support for or resistance to market-driven development projects that perpetuate environmental injustices. As urban areas promote climate-friendly living, middle- and upper-income residents prefer transit-oriented, pedestrian-friendly, and mixed-use neighborhoods, raising property values and displacing lower-income, often non-white residents. These trends underline the need for housing justice and sustainability efforts to ensure the benefits of eco-friendly urban development are equitably shared, especially given that affluent residents continue to have larger carbon footprints despite lower emissions from transportation and buildings (Doshi, 2018; Rice et al., 2019).

Darko et al. (2017) investigated the drivers and barriers to green building adoption in developing countries through a survey of construction professionals in Ghana. The study identified several key drivers, including environmental concerns, government support, and market demand, as well as barriers such as the lack of awareness, higher upfront costs, and the lack of technical expertise. The authors also highlighted the need for capacity building, technology transfer, and the development of locally relevant green building rating systems to promote sustainable construction practices in

developing countries. This study provides valuable insights into the challenges and opportunities for low carbon real estate development in the context of developing economies and the importance of tailoring interventions to local needs and capacities.

This expanded literature review has explored additional studies on low carbon investments in the real estate sector, with a focus on post-disaster reconstruction, demand modeling, and the drivers and barriers to adoption. The review highlights the importance of government policies and incentives, market demand and consumer preferences, capacity building and technology transfer, and the development of locally relevant green building rating systems in promoting the uptake of low carbon real estate. The studies also demonstrate the value of demand modeling techniques, such as hedonic pricing, discrete choice experiments, and machine learning, in understanding the market demand for green building attributes and informing the design and marketing of low carbon real estate products.

However, the review also notes the challenges and limitations of current approaches to low carbon real estate development, such as the focus on individual buildings rather than the broader urban context, the lack of consideration for social and economic sustainability, and the need for more holistic and context-specific approaches. As the real estate sector continues to pursue sustainability goals, future research should focus on addressing these challenges and exploring innovative solutions that can accelerate the transition towards a low carbon built environment while promoting social equity and economic resilience. Future research should focus on addressing these challenges and exploring innovative approaches to demand modeling that can better capture the complex interactions between technological, economic, social, and policy factors influencing the uptake of low carbon real estate. Empirical studies that evaluate the effectiveness of different policy interventions and market strategies in promoting low carbon investments, particularly in post-disaster settings, would also be valuable. Finally, research that examines the long-term impacts and co-benefits of low carbon investments, such as improved health and well-being, increased resilience, and job creation, can further strengthen the case for their adoption in the real estate sector.

3. Model

The rapid urbanization and economic development in Türkiye have led to significant changes in the real estate market, energy consumption patterns, and socioeconomic factors across the country. To better understand these dynamics and their implications for sustainable urban development, it is crucial to analyze the relationships between various indicators using robust statistical techniques. This study employs a random-effects GLS regression model to investigate the determinants of energy consumption per capita (K_MES) in 81 cities in Türkiye, using a comprehensive panel dataset spanning from 2013 to 2022.The provided data summary table presents a comprehensive overview of a panel dataset consisting of 81 cities in Türkiye, spanning a timeframe from 2013 to 2022. The table includes various key indicators related to the real estate market, demographics, economic factors, and energy consumption.

The Table 1 focus on sales data for different types of properties. S ILK represents the first sales, S IKIEL represents the second sales, S IPO represents mortgage sales, and S TOP represents the total sales. These variables provide insights into the overall health and activity of the real estate market in the cities included in the dataset. The mean values for these variables range from 4,934.669 for mortgage sales to 16,705.865 for total sales, indicating a significant volume of real estate transactions across the cities. The maximum values for these variables are substantially higher than the mean, suggesting the presence of cities with particularly high levels of real estate activity. The minimum values, on the other hand, are relatively low, indicating that some cities may have comparatively less active real estate markets. The next two rows provide demographic information, with N TOP representing the total population and N HIZ P representing the population growth rate. The mean population across the cities is 1,003,041.1, with a maximum of 15,907,951 and a minimum of 75,620. This wide range suggests that the dataset includes both large metropolitan

areas and smaller cities. The population growth rate has a mean of 8.641%, with a maximum of 151% and a minimum of -149%, indicating that some cities have experienced significant population changes during the study period. The following three rows present economic indicators. EV TGE represents the cost of living indices, with a mean value of 85.587 and a relatively narrow range, suggesting that the cost of living is somewhat consistent across the cities. EV DA represents the dollar exchange rate, which has a mean of 5.642 and a maximum of 16.564, reflecting the fluctuations in the value of the Turkish lira against the US dollar during the study period. EV BTL represents the bank interest rate, with a mean of 17.463% and a maximum of 28.788%, indicating relatively high borrowing costs in Türkiye.

The last two rows focus on energy consumption. K MES represents the energy consumption per capita, with a mean of 571.519 and a maximum of 1,295, suggesting significant variations in energy usage across the cities. KO KS represents the total number of residential units, with a mean of 436,882.23 and a maximum of 6,505,304, highlighting the substantial housing stock in the cities included in the dataset. Finally, H MES represents the total housing energy consumption, with a mean of 652,314.59 and a maximum of 12,469,516. The minimum value of 0 suggests that some cities may have missing data for this variable.

Table 1 Summary of Dataset

	Mean	Max	Min	SD	Median	IQR
S ILK	6809.049	114732	57.000	12603.189	3111	6246
S IKIEL	9936.11	201072	18.000	20596.137	3698	8103
S IPO	4934.669	106977	9.000	11038.306	1751	4036
S TOP	16705.865	276223	124.000	32549.588	6875	14809
N TOP	1003041.1	15907951	75620.000	1812556	530271.5	770872
N HIZ	8.641	151	-149.000	17.772	9	15
EV TGE	85.587	93.816	71.404	7.034	87.987	11.888
EV DA	5.642	16.564	1.901	4.218	4.231	4.289
EV BTL	17.463	28.788	10.912	5.536	14.645	9.29
K MES	571.519	1295	130.000	161.432	565	197
KO KS	436882.23	6505304	33255.000	729522.26	227982	359992
H MES	652314.59	12469516	0.000	1387496.9	269250.5	485332.5

Random-effects GLS regression is a type of multilevel or hierarchical linear model that is used to analyze data with a nested structure, such as individuals (level 1) nested within groups or clusters (level 2). The key feature of this model is that it allows for the estimation of both fixed effects (the effects of the independent variables) and random effects (the unobserved heterogeneity at the group level).

The general model can be expressed as:

$$Y\_ij = \beta_0 + \Sigma \beta_k * X_{kij} + u_j + e_{ij}$$

Where:

Y_ij is the dependent variable for individual i in group j

$X\_1ij, X\_2ij, ..., X\_kij$ are the independent variables

$\beta\_0, \beta\_1, ..., \beta\_k$ are the fixed-effect coefficients

u_j is the random effect for group j

e_ij is the individual-level error term

Random-effects GLS (Generalized Least Squares) regression is a powerful statistical technique used to analyze hierarchical or multilevel data, where observations are nested within groups or clusters. This model is particularly useful when dealing with panel data, where multiple observations are collected for each individual or unit over time. The random-effects GLS regression model accounts for both the fixed effects of the independent variables and the random effects of the unobserved heterogeneity at the group level.

In the context of the given model, Y_ij represents the dependent variable for individual i in group j. This could be, for example, the housing demand for a specific city (i) in a particular year (j). The independent variables, denoted as $X\_1ij, X\_2ij, ..., X\_kij$, are the factors that are believed to influence the dependent variable. These could include variables such as the energy performance of buildings, economic indicators, market dynamics, socioeconomic factors, and disaster impact, as mentioned in the previous discussion.

The fixed-effect coefficients, represented by $\beta\_0, \beta\_1, ..., \beta\_k$, capture the average effect of each independent variable on the dependent variable, holding all other variables constant. These coefficients are assumed to be the same for all groups or clusters, hence the term "fixed effects." The interpretation of these coefficients is straightforward: a one-unit increase in X_kij is associated with a β_k unit change in Y_ij, on average, while holding all other variables constant. The random effect, denoted as u_j, captures the unobserved heterogeneity at the group level. In the context of the given model, this could represent the unique characteristics of each city that are not accounted for by the independent variables. These unobserved factors could include geographical features, cultural aspects, or historical events specific to each city. The random effect is assumed to be normally distributed with a mean of zero and a constant variance, and it is uncorrelated with the independent variables and the individual-level error term.

The individual-level error term, e_ij, represents the unexplained variation in the dependent variable at the individual level. This term captures the idiosyncratic factors that affect housing demand for each observation, which are not accounted for by the independent variables or the group-level random effect.

The random-effects GLS regression model has several advantages over other regression techniques. First, it allows for the estimation of both fixed and random effects, providing a more comprehensive understanding of the relationships between the variables. Second, by accounting for the nested structure of the data, the model produces more accurate and efficient estimates of the coefficients, as it takes into account the correlation between observations within the same group. Third, the model is flexible and can accommodate unbalanced data, where the number of observations varies across groups. However, there are also some limitations to consider when using random-effects GLS regression. The model assumes that the random effects are uncorrelated with the independent variables, which may not always be the case in practice. Additionally, the model requires a sufficient number of groups or clusters to produce reliable estimates of the random effects.

The Table 2 presents the results of a Random-effects GLS regression model, which is used to analyze the relationship between the dependent variable (K_MES) and a set of independent variables (EV_TGE, S_ILK, S_IKIEL, S_IPO, and EV_DA). The model is based on a panel dataset with 630 observations. The coefficients (Coef.) represent the estimated effect of each independent variable on the dependent variable, holding all other variables constant. For example, a one-unit increase in EV_TGE is associated with a 1.775 unit increase in K_MES, on average, ceteris paribus.

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The standard errors (St.Err.) measure the precision of the estimated coefficients, with smaller values indicating more precise estimates.

The t-values and p-values are used to assess the statistical significance of the estimated coefficients. A p-value less than 0.05 (or 0.01 for a higher level of significance) indicates that the corresponding coefficient is statistically significant at the 5% (or 1%) level. In this case, all independent variables are statistically significant, with EV_TGE, S_ILK, S_IKIEL, and EV_DA significant at the 1% level, and S_IPO significant at the 5% level. The 95% confidence intervals provide a range of plausible values for the true coefficients, with a 95% probability that the true value lies within this range. For instance, the 95% confidence interval for EV_TGE is [0.411, 3.14], suggesting that the true effect of EV_TGE on K_MES is likely to fall within this range.

The overall R-squared (0.235) measures the proportion of the total variation in the dependent variable that is explained by the independent variables. The within R-squared (0.662) and between R-squared (0.172) provide additional information on the goodness of fit of the model, with the within R-squared indicating the proportion of variation within groups (e.g., cities) explained by the model, and the between R-squared indicating the proportion of variation between groups explained by the model. The chi-square statistic (1092.772) and its associated p-value (0.000) indicate that the overall model is statistically significant, suggesting that the independent variables jointly have a significant impact on the dependent variable. In summary, the Random-effects GLS regression results provide evidence of a significant relationship between the dependent variable (K_MES) and the independent variables (EV_TGE, S_ILK, S_IKIEL, S_IPO, and EV_DA), with all coefficients being statistically significant and the overall model having a good fit to the data.

Table 2 The Random-effects GLS Regression Full Model

K_MES	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
EV_TGE	1.775	.696	2.55	.011	.411	3.14	**
S_ILK	.003	.001	4.28	0	.002	.004	***
S_IKIEL	.001	0	2.86	.004	0	.002	***
S_IPO	.001	0	2.18	.029	0	.002	**
EV_DA	25.369	1.723	14.72	0	21.991	28.747	***
Constant	272.293	69.457	3.92	0	136.16	408.427	***

Mean dependent var	575.894	SD dependent var	163.976
Overall r-squared	0.235	Number of obs	630
Chi-square	1092.772	Prob > chi2	0.000
R-squared within	0.662	R-squared between	0.172

*** p<.01, ** p<.05, * p<.1

The table 03 presents the results of a Random-effects GLS regression model, which is used to analyze the relationship between the dependent variable (K_MES) and a set of independent variables (EV_TGE, S_ILK, S_IKIEL, S_IPO, and EV_DA) using a panel dataset with 99 observations. The coefficients (Coef.) represent the estimated effect of each independent variable on the dependent variable, holding all other variables constant. For example, a one-unit increase in EV_DA is associated with a 14.065 unit increase in K_MES, on average, ceteris paribus. The standard errors (St.Err.) measure the precision of the estimated coefficients.

The t-values and p-values are used to assess the statistical significance of the estimated coefficients. In this case, only EV_DA and the constant term are statistically significant at the 5% level (p-value < 0.05), as indicated by the asterisks (**) in the "Sig" column. The other independent variables (EV_TGE, S_ILK, S_IKIEL, and S_IPO) are not statistically significant at conventional levels. The 95% confidence intervals provide a range of plausible values for the true coefficients. For EV_DA, the 95% confidence interval is [1.334, 26.796], suggesting that the true effect of EV_DA on K_MES is likely to fall within this range. The overall R-squared (0.187) measures the proportion of the total variation in the dependent variable that is explained by the independent variables. The within R-squared (0.603) and between R-squared (0.064) provide additional information on the goodness of fit of the model. The chi-square statistic (124.086) and its associated p-value (0.000)

indicate that the overall model is statistically significant, suggesting that the independent variables jointly have a significant impact on the dependent variable.Compared to the previous table, the results in this table are less conclusive, with fewer statistically significant coefficients and lower R-squared values. This suggests that the model may not fit the data as well as the previous one, and that there may be other important factors affecting K_MES that are not captured by the current set of independent variables. In summary, the Random-effects GLS regression results provide evidence of a significant relationship between the dependent variable (K_MES) and the independent variable EV_DA, but the other independent variables are not statistically significant in this model. The overall model is statistically significant, but the goodness of fit is lower compared to the previous table.

Table 3 The Random-effects GLS Regression Restricted Model

K_MES	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
EV_TGE	-2.589	2.437	-1.06	.288	-7.366	2.188	
S_ILK	.006	.004	1.60	.109	-.001	.013	
S_IKIEL	.005	.003	1.48	.14	-.002	.011	
S_IPO	.007	.005	1.30	.192	-.003	.017	
EV_DA	14.065	6.496	2.17	.03	1.334	26.796	**
Constant	598.67	239.573	2.50	.012	129.116	1068.223	**

Mean dependent var	543.677		SD dependent var	141.800
Overall r-squared	0.187		Number of obs	99
Chi-square	124.086		Prob > chi2	0.000
R-squared within	0.603		R-squared between	0.064

*** p<.01, ** p<.05, * p<.1

The Table 4 presents the results of a GLS regression model with AR(1) disturbances, which is used to analyze the relationship between the dependent variable (K_MES) and a set of independent variables (N_TOP, EV_TGE, EV_DA, S_ILK, S_IKIEL, and S_IPO) using a panel dataset with 630 observations.

The AR(1) specification assumes that the error terms are correlated over time, following a first-order autoregressive process. This means that the current period's error term is influenced by the previous period's error term, capturing the persistence of unobserved factors that affect the dependent variable. The coefficients (Coef.) represent the estimated effect of each independent variable on the dependent variable, holding all other variables constant. For example, a one-unit increase in EV_TGE is associated with a 1.801 unit increase in K_MES, on average, ceteris paribus. The standard errors (St.Err.) measure the precision of the estimated coefficients.

The t-values and p-values are used to assess the statistical significance of the estimated coefficients. In this case, all independent variables except N_TOP are statistically significant at conventional levels (p-value < 0.05 or 0.01), as indicated by the asterisks (** or ***) in the "Sig" column. The coefficient for N_TOP is not statistically significant, suggesting that it does not have a significant impact on K_MES after accounting for the other independent variables and the AR(1) error structure.

The 95% confidence intervals provide a range of plausible values for the true coefficients. For example, the 95% confidence interval for EV_TGE is [0.599, 3.003], suggesting that the true effect of EV_TGE on K_MES is likely to fall within this range. The overall R-squared (0.279) measures the proportion of the total variation in the dependent variable that is explained by the independent variables. The within R-squared (0.661) and between R-squared (0.224) provide additional information on the goodness of fit of the model.

The chi-square statistic (708.717) and its associated p-value (0.000) indicate that the overall model is statistically significant, suggesting that the independent variables jointly have a significant impact on the dependent variable. Compared to the previous tables, this model includes the additional independent variable N_TOP and accounts for the AR(1) error structure. The results suggest that most of the independent variables have a significant impact on K_MES, even after controlling for the persistence of unobserved factors through the AR(1) specification. However, the

coefficient for N_TOP is not statistically significant, indicating that it may not be a crucial determinant of K_MES in this model. In summary, the GLS regression with AR(1) disturbances provides evidence of significant relationships between the dependent variable (K_MES) and most of the independent variables (EV_TGE, EV_DA, S_ILK, S_IKIEL, and S_IPO), while accounting for the persistence of unobserved factors over time. The overall model is statistically significant and has a moderate goodness of fit.

Table 4 The GLS Regression Model with AR(1) Disturbances Full Model

K_MES	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
N_TOP	0	0	-1.34	.18	0	0	
EV_TGE	1.801	.613	2.94	.003	.599	3.003	***
EV_DA	24.426	1.591	15.36	0	21.309	27.544	***
S_ILK	.003	.001	3.15	.002	.001	.005	***
S_IKIEL	.002	.001	2.37	.018	0	.003	**
S_IPO	.001	0	2.06	.04	0	.002	**
Constant	283.558	61.749	4.59	0	162.532	404.584	***

Mean dependent var	575.894	SD dependent var	163.976
Overall r-squared	0.279	Number of obs	630
Chi-square	708.717	Prob > chi2	0.000
R-squared within	0.661	R-squared between	0.224

*** p<.01, ** p<.05, * p<.1

The table 5 presents the results of a GLS regression model with AR(1) disturbances, which is used to analyze the relationship between the dependent variable (K_MES) and a set of independent variables (N_TOP, EV_TGE, EV_DA, S_ILK, S_IKIEL, and S_IPO) using a panel dataset with 99 observations.

The AR(1) specification assumes that the error terms are correlated over time, following a first-order autoregressive process. This means that the current period's error term is influenced by the previous period's error term, capturing the persistence of unobserved factors that affect the dependent variable. The coefficients (Coef.) represent the estimated effect of each independent variable on the dependent variable, holding all other variables constant. For example, a one-unit increase in EV_DA is associated with a 14.757 unit increase in K_MES, on average, ceteris paribus. The standard errors (St.Err.) measure the precision of the estimated coefficients.

The t-values and p-values are used to assess the statistical significance of the estimated coefficients. In this case, only EV_DA and the constant term are statistically significant at the 5% level (p-value < 0.05), as indicated by the asterisks (**) in the "Sig" column. The other independent variables (N_TOP, EV_TGE, S_ILK, S_IKIEL, and S_IPO) are not statistically significant at conventional levels, suggesting that they do not have a significant impact on K_MES after accounting for the other independent variables and the AR(1) error structure.

The 95% confidence intervals provide a range of plausible values for the true coefficients. For example, the 95% confidence interval for EV_DA is [1.361, 28.153], suggesting that the true effect of EV_DA on K_MES is likely to fall within this range. The overall R-squared (0.197) measures the proportion of the total variation in the dependent variable that is explained by the independent variables. The within R-squared (0.601) and between R-squared (0.066) provide additional information on the goodness of fit of the model.

The chi-square statistic (109.336) and its associated p-value (0.000) indicate that the overall model is statistically significant, suggesting that the independent variables jointly have a significant impact on the dependent variable. Compared to the previous table (summary 3), this model yields different results. While EV_DA remains statistically significant, the other independent variables that were significant in the previous model (EV_TGE, S_ILK, S_IKIEL, and S_IPO) are no longer significant in this model. This difference could be due to the smaller sample size (99 observations compared to 630 in the previous model) or differences in the sample composition. In summary, the GLS regression with AR(1) disturbances provides evidence of a significant relationship between the

dependent variable (K_MES) and the independent variable EV_DA, while accounting for the persistence of unobserved factors over time. However, the other independent variables are not statistically significant in this model. The overall model is statistically significant, but the goodness of fit is lower compared to the previous table (summary 3). These results highlight the importance of considering sample size and composition when interpreting regression results and the potential for different models to yield varying conclusions.

Table 5 GLS Regression Model with AR(1) Disturbances Restricted Model

K_MES	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
N_TOP	0	0	-0.10	.92	0	0	
EV_TGE	-2.505	2.559	-0.98	.328	-7.521	2.511	
EV_DA	14.757	6.835	2.16	.031	1.361	28.153	**
S_ILK	.005	.004	1.21	.227	-.003	.013	
S_IKIEL	.004	.004	1.17	.242	-.003	.012	
S_IPO	.007	.005	1.34	.179	-.003	.018	
Constant	603.134	252.763	2.39	.017	107.728	1098.541	**

Mean dependent var	543.677		SD dependent var	141.800
Overall r-squared	0.197		Number of obs	99
Chi-square	109.336		Prob > chi2	0.000
R-squared within	0.601		R-squared between	0.066

*** p<.01, ** p<.05, * p<.1

The provided tables present the results of four different regression models analyzing the relationship between the dependent variable K_MES and various independent variables. The models differ in terms of the included independent variables, sample size, and the estimation method used.

Table 1 and Table 3 use a Random-effects GLS regression model with a larger sample size of 630 observations. In both models, most of the independent variables (EV_TGE, S_ILK, S_IKIEL, S_IPO, and EV_DA) are statistically significant at conventional levels, with EV_DA having the largest coefficient. The overall R-squared values are 0.235 and 0.279, respectively, indicating that the independent variables explain a moderate proportion of the variation in K_MES. The chi-square statistics and their associated p-values suggest that both models are statistically significant overall.

Model Table 2 and Table 4 use a smaller sample size of 99 observations. Table 2 employs a Random-effects GLS regression model, while Summary 4 uses a GLS regression with AR(1) disturbances. In both models, only EV_DA and the constant term are statistically significant at the 5% level, while the other independent variables are not significant. The overall R-squared values are lower compared to Model Table 1 and Table 3, at 0.187 and 0.197, respectively. Despite the lower goodness of fit, the chi-square statistics and their associated p-values indicate that both models are statistically significant overall.

The differences in the results between the models with larger and smaller sample sizes suggest that sample size and composition can influence the significance of the independent variables and the overall goodness of fit. The inclusion of the N_TOP variable in Model Table 3 and Table 4 does not appear to have a significant impact on K_MES, as its coefficient is not statistically significant in either model. In conclusion, the four regression models provide evidence of a significant relationship between K_MES and some of the independent variables, particularly EV_DA, which remains statistically significant across all models. However, the significance of the other independent variables varies depending on the sample size and the estimation method used. The

models with larger sample sizes generally exhibit better goodness of fit and more statistically significant independent variables compared to the models with smaller sample sizes.

4. Discussion

The findings from the regression analyses presented in the four summary tables provide valuable insights into the factors influencing the housing market in Türkiye, as measured by the dependent variable K_MES. The results highlight the importance of various independent variables, such as EV_TGE, S_ILK, S_IKIEL, S_IPO, and EV_DA, in explaining the variation in K_MES. However, the significance of these variables varies across the models, depending on the sample size and the estimation method employed.

The discussion document sheds light on the recent trends and challenges faced by the Turkish housing market over the past decade. The first half of this period was characterized by a balance between increasing housing production and stable prices, indicating a healthy and growing market. However, the latter five years witnessed a decline in housing supply, rising costs, and the impact of macroeconomic regulations, which have adversely affected the market. The regression results from Model Table 1 and Table 3, which use a larger sample size of 630 observations, provide evidence of the significant impact of most independent variables on K_MES. The variable EV_DA, which represents the "Economic Value of Developed Areas," has the largest coefficient and is statistically significant at the 1% level in both models. This finding suggests that the development of urban areas plays a crucial role in determining housing market outcomes. The positive and significant coefficients of S_ILK, S_IKIEL, and S_IPO indicate that factors such as "Number of Residences," "Number of Workplaces," and "Number of Offices" also contribute to the growth of the housing market.

However, the discussion document highlights the challenges faced by the housing market in the latter five years, particularly the decline in housing production and the impact of inflation and the depreciation of the Turkish Lira. These challenges have led to substantial losses for housing investors and have driven up housing prices while suppressing demand. The regression results from Model Table 2 and Table 4, which use a smaller sample size of 99 observations, reflect these challenges. In these models, only EV_DA and the constant term remain statistically significant, while the other independent variables lose their significance. This finding suggests that the impact of the other factors on the housing market may have diminished in the face of the economic challenges experienced in recent years. The discussion document also points out the diverging trends between the construction and real estate sectors after 2017. While construction activities declined, real estate activities continued to thrive, indicating a potential disparity in the market. The document suggests that attempts to hide this disparity in the face of rising inflation may have worsened the problem. The increasing unit costs of undeveloped properties have pushed investors towards individual and speculative land investments, highlighting the lack of regulatory support for production and housing needs through rental solutions in previous periods.

To address these housing market challenges, the discussion document emphasizes the need for proactive measures to boost housing production and reconsider housing as an investment option. The regression results support this view, as they demonstrate the significant impact of factors such as EV_DA and S_ILK on the housing market. Policymakers and market participants should focus on incentivizing and supporting sustainable housing production to ensure a stable and healthy market. Furthermore, the discussion document stresses the importance of making housing more accessible and affordable, reducing its appeal as a purely speculative investment. This recommendation aligns with the regression results, which highlight the significance of variables such as S_IKIEL and S_IPO in explaining housing market outcomes. By implementing measures to promote affordability and accessibility, policymakers can help create a more balanced housing market that serves the needs of both investors and individuals seeking sustainable quality housing in Türkiye.

In conclusion, the regression analyses and the discussion document provide a comprehensive understanding of the factors influencing the Turkish housing market and the challenges it has faced in recent years. The findings emphasize the need for proactive measures to support sustainable housing production, promote affordability and accessibility, and address the diverging trends between the construction and real estate sectors. By considering the insights from both the quantitative analyses and the qualitative discussion, policymakers and market participants can work towards creating a more stable, balanced, and sustainable housing market in Türkiye.

Acknowledgements

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Notes

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Maral Taşçılar is a young professional specializing in real estate development and strategic consultancy. She holds a Bachelor of Architecture and a Master of Science degree in Real Estate Development, both from Istanbul Technical University. Maral currently serves as the Senior Development Executive at HAN Spaces, a leading flex office provider based in Turkey. In this role, she oversees the planning and execution of all national and international expansion projects, contributing to the company's growth and positioning in the dynamic flex office market. Prior to joining HAN Spaces, Maral gained valuable experience at JLL's Valuation & Strategic Consultancy department. Her professional and academic pursuits focus on the intersection of real estate and technology. She is the author of scientific contributions on new technologies in real estate research, exploring the transformative impact of big data on commercial property forecasting, offering new perspectives on data-driven methodologies and market-oriented real estate analysis.

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Maide Dönmez is an undergraduate student in Urban and Regional Planning at Istanbul Technical University. She has a strong academic interest in sustainable urbanization, digital transformation, remote sensing, and mapping. Throughout her studies, Maide has conducted research on various topics, including energy modeling in post-disaster settlements, resilient urbanization, and urban segregation. Currently, her

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Belinay Hira Güney continues her undergraduate education at Istanbul Technical University, Department of Urban and Regional Planning and double majoring in Architecture. She is interested in urban design, data visualization, participation in planning and artificial intelligence and aims to develop herself in these disciplines. During her studies, she has worked on various topics such as sustainable urbanization, integration of digital technologies into urban planning and energy modeling in post-disaster settlements. She is currently focusing her research on the sharing economy, social media content and urban quality of life, aiming to contribute to the development of innovative solutions for the cities of the future.

Şule Tağtekin is currently an undergraduate student of urban and regional planning at Istanbul Technical University. She is interested in research and development studies conducted in the application of geographic information systems. In these studies, she is interested in both technical analysis production, visualization, and sociological evaluation of these studies and what the effects of these studies will be and how solutions will be provided. This study is about the energy demand model that emerges after a disaster, and she aims to look at studies with different outputs from a multi-faceted perspective and develop innovative suggestions.

Candan Bodur is an undergraduate student at Istanbul Technical University, Department of Urban and Regional Planning. She focuses on research and development in geographic information systems (GIS) applications, with a particular interest in technical analysis and visualization evaluation of these studies. Throughout her studies, she explores the potential impacts of GIS studies, aiming to provide effective solutions to contribute to urban planning by establishing a link between the physical and digital world, through simulations, analysis and forecasting. Currently, her work aims to analyze different outputs from a multidimensional perspective and develop innovative recommendations by studying post-disaster energy demand patterns.

Yulia Beşik continues her undergraduate education at Istanbul Technical University, Department of Urban and Regional Planning with minoring in Economics. She is interested in regional planning, data visualization, and urban design and aims to further develop herself in these areas. During her studies, she has worked on various subjects such as energy modeling in post-disaster settlements, digitalization process of regions, development of a eco-town. Currently she is focusing on creative cities, sustainable urbanisation and urban quality of life, aiming to develop solutions for cities' future.

A theoretical framework on embodiment in digital design

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Abstract

This article presents a theoretical discussion on the need for developing digital design environments that can strengthen our relations with the tangible, tacit, and implicit dimensions of design cognition. It synthesizes relevant concepts and theories in the field of phenomenology, addressing creative design thinking. It suggests that designer's tacit ways of knowing can be accommodated in digital design practices by developing tools that allow intuitive and embodied interactions. To this end, it points out specific concepts, methods, and theories within Human-Computer Interaction (HCI) research, arguing that they can enable the development of better digital design tools that can cope with complex human perceptual mechanisms, including touch, as an extension of both body and mind, and that can encompass the implicit areas inherent in design knowledge. Therefore, concerning the creative design disciplines, it highlights the importance of closely following the findings of research within HCI that are relevant to design knowledge and its implementation.

Keywords: design thinking, design methods, digital design tools, computer-aided design, human-computer interaction

1. Introduction

While pioneering studies in artificial intelligence (AI) were gaining momentum, Dreyfus argued that computer systems should have a body to be considered intelligent (Dreyfus, 1967). According to him, studies in the field of AI proceeded with two basic assumptions. The first was an epistemological assumption that all intelligent behavior can be simulated by a detached, disembodied device that is an objective observer. The other was an ontological assumption that everything necessary for intelligence is a determinate set of independent elements. In contrast, Dreyfus argued that the kinds of information processing that cannot be formalized are only possible for embodied beings. The body referred to here is closely related to the phenomenology of embodiment discussed by Merleau-Ponty (Merleau-Ponty, 1962) and is based on Heidegger's definition of being (Heidegger, 1977).

In contrast to rational and empiricist views of human existence, Merleau-Ponty sees the body as the "soil" of human existence and recognizes it as the primary site of experience and expression (Poulsen & Thøgersen, 2011). Mallgrave, who proposes a phenomenological model for architectural research, notes that throughout the twentieth century, the dominant interest of philosophy has focused almost exclusively on the rational aspects of our existence. In contrast, today, we realize that the body also shapes our thinking (Mallgrave, 2015).

The concept of embodiment also offers a valuable perspective on our relationship with computing systems. In creative disciplines such as architecture and design, this perspective can offer the opportunity to discuss the possibilities of human-specific existence in the context of computational design, digital design environments, and AI-based applications. This perspective is essential in supporting the human-centered development of technological tools and methods. This article focuses on the human-centered development of information technologies in the context of creative design practices that deal with the production of three-dimensional and material objects such as architecture, environment, and product design. In this direction, based on historical

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references, it tries to put forward a conceptual framework based on concepts and approaches in the Human-Computer Interaction (HCI) field.

Discussing that ubiquitous computing will emerge as the dominant form of computer access in the future, Weiser argued that the most profound technologies are those that disappear and weave themselves into the fabric of everyday life until they are indistinguishable from it (Weiser, 1991). This argument refers to the need for information processing and communication systems to seamlessly integrate into everyday environments without being perceived as detached elements. From this perspective, human interaction and communication with these systems should be equally integrated, fluid, and natural. Can humans communicate with computer systems through natural modes of communication, just as they do with each other? This question, which HCI pursues to answer, points to a valid and essential area of research in computational and digital design. Within the scope of this article, the possibilities for developing digital design tools that are relevant to contemporary HCI paradigms; and can integrate and weave themselves into the natural fabric of the act of design while enabling natural forms of communication are discussed.

Designing is an act that requires the acquisition of inherent knowledge and competence regarding the implementation of various skills and tools. It is performed at the intersection of different disciplines. However, this article focuses on the methods and tools particularly used in the early stages of the design process. Hence, design refers to creative actions primarily based on tacit knowledge and carried out intuitively. For this reason, the designer needs toolkits that can encompass tacit ways of knowing and enable them to maintain their intuitive behaviors.

In digital and computational design fields, expert and AI-based applications developed for use in different phases of design processes are becoming increasingly common. However, studies that aim to cover the tacit domains of design knowledge and consider the embodiment approach are quite rare. This situation may even cause concerns and criticisms regarding using these systems in the design process. On the other hand, HCI studies carried out within the scope of computer sciences are leading the way to approaches and applications that can enable the concepts of tacit knowledge and human intuition to be reconsidered in the context of design.

This position paper presents a theoretical discussion in line with these concepts, as well as the background of current work in the field of HCI and critical concepts in this field. It presents a theoretical framework by discussing existing theories and concepts, synthesizing the existing literature and discourses, and refining a conceptual model relevant to the creative design fields (Chapter 2). It starts with a broad discussion on the relationship between tool use and design cognition, structuring a line of thought through arguments in cognitive theories and phenomenology. Then, it refines this line within digital design media, discussing why digital design tools must be developed through an understanding of embodiment (Chapter 3). Finally, it presents the relevant theories, concepts, and methods within HCI research and links them to design cognition to illustrate how digital design tools can address embodiment, allowing intuitive interactions. While doing so, it visits the pioneering historical examples that support these arguments. In this way, we aim to contribute to developing more effective digital design tools that can encompass non-formalizable ways of knowing in the design process, are integrated into the fabric of the design practice, and allow the designer to interact naturally and seamlessly.

2. Tacit Knowledge and Embodiment in the Context of Creative Design

The motivation for this article is to explore the apparent effects of tool use in design cognition within digital media. Dahlbom and Janlert state that just as you cannot do very much carpentry with your bare hands, there is not much thinking you can do with your bare brain (Dennett, 2000). One uses tools to perform physical and mental activities. Whether mental or physical, all activities require a cognitive relation with the tool. The validity of these relations is based on two fundamental theses: first, the tool embodies specific knowledge that not only influences the user's way of knowing but also is influenced by the user's knowledge. Secondly, there are conceptual tools as well as physical ones. Baber illustrates the first thesis by giving the example of the cognitive

transformation that takes place when using a shoe sole instead of a hammer to drive a nail (Baber, 2003). Here, the hammer possesses purposeful knowledge. Once the user internalizes this knowledge, it may be adapted to another instrument, in this case, the shoe sole. The second thesis refers to what Vygotsky calls the tools of the mind. The tools of the mind consist of symbolic cultural artifacts such as signs, symbols, texts, formulae, maps, diagrams, and language, and they influence how we think (Vygotsky, 1965).

Designing involves performing both physical and mental activities. It requires various forms of engagement with both material and immaterial artifacts. It is fully engaged with tool use, both physical and psychological, and the distinction between the two is often unclear. Hence, design media is a better phrase for addressing the diversity and complexity of a designer's tool set. Design media is the environment of the act of design, which is subject to design thinking and execution. It involves the designers themselves and their interactions with various types of tools. Its inherent qualities and economies are encouraged to shape both process and products in a condition of craft (McCullough, 1998); therefore, it is an actuator.

Representation tools constitute the most common realm of design media. Unlike vernacular forms of making, modern disciplinary design methods are closely engaged with representation tools. Indeed, the modern understanding of design fairly addresses the production and processing of representation tools, just like Schön defines design as producing the representations of the things to be built. According to him, design is a reflection-in-action with talking backs, which emerges as the spontaneous reciprocal reflections between the maker and representations (Schön, 1984). However, this precious definition does not address the materiality of design artifacts as a potential participant in the reflective conversation.

Representation is a form of abstraction. Design representation is commonly considered visual abstraction, imagery of the things to be built. Therefore, the sense of sight is hegemonic in our relationships with artifacts in design development and evaluation through their representations. Modernist design methods celebrate the eye as a superior sense organ above the others. They emphasize the praise of sight. They constrain our relationships to the visual in an abstract sense. They distinctly separate design and making. Because, in the age of professionalism and expertise, the designer is responsible for producing rhetoric. Moreover, this rhetoric is principally produced by and for the eye because, as Pallasmaa mentions, sight is the only sense that is fast enough to keep pace with the astounding increase of speed in the technological world (Pallasmaa, 1996). Sontag also mentions the modern praise of sight, emphasizing image. She claims that reality has come to seem more like what is shown by the camera, and the people of the industrialized countries seek to have their photographs taken because they feel that they are images and are made real by photographs (Sontag, 1977). Hence, the image becomes the sole reality in the modern world, and believing becomes a consequence of seeing.

Steiner claims that five classical senses fuse into each other in multiple ways and generate a complex perception system that eventually constitutes twelve senses such as the senses of sight, taste, smell, balance, movement, life, touch, ego, thought, speech, hearing, and warmth (Steiner, 1958). He categorizes them as outward and inward senses. The ones directed more towards the outside are adapted to penetrate the outer world. The inward senses let us perceive ourselves in the things and the effect of things upon us (Steiner, 1981). In this regard, the sense of sight is outward, whereas the sense of touch is inward.

Also, Gibson defines senses as aggressively seeking mechanisms rather than passive receivers (Gibson, 1983) and considers the perceptual system a continuously operating actor. This is strongly related to Merleau-Ponty's definition of embodied perception, which is not a passive receptor activity but an active involvement of the whole body (Merleau-Ponty, 1962). Neglecting this complex system of perception of the involved body and letting the sight be hegemonic over the other senses will disable most of the capabilities of the individual and constrain his/her existence

to a witness who has nothing but eyes to perceive; in Pallasmaa's terms, a bodiless observer (Pallasmaa, 1996).

Within the knowledge acquired by perception, Diderot claimed that the eye is the most superficial, the ear is the haughtiest, the smell is the most voluptuous, the taste is the most superstitious and inconstant, and touch is the most profound and philosophical (Diderot & Jourdain, 2010). What is profound about touch is that it is not only a way of receiving but also a way of transmitting. Moreover, Pallasmaa claims that all the senses, including vision, are extensions of the sense of touch, the senses are specializations of the skin, and all sensory experiences are related to tactility (Pallasmaa, 1996). Tactility enables mutual engagement with things. It allows the hybrid assemblage of brains, bodies, and things, which Malafouris defines as how we think (Malafouris, 2013). While the primacy for sight is witnessing, for touch, it is making.

Moreover, our relationships with the material world are not always based on explicit knowledge. Polanyi claims that we can know more than we can tell to refer to the realm of knowledge that is not possible to express by verbal means (Polanyi, 2009). Many of such engagements are rooted in tacit knowledge. Also, the tacit knowledge that many physical situations afford plays an important role in expert behavior (Klemmer et al., 2006). Craft, for example, is a good example of a field where such ways of knowing play an active role. Craftsmanship refers to workmanship using any technique or apparatus in which the quality of the result is not predetermined but depends on the judgment, dexterity, and care that the maker exercises as he works (Pye, 1978). Pye claims that the quality of the result is continually at risk during the making process, so he calls it the workmanship of risk (Pye, 1978). Similarly, Dutta's definition of felicitous error refers to a variation from the programmed and indeterminacies in physical processes and is essential to craft (Dutta, 2007). Both felicitous error and workmanship of risk are rooted in the tacit and inarticulable dimensions of craft skills and are not to be afraid of. Sennet addresses this by claiming that the craftsman's desire for quality poses a motivational danger: the obsession with getting things perfectly fitting may deform the work itself (Sennett, 2009).

Both the practice of design and the fabrication of a design object are directly related to craft. Likewise, a significant part of design knowledge is tacit. According to Cross, what designers know about their own problem-solving processes remains largely tacit knowledge, i.e., they know it in the same way that a skilled person knows how to perform that skill (Cross, 1982). According to Schön, it comes from our actions (Schön, 1983); that is, we know it by acting and perceiving.

We need to consider design as a practice that involves the complex mechanisms of perception and enables various forms of bodily and cognitive engagement between material and immaterial entities. Therefore, we need to develop design media that can perform as actuators in collaboration with the designer. In other words, we need diverse tools, which are the aids of imagination and instruments of thinking tied to the body (Latour & Yaneva, 2017). Thus, they will perform as the extensions of one's bodily range and bodily syn-thesis, as defined by Merleau-Ponty (Merleau-Ponty, 1962).

3. Digital Design Media as an Extension of the Body

There are two crucial notions towards developing digital design media as an extension of the body: the theory of affordances and the synchronization of action and perception. The theory of affordances was initially introduced by psychologist Gibson to address the possibilities of actions that are formed by the relationship between an agent and its environment (Gibson, 1977). Norman introduces this notion into design to address the relationship between a physical object and a person (or, for that matter, any interacting agent, whether animal or human, or even machines and robots). He claims that affordance is a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used (Norman, 1990). Related to digital design media, the term can relate both to software and input systems. This article focuses on the latter. Common input devices are not capable of performing affordance. As discussed by Sharlin et al., the lack of affordance of the most common computer interaction

techniques causes uncertainties about the functionalities of input devices (Sharlin et al., 2004). Common interaction methods and devices have a very low level of affordance and can negatively affect cognition, especially in creative practices like design, where the outcome is a three-dimensional tangible object largely identified through its material qualities.

Sutphen et al. seek interface affordances as well as the synchronization of the perception space and the action space for better interactions. They claim that the spatial and temporal natural synchronization of our perception space and our action space enables us to perform complex tasks (Sutphen et al., 2000). The synchronization enables direct and immediate reflections between the maker and the object. Hence, making becomes a dialogue between the object and the maker. The synchronization mentioned here refers to the situation in which the transfer of the input to the system and its perception by the user happens at the same time and place. Sketching in design is a good example of this synchronization. While sketching, the designer visualizes what he/she imagines in its simplest form and in the fastest way and gets the chance to perceive his/her imagination through the same visual instantly. Synchronization enables the practice of thinking in direct, uninterrupted, and instantaneous action between the object and its maker.

The actuator design media must afford the user and synchronize the actions and perceptions. To this end, we need to develop multimodal interaction systems. Multi-modality refers to interaction with the virtual and physical environment through natural modes of communication such as speech, body gestures, handwriting, graphics, or gaze (Bourguet, 2003). Therefore, they incorporate the human sensory systems. In this regard, the interface becomes a natural and organic layer. Actually, in its ultimate sense, this layer entirely ceases to exist.

In order to develop digital design environments that can cope with complex human perceptual mechanisms, including touch, as an extension of both body and mind and that can encompass the implicit areas inherent in design knowledge, it is necessary to closely follow the findings of research within computer science that are relevant to design knowledge and its implementation. In this way, it may be possible to develop strategies that do not weaken our relations with the tangible, tacit, and implicit but strengthen them with the help of adopted technologies. Potential methods enabling intuitive behaviors and hybrid environments that designers seek are being developed within the scope of computer science.

We can now design HCI capabilities where the computer anticipates, predicts, and augments the performance of the user and where the human supports, aids, and enhances the learning and performance of the computer (Grigsby, 2018). Augmented cognition, a form of human-technology interaction where a tight coupling between a user and a computer is achieved via physiological and neurophysiological sensing of the user's cognitive state (Stanney et al., 2009), seeks to advance this human-machine symbiosis through both machine understanding of the human (such as physical state sensing, cognitive state sensing, psychophysiology, emotion detection, and intent projection) and human understanding of the machine (such as explainable AI, shared situation awareness, trust enhancement, and advanced UX) (Grigsby, 2018).

Such environments can foster Hybrid Intelligence (HI), which was introduced by (Dellermann et al., 2019) as the most likely paradigm for the division of labor between humans and machines, aiming at using the complementary strengths of human intelligence and AI, so that they can perform better than each of the two could separately. (Liu & Fu, 2024) emphasize HI's potential in promoting the sustainable development of human society, as it stands out to become the pivotal force driving purposeful and planned sustainable creative behavior in the AI era. Addressing these discussions in the context of design knowledge will pave the way for developing better design tools. The following section presents fundamental concepts and discussions related to these technologies.

4. Possibilities for Intuitive Interactions

The inclusion of various human senses in our interaction with the digital environment is becoming more possible, in line with the developments in HCI technologies. Modern HCI systems consider three modes within this evolution: Command-Line Interfaces (CLI), Graphical User Interfaces (GUI), and Natural User Interfaces (NUI).

CLI refers to the mode of interaction where the user inputs commands to the system through consecutive lines of text. This mode of interaction distinctly separates the perception space and the action space. It requires the use of symbolic systems; hence, cognitively advanced abstraction is essential.

GUI allows the user to interact through graphics on a screen. Interaction is achieved through Windows / Icons / Menus / Pointer (WIMP) interfaces. Yet, many natural human abilities are blocked by the common Keyboard / Mouse / Monitor interface and the WIMP interaction (Sharlin et al., 2001). Also, as 3D object manipulation and movement require much more than a 2 degrees of freedom (DOF) interface, a WIMP method of object interaction tends to interfere with fluidity (Gauldie et al., 2004). In such interactions, the pointer is controlled using generic devices such as the mouse or the fingers on touch screens. These devices do not perform affordance as they do not naturally guide users toward their functional characteristics. They are not functionalized by their forms but by the software used. The use of fingers may have both pros and cons in terms of enhancing the interaction. However, in either way, GUI-based HCI displays all information as "painted-bits" on rectangular screens in the foreground, thus restricting itself to very limited communication channels; and they fall short of embracing the richness of human senses and skills people have developed through a lifetime of interaction with the physical world (Ishii & Ullmer, 1997).

The still hypothetical concept of NUI aims at providing more intuitive interaction modes. NUI needs to be multimodal, invisible, and intuitive. Affordance is key to intuition. So, a novice user can intuitively start using the system and experience a steep learning curve. NUI is relevant to most everyday interactions with the material world through tactile engagements. Indeed, the most seamless interaction with computer systems could emerge by changing the world into an interface, in Ishii and Ullmer's words (Ishii & Ullmer, 1997). And by moving the interface out of the screen, we move it closer to the human world (Svanæs, 2009).

One can find potentials for enhanced, bodily, and intuitive interactions with digital design media through certain key concepts of the so-called third-wave HCI, named the phenomenological matrix by Harrison et al. The third-wave treats interaction not as a form of information processing but as a form of meaning making in which the artifact and its context at all levels are mutually defining and subject to multiple interpretations (Harrison et al., 2007).

Schmidt defines the concept of implicit HCI (iHCI) as an action performed by the user that is not primarily aimed to interact with a computerized system but which such a system understands as input (Schmidt, 2000). The implicit dimension of HCI is rooted in certain concepts within the discipline of Human-Centered Computing, such as Ubiquitous Computing (ubicomp, also called Pervasive Computing), Calm Technology, Context Awareness, Intelligent Environments (IE), and Ambient Intelligence (AmI). Each concept is strongly related to the other while having minor differences.

Satyanarayanan characterizes a ubicomp environment as one saturated with computing and communication capability, yet so gracefully integrated with users that it becomes a technology that disappears (Satyanarayanan, 2001). Calm technology refers to the computer systems that engage both the center and the periphery of our attention, while the periphery stands for what we are attuned to without attending to explicitly (Weiser & Brown, 1997). Context-aware computing is the ability of a mobile user's applications to discover and react to changes in the environment they are situated in (Schilit & Theimer, 1994). Augusto et al. define IE as environments in which the actions of numerous networked controllers are orchestrated by self-programming pre-emptive processes

in such a way as to create an interactive holistic functionality that enhances occupants' experiences (Augusto et al., 2013). AmI refers to electronic environments that are sensitive and responsive to the presence of people (Aarts & Encarnação, 2006).

As a result, the hybrid design media of intuitive interactions is a matter of environment in which the computer system disappears. It is programmed and functionalized in a way that is aware of the user and the particularities of the context of use. This notion addresses Norman's definition of soft technology (Norman, 2014). He argues that soft technology refers to compliant, yielding systems that informate and provide a richer set of information and options than would otherwise be available. He also states that these systems acknowledge the initiative and flexibility of the person, whereas hard technology refers to systems that prioritize technology with inflexible, hard, rigid requirements for the human.

Developing our interactions with computer systems in line with these approaches will enable easier end-user integration while obtaining outputs easily. Particularly in design domains, such systems will allow more direct, seamless, and organic interaction between the designers and the objects while enabling humans to use their complex perceptual mechanisms and intuitive skills. Furthermore, they will enable designers to maintain the practice of fluid thinking, such as sketching, while utilizing the possibilities of digital technology. What is needed for this is to consider the knowledge, concepts, and methods in HCI and related fields when developing design tools.

Looking at the historical development of digital design media, one can observe that explorations that could relate to the concepts of embodiment, tacit knowledge, and intuitive interaction discussed in this article can be seen even in the early works of this field. For example, in the 1960s, Sutherland mentioned that most interaction between man and computers has been slowed down by the need to reduce all communication to written statements that can be typed (Sutherland, 1964). He developed a system called Sketchpad, which was in favor of line drawings instead of typed statements in the early 1960s. It was the pioneering demonstration of direct user input into digital design media. Therefore, it is often coined as the first GUI or HCI application for CAD. Sutherland proposed a tangible device: a light pen integrated with a control box containing command buttons like draw, move, or rotate. The device allowed the user to use his/her hands in real 3D to perform certain functions. It enabled spatial interaction through a handheld device, while today's most common input devices, like the mouse or touchpad, can operate only on 2D surfaces.

Explorations towards more enhanced interactions date back to the 1970s. The Architecture Machine Group of Nicholas Negroponte was one of the pioneers who worked on outstanding projects such as the Seek (Negroponte, 1970). It demonstrated a possible direct relationship between the model world and the real world. It included 500 metal-plated cubes of 5 cm dimension and curious gerbils inside an enclosed space. The gerbils were constantly moving the cubes. These movements were being recorded and repeated by a robot arm. Negroponte defines the output as a constantly changing architecture that reflects how little animals used the place.

Aish claimed that it is often difficult for the user of conventional graphic computer-aided architectural design (CAAD) systems to conceptualize the building being designed by only inspecting and manipulating drawings displayed on the screen. He proposed a 3D input method for CAAD systems to complement the graphical channel of man-machine communication by enabling much of the 3D information to be communicated by the designer directly to the system (Aish, 1979). Such a system could eliminate the need to learn operating commands for interaction (Aish & Noakes, 1984). It was an early significant demonstration of the applicability of hybrid design media, which naturally complements the human intuitive skills and the capabilities of the computer.

As seen in these early works, the idea of creating embodied, three-dimensional, intuitive, and hybrid interaction possibilities with digital design media has existed since the beginning of their development. Current technologies and approaches in the field of HCI can make it more possible to realize such interactions in more seamless ways.

Several existing studies in this field can help understand how hybrid interaction methods might evolve and how they can be effectively utilized in design fields. They are mostly developed for general design applications (Follmer & Ishii, 2012; Huang & Eisenberg, 2012; Vuletic et al., 2021), while some of them address specific design disciplines such as architecture (Johns, 2013; Mitterberger et al., 2020; Yoshida et al., 2015) fashion design (Iarussi et al., 2015), urban design (Han et al., 2023), landscape design (Ishii et al., 2004), or arts (Shilkrot et al., 2015; Yao et al., 2024). They are mostly used for digital modelling and visualization (De Araújo et al., 2013; Momenaei et al., 2021), while the ones that are used for tangible applications such as fabrication and physical object manipulation (Burden et al., 2022; Weichel et al., 2015) have been increasing in the last decades too. Most applications are developed for designers to use (Devendorf & Ryokai, 2015), while some target end users for participatory or Do-It-Yourself design purposes (Beattie et al., 2015), and others are developed for craftsmen or makers involved in the fabrication process (Frost et al., 2024; Mitterberger et al., 2022; Zoran & Paradiso, 2013).

(Niu et al., 2022) present a review of multimodal natural human-computer interfaces for computer-aided design, categorizing them as eye tracking, gesture recognition, speech recognition, and brain-computer interface-based systems. Also, (Vuletic et al., 2019) present a literature review identifying the characteristics of gesture-based interaction interfaces through visual-based sensors and cameras, and physical wearables. More research is needed to outline how tangible and bodily interaction can advance HCI research in design. For this, it is necessary to consider approaches to developing these technologies that encompass the implicit domains of design knowledge and action and understand the digital environment as an extension of the body and the material environment.

5. Conclusion

At a time when digital technologies and artificial intelligence-based applications are becoming increasingly widespread, it is important to question the possibilities of technology to develop in a human-centered direction. The concept of embodiment can provide a guiding conceptual framework by drawing attention to the relationship of thinking with the body and the physical environment. This framework is even more vital in creative design practices such as architecture, environmental, and product design, where the end product is a material object. Approaches and paradigms in the field of HCI guide the development of contemporary design tools to encompass the implicit and intuitive design domains.

The creative design process is significantly influenced by the environment in which it takes place. This process involves the designer's complex sensory and perception system, including their body. As a result, the designer must be able to interact with design tools both physically and mentally, a principle that holds true in digital design. Therefore, there is a need for explorations that can enable multimodal communication and the use of design tools as an extension of both the mind and the body. The development of technology in this direction, utilizing the concepts, approaches, and techniques in the field of HCI, is critical for the future of design as an embodied creative practice.

The digital design environment can be reconsidered so that the designer can interact with his/her tools multimodally, with a high level of affordances and synchronization of action and perception. The sense of touch has a special place in this interaction and requires the use of a three-dimensional natural environment. Studies in the field of HCI, especially the developments within the so-called third-wave paradigm, can be instructive in this direction. Therefore, concepts such as iHCI, distributed computing, serene computing, context-aware systems, intelligent environments, and ambient intelligence should be emphasized in the context of design tools. These concepts have been of interest since the early days of computer-aided design research, and a body of work can guide us in this regard. Evaluating recent innovations in HCI in the context of design knowledge will support the human-centered development of design tools, making it possible to use them as extensions of both the mind and the body.

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Resume

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Level of participation in land development: The case of Almere, Netherlands

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Abstract

The actors and processes change in the stages of the land development process, and the involvement of the changing actors and processes in the process is at different levels. This involvement and the dimensions of the participation of the actors may differ according to the planning approaches and practices of the country where the project is developed. Participation discussions, especially after the 2000s, have led to an increase in the practices aimed at including citizens and other actors in the planning processes. In residential land development processes, examining the balance of power between actors and participation has gained importance over the years. The dimensions of participation at each stage in land development processes are the subject of the research. This research examines the city of Homeruskwartier, Almere, Netherlands, in order to explore the dimension of participation in the land development stages. It accepts Arstein's Citizen Participation Ladder and institutional land development theory as the theoretical basis. The level of participation in the institutional land development stages of the examined example was evaluated. The findings of the study determined that the stage with the highest participation in Homeruskwartier is the construction focused on self-organization. The study also found that participation was not concentrated in a single stage in the design of the project carried out to meet the need for social housing, and that it had an effect in other stages as well. Homeruskwartier is a successful participatory and self-organization-focused housing project. It is expected that the findings of this study will form a basis for policy developers and decision-makers to create participatory land development models.

Keywords: Homeruskwartier-Almere, housing, land development process, participation

1. Introduction

The production of developed or transformed housing plots to meet the housing needs is realized at the end of the land development process. Many processes and actors are involved in this process, from raw land as input to zoned land as output. Raw land, which is initially inactive, turns into mature land with a completed infrastructure ready for construction along with many factors such as the balance of power, financing, land owners, the interaction between actors, and development of infrastructure during the development process. In this process, many elements such as the location of the land, being in or out of the city, distribution of power among the actors involved, methods followed in land development processes, regulations, planning approaches of the country or region, etc. affect the shaping of the process. Although there are different approaches to the land development process, the institutional land development process stands out. The mentioned land development process is defined with different stages. These stages are grouped under six headings: land acquisition, financing, land preparation, land disposal, construction, and property transfer (Turk & Korthals Altes, 2010). In traditional land development processes, the acquisition of land is provided by the use of the state's public land acquisition powers, such as purchase and expropriation, or by the powers of special administrations within the framework of market dynamics. In the land development process, financing plays an important role in shaping the process. This stage includes the provision of resources such as banks, insurance, cooperation, etc., or public loans to finance the project.

The preparation of the infrastructure outside the designated area and on-site for the development of a plot of land without zoning is carried out during the land preparation process. This process includes planning land use, providing infrastructure and public service areas, and obtaining the necessary construction permits for the project (Turk & Korthals Altes, 2010). This process is the stage that may differ the most in the land development process depending on the country where the project is realized and/or the project proposal. In the traditional land development process, in addition to local governments as actors in the creation and execution of zoning plans, private sector actors such as developers and contractors with neo-liberal policies are also involved in this stage. The process of constructing a structure on a plot ready for construction is called the construction stage. This stage has a complicated structure such as design, project preparation, financing, and implementation. After the completion of construction, the transfer of the property rights of the developed real estate to the buyer actor, such as sale and rental, is the property transfer stage. As mentioned above, land development processes have a dynamic structure with different actors. Apart from the public and private sectors, there are also different actors involved in the process such as the landowner where the project will be carried out, the user of the developed residential real estate, and the residents of the surrounding area. However, in the traditional land development model, the balance of power is concentrated in the public and private sectors, the level of involvement of the local people in the process remains at a minimum level and they follow a passive role without having a say throughout the process.

On the other hand, especially after the 1960s, the involvement of different segments of society in political decisions has been rising as an important issue. The involvement of society in decision-making processes is called "participation". However, the level of participation may vary depending on the project, country, region, subject, etc. Determining the level of participation is also one of the main issues in participation studies in the literature. Many different approaches have been developed to measure participation, but all of these approaches have shown that as the balance of power increases, the involvement of citizens in decision-making processes increases (Arnstein, 1969; Burns et al., 1994; IAP2, n.d.; Wilcox, 1994; Wulz, 1986). On the other hand, increasing participation in discussions brings up the involvement of different actors in the land development process, the production of responses to different housing needs, and the local people having a say in housing production projects. This situation makes it a research topic to try different models in the housing-based land development process and to evaluate the extent of participation within these models.

This study examines the dimensions of participation in the process of residential land development. The extent of participation is examined at which stages in the land development process. In this context, the Homeruskwartier region in Almere, Netherlands, is considered a case study as a "participatory land development" project. To evaluate the dimensions of participation, the study first examines Arnstein's (1969) "Ladder of Citizen Participation". Then, a case study is conducted. In the field study, academic resources on the subject and plans published by public institutions and organizations are used. First of all, the planning process of the area is historically addressed in order to understand the culture of participation. This study aims to determine the distribution of the balance of power in the process by evaluating the extent of participation at which stages in the process of residential land development. The outputs of the study are expected to form a basis for policymakers and decision-makers in the production of participation-supported land development models.

1.1. Participation

Arnstein (1969) defines participation as 'the people having a say in decisions about the future of the city.' The focus of participation, which includes terms like public or citizen participation, is on the distribution of power among actors. Wulz (1986) sees participation as a broad concept involving various stakeholders in decision-making. While its roots trace back to Ancient Greece, active participation in decision-making has gained importance in modern democratic societies. Since the 1960s, citizen participation has increasingly influenced urban planning, evolving beyond voting to

include broader involvement in shaping decisions. As participation increases, citizens gain more influence in the decision-making process. Arnstein's 'Ladder of Citizen Participation' (1969) remains the most influential model, classifying levels of participation and power distribution.

Arnstein (1969) classified participation into eight levels, illustrating the extent of citizen power in decision-making through the 'Ladder of Citizen Participation' (Figure 1) These levels are organized into three categories: 'Nonparticipation,' 'Degrees of Tokenism,' and 'Citizen Power.' At the lowest levels of nonparticipation—Manipulation (1) and Therapy (2)—citizens are excluded from meaningful engagement in the planning process. Rather than contributing to decisions, they are subjected to efforts aimed at persuading or educating them to accept pre-made decisions. In these steps, the focus is on convincing citizens to adopt a plan, without soliciting their input or feedback. Examples of this include surveys that do not influence the outcome or tokenistic actions that give the appearance of participation without genuine involvement. Especially in the manipulation step, citizens are in a passive and spectator role in the decision-making process. In the therapy step, an attempt is made to create an impression of unreal participation. Public campaigns can be organized in these steps.

The second group includes the ostensible level. This group includes Informing (3), Consultation (4) and Persuasion (5). At these levels, citizens again do not have a say. However, they are informed about the plan or are given the opportunity to make suggestions. Although the level of participation increases as the steps go up in this group, the suggestions of the citizens are not actually evaluated by the powerful, but the citizens are persuaded. Here, the process of the demands, ideas and decisions of the citizens is completely under the initiative of the powerful. However, the powerful can revise the project in line with the demands and requests of the citizens at these stages. While there is a one-way flow at the informing stage, a flow also occurs from the citizen side as you go up. In other words, there is a one-way communication. There is limited and controlled participation at the consulting stage. This situation mentioned provides partial citizen participation. However, the main purpose here is still to have the project adopted by the citizens. Citizens do not have the power to control whether their demands create a change within the scope of the project and provide an input. This indicates that citizens have only a nominal, rather than real, participation in decision-making processes.
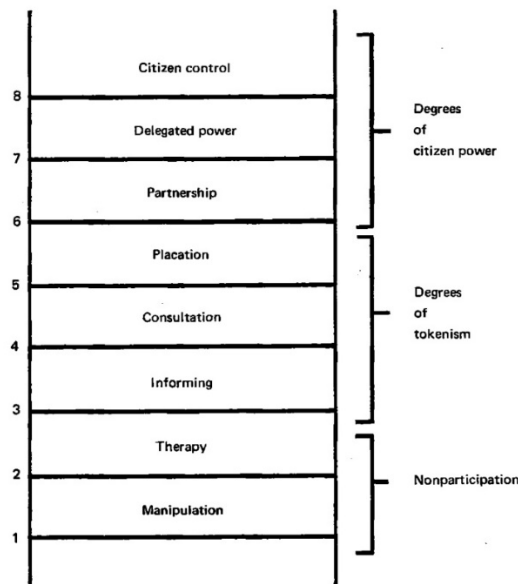

Figure 1 Ladder of citizen participation (Arnstein, 1969)

Participation (6), Delegated Power (7) and Citizen Control (8) levels are included in the Citizen Power levels. In the cooperation level, citizens are given the opportunity to negotiate. Citizens play an active role and are given the right to negotiate. In this process, the public's opinions are considered through negotiations. Cooperation is the level where the public and decision-makers

exchange ideas and different stakeholders come together. In the delegation and citizen control levels, citizens gain the majority of the power in decision-making. In delegation, the public has more authority than the planner, especially in practice. In citizen control, power is completely left to the public. At this level, the participation of citizens in the decision-making process is the highest. Decisions are made collectively without relying on the power of the authorities, and responsibility is left to the citizens through an organization or committee. Arnstein says that this level means citizen participation.

1.2. Self-Building

Self-building is the practice in which households, individually or in groups, undertake the responsibility of producing housing for their use in disciplines such as planning, architecture and construction. Participation in this process can show different dimensions (Bossuyt et al., 2018). The scope of household participation can vary from building their own homes completely on their own to sharing design and construction responsibilities with other parties. The self-building method generally encourages the production of more sustainable and environmentally friendly housing (Davies, 2021). In this housing construction practice, households have more control over the design, construction and personalization of the houses they will live in. Thus, instead of uniformity in the houses produced with this method, personalized and diversified living spaces that meet the needs of the household emerge. This provides more autonomy and flexibility compared to traditional housing production, such as purchasing or renting properties built by developers, etc. (Bossuyt et al., 2018). In this practice, residents actively participate in different stages of the housing and land development process. The self-building method, where participation is high, is defined as a "simple" and "collective" method (Barlow et al., 2021). This situation shows that the self-building method is one of the upper stages of participation in housing production.

Unlike traditional housing and land development processes, this method has very low or no profit margin and marketing costs. According to Bossuyt et al. (2018), instead of freedom of choice and profit maximization in housing provision, "maximization of life satisfaction" are the two fundamental bases of the self-building method. In this context, self-building serves democratic rights with freedom of choice as well as ensuring the right to housing and aims to develop housing environments that meet the needs of households instead of profit-oriented projects in market conditions. The fact that it acts differently from market dynamics has made the self-building method more resilient in housing provision during financial crisis periods (Davies, 2021). For the reasons mentioned, many countries resort to the self-building method. However, it should not be forgotten here that this method is implemented in developed countries under a legal regulation. Although the gecekondu approach, which is the illegal production of housing by households to meet housing needs in our country (Korkmaz & Balaban, 2020), is a kind of self-building, this study discusses projects that are legally realized as self-building.

The self-build method is frequently used in European countries such as the Netherlands, England, France, and Germany (Davies, 2021; Portschy, 2016; Savini, 2017). For example, in Amsterdam, the largest city in the Netherlands, it is planned to use the self-build method in approximately one-quarter of newly built houses (Savini, 2017). Similarly, the United Kingdom has been implementing many policies and initiatives to support the self-build industry, especially since 2016 (Davies, 2021). In addition, Davies (2021) states that according to Morton (2013), the self-build method accounts for almost half of the current housing production in Europe. On the other hand, there are also aspects of self-build that require concern such as finding and providing suitable land, managing the planning process, creating knowledge and competence, managing the construction process, and creating an integrated environment.

2. Method

This study examines the extent of public participation in the process of residential land development. In this context, the Homeruskwartier neighborhood in Almere, Netherlands, is taken

as a case study. The first reason for choosing this example is that the flexible planning approach exists in the Netherlands, where the province of Almere is located. The second is that the country sees the city of Almere as a laboratory to try out new planning theories and approaches within itself. Another reason is that the participation approach in city planning has been included in the planning process and culture for a long time. Finally, in the literature, participation-oriented land development processes are mainly examined in urban areas and areas where there is already construction, and the participation of stakeholders (property/land owners) in these areas is examined. However, the examination of participation approaches in housing-oriented projects carried out in the periphery of the city or in development areas outside the city is limited. For these reasons, the city of Almere was chosen as an example for the study.

In the study, information about the case within the scope of the project was obtained from secondary sources through literature review. The literature review about the case was conducted through "ScienceDirect" using "Almere" and "land development", but since sufficient resources could not be reached, only the keyword "Almere" was used and journals related to the planning discipline were selected. The study first started the review through the articles obtained from here and then continued with secondary source review through search engines. In order to have a command of the planning process of the case, the plan reports on the official website of the local municipality were included in the review. The information obtained as a result of the research was evaluated in six steps of the land development process. Although many theories have been developed for participation (Arnstein, 1969; Burns et al., 1994; IAP2, n.d.; Wilcox, 1994; Wulz, 1986), the theory of Citizen Participation Ladder gains importance with its deep-rooted and detailed participation in different dimensions. In evaluating the participation dimension of the case, this study uses Arnstein's (1969) Citizen Participation Theory, which is available in the literature. In line with the information obtained from secondary sources, the study examined at which stage of the Citizen Participation Ladder the Homeruskwartier project was located in the land development process and a participation matrix was created.

3. A Look at the City of Almere

The city of Almere is located across the IJmeer River from Amsterdam, the largest city in the Netherlands. The city is administratively affiliated with the province of Flevoland. However, due to spatial proximity and economic relations, it is part of the Amsterdam Metropolitan Area (MRA) (Figure 2). This situation causes the pressure and housing needs in the city of Amsterdam to be reflected in the Almere region. The city is also one of the newest cities in the Netherlands. This situation enables Almere to serve as a laboratory for the country's planning approaches. The first construction in the city began in 1976 (Zhou & Commandeur, 2009). However, with the increasing density of construction in the region, the city has become the most populous city in the Flevoland region to which it is affiliated. The city's population exceeded 200,000 people in 2017.

When the development of the city of Almere is examined, it is seen that the city is a typical example of the spatial planning of the Netherlands after the Second World War (Jansma & Wertheim-Heck, 2021). Although it has a hierarchy within itself, the city acts as an extension of Amsterdam and includes the garden city concept. The development of the city was planned as an agricultural hinterland to meet the agricultural needs of the region, and in the projects developed, efforts were made to preserve this feature in part.

Figure 2 Location of Almere, Almere Poort is highlighted in red by the author (Zhou et al., 2015)

The city of Almere consists of five official districts: Almere Stad, Almere Buiten, Almere Haven, Almere Hout and Almere Poort. The Almere Stad district is the city's center with a population of 108,605. It is a commercial, social and transportation focal point. The Almere Buiten district is the second most populous district with a population of 56,120. The Almere Haven district is defined by the municipality of Almere as the smallest district and Almere Hout as the most rural district. Almere Poort, one of the official districts, is the part of the city closest to Amsterdam (Figure 2). It is also defined as the youngest district in terms of development of the city. Development in this district started in 2005 (This is Almere, n.d.). The fact that this district has young and strong economic connections provides an advantage in the application of different models in the process of developing land for residential purposes.

3.1. Planning Process

Jansma and Wertheim-Heck (2021) examine Almere's planning process in four periods: 1958-1971, 1972-1983, 1984-2003, and 2004-2013. Almere's planning began in 1958 with the first national spatial planning document, responding to the Netherlands' need for new development and housing areas. Influenced by modernization, the garden city concept gained popularity in suburban planning. By 1971, legal procedures were finalized, aiming to accommodate 125,000 to 250,000 residents within 25 years. Flexibility was prioritized to account for the nation's agricultural policies and future uncertainties (Jansma & Wertheim-Heck, 2021). The plan emphasized rural-urban integration, allocating one-third of the area to green spaces, with key zones identified for urban concentration, industry, and recreation (Figure 3-A). Almere Poort was designated as agricultural land, with development focused along the coast.
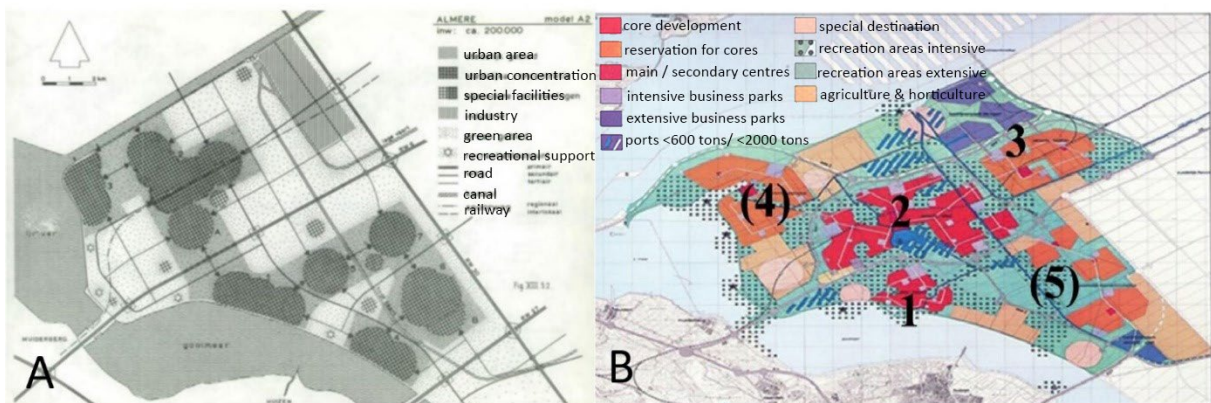
Figure 3 Development Plan of Almere in the 1970s (A) and Almere 1978 Concept Plan (B) (Jansma & Wertheim-Heck, 2021) (Translated by the author)

The planning period from 1972 to 1983 marked a shift in Almere's development, with growing support for it to become an independent city rather than a suburb of Amsterdam or Utrecht. In 1972, the Flevo Polders Development Authority (FPDA) was tasked with developing a city for 125,000 to 250,000 residents by 2000. The goal was for Almere to function independently, reflecting the national trend of "controlled and concentrated urbanization" outlined in the Third National Spatial Plan of 1977 (Jansma & Wertheim-Heck, 2021). This situation made Almere one of the first examples of the reflections of the national planning of the Netherlands in the 70s. The 1978 concept plan (Figure 3-B) outlined a hierarchical development strategy, with Almere Haven (1), Almere Stad (2), and Almere Buiten (3) prioritized for development until 2000. The regions Almere Pampus (4) and Almere Poort (5) were designated for later development, with rural character preserved in Almere Poort (Almere, 1983). The Homeruskwartier neighborhood, analyzed in this study, began to emerge in this period, although its development was not fully realized until later.

Following the 1978 concept plan, the official land use plan for Almere was approved in 1983 (Jansma & Wertheim-Heck, 2021). This plan introduced six social goals, reflecting a people-oriented approach: promoting regional population flow, anticipating future needs, ensuring inclusivity ("room for everyone"), supporting individual development, protecting the natural environment, and fostering urban culture and identity (Gemeente Amsterdam, 2003). The goal of inclusivity highlights a commitment to accommodating diverse social groups. The 1983 Construction Plan directed city expansion northward, toward the sea, along the Amsterdam-Leystad route (Figure 4). Although the plan maintained elements of a distinct city, it remained influenced by Ebenezer Howard's Garden City concept (Cabannes & Ross, 2018).

Figure 4 1983 Construction Plan (Gemeente Amsterdam, 2003)

The approval of the 1983 Construction Plan marked the beginning of Almere's third planning period (1984–2003), coinciding with the establishment of the local municipality in 1984. This transfer of planning authority from regional to local government allowed the municipality to acquire land from the central government at a low cost, enabling real estate development and revenue generation from housing projects (Jansma & Wertheim-Heck, 2021). To accelerate housing, the municipality invested in public infrastructure such as hospitals, parks, and schools. The city's rapid growth, influenced by the Amsterdam metropolitan area, led to an annual construction of 2,000–3,000 homes, increasing the population to over 150,000. While Almere had traditionally housed middle-income groups, this period saw a shift, with expectations that higher-income

residents would move from Amsterdam to Almere (Gemeente Amsterdam, 2003). The city also aimed to attract both young and older populations during this phase.

After the 1980s, influenced by neoliberal policies, real estate projects in Almere were developed through public-private partnerships, following the traditional Dutch land development model. A new planning phase began in 2010, focusing on intensive urbanization on the city's western side (towards Amsterdam), while the eastern side retained a rural character. The 2010 Almere Construction Plan (Figure 5), approved in 2003, set development goals for 2030, outlining land use and project timelines. In Almere Poort, the plan designated areas for a city center (red), central axis (orange), suburban neighborhoods (cream), mixed-use spaces (grey), and office areas (light pink). Unlike earlier plans, northern coastal development was postponed, with initial growth focused on office areas near the Amsterdam route. The plan provided clearer development directives than in previous periods, particularly prioritizing Almere Poort between 2003 and 2010.
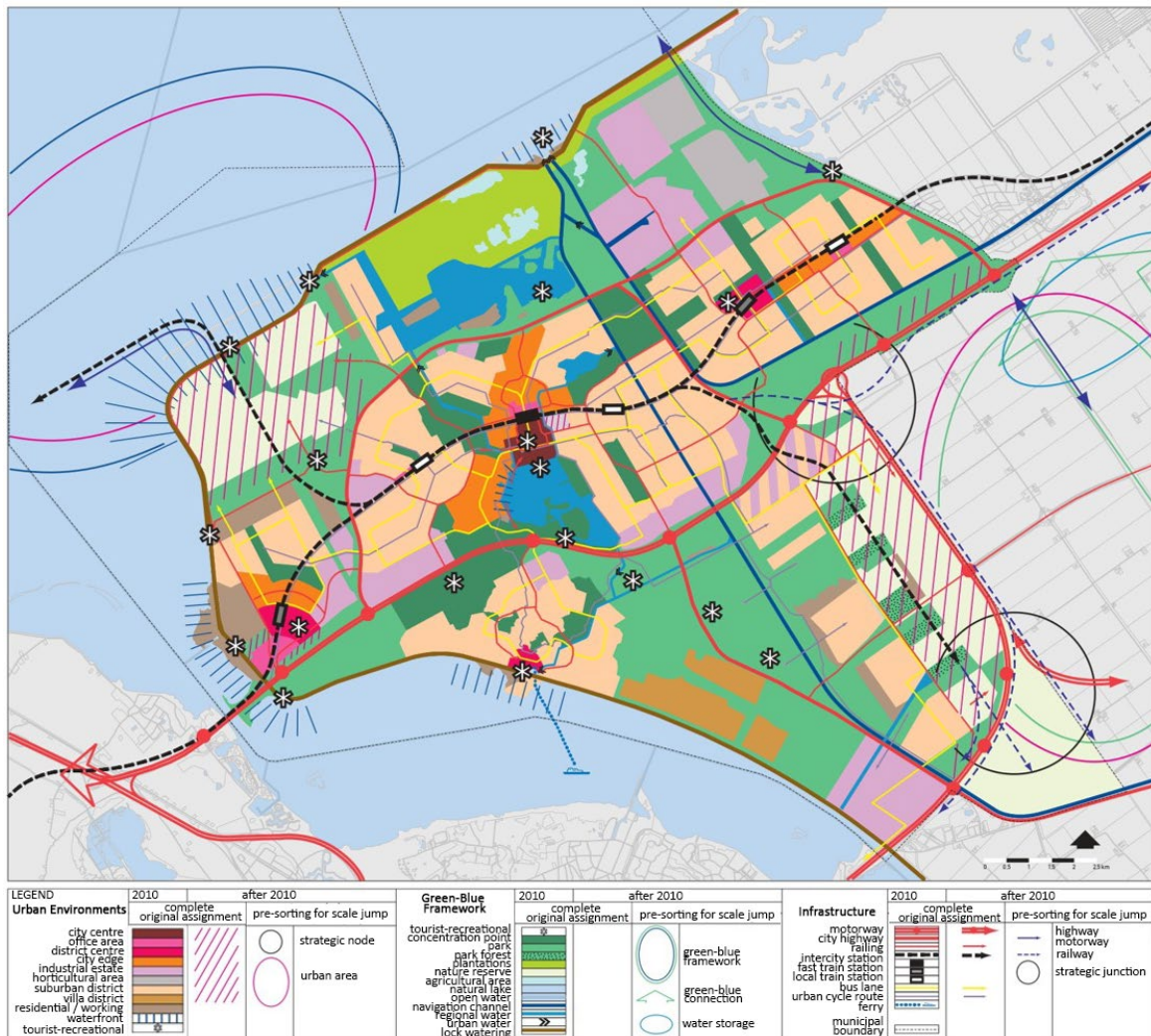
Figure 5 2010 Almere Construction Plan, 2003 (Gemeente Amsterdam, 2003) (Translated by the author)

Between 2004 and 2013, during the implementation of the 2010 Almere Development Plan, significant developments occurred. In 2006, the central government approved a national program aimed at enhancing the international competitiveness of the Amsterdam Metropolitan Region, which increased development pressure on Almere (Jansma & Wertheim-Heck, 2021). This led to the approval of the Almere 2.0 Program in 2009, planning the construction of 60,000 homes over 30 years. The Almere Urbanization Fund (FVA) was established to support these goals. However, due to the economic crisis, housing production dropped from 2,000 to 500 units annually, falling short of targets.

The Almere 2.0 Program outlined seven principles for regional development, including fostering diversity, connecting the city with its surroundings, strengthening ties with nature, anticipating change, promoting innovation, designing healthy systems, and encouraging residents to actively participate in city-building (McDonough & Partners, 2018). The principle of "encouraging people to create the city" highlights the inclusive nature of Almere's planning approach. In this process, planners focused on enhancing local self-organization capacity (Jansma & Wertheim-Heck, 2021), reflecting a shift towards participatory planning. The program targeted new development in Pampus, Centrum Weerwater, and Oosterwold (Figure 6), with the goal of reaching a population of 350,000 by 2030. The Oosterwold Master Plan was approved in 2013, while Almere Poort was identified as a key area for implementing self-organization strategies.
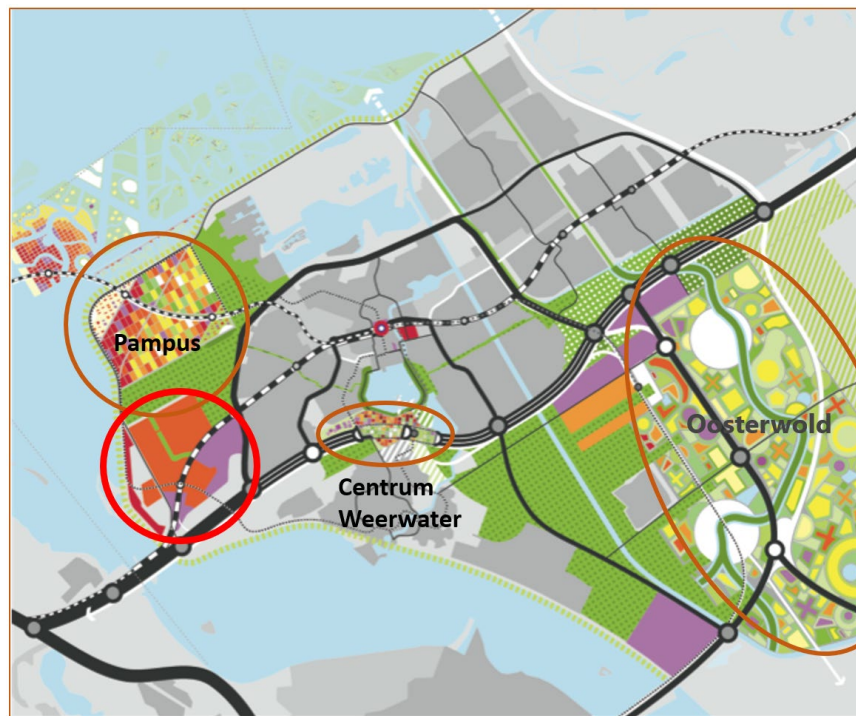
Figure 6 Almere 2.0 Concept Plan (Duivesteijn, n.d.)

3.2. Homeruskwartier

The Homeruskwartier neighborhood is the largest self-built and self-constructed settlement in the Netherlands, located in the Almere Poort district. The neighborhood has become a brand with self-building. In the 1980s, self-building and property ownership were seen as a choice and control method by the central government (Bossuyt, 2021). This method has been used quite frequently in the housing production of the Netherlands. After 2006, conceptual planning in the eighties began to support residents in building their own homes. Almere Poort was chosen as the first new core created within the framework of the new expansion program. The aim here is to meet the needs of households in particular in need of social housing. Self-building is generally done by high-income households in the Netherlands. Middle and low-income households tend to meet their needs with the existing housing stock (Bossuyt, 2021). Most households thought about building their own homes after coming across the Homeruskwartier project. Meeting the need for social housing through self-building is a model supported by local governments responsible for social housing production.

Homeruskwartier is a 106-hectare neighborhood. A total of 3000 housing units with different model types are envisaged for the entire neighborhood. Of these 3000 housing units, 1200 are planned to be developed in the self-building model. The remaining 600 housing units are planned to be built with collective methods and 1200 with other models (co-commissioning) (Bossuyt et al., 2018). A conceptual / abstract land use plan was prepared for the neighborhood. When looking at the plan, there are public areas and common use functions in the center of the neighborhood with

a circular form. The center facilities (centrum voorzieningen) shown in purple serve as the heart of the neighborhood. Then there are private and collective parcels marked with different colors. On the periphery of the area, there are areas defined as institutional (institutioneel) (Figure 7-B).

In this plan, plot-based rules that will guide the commissioning process are included in special land registry records (plot passports) for each plot. In addition to national construction regulations, there are additional, special-legal requirements for each plot (Bossuyt et al., 2018). These documents, which can be translated as plot passports, show that all scales and binding legal regulations regarding the plot are collected in a single document. The area is divided into 720 separate plots of different sizes, as well as a higher density, mixed-use central area where future tenants can come together to build multi-family apartment blocks, offices or retail space (Portschy, 2016).
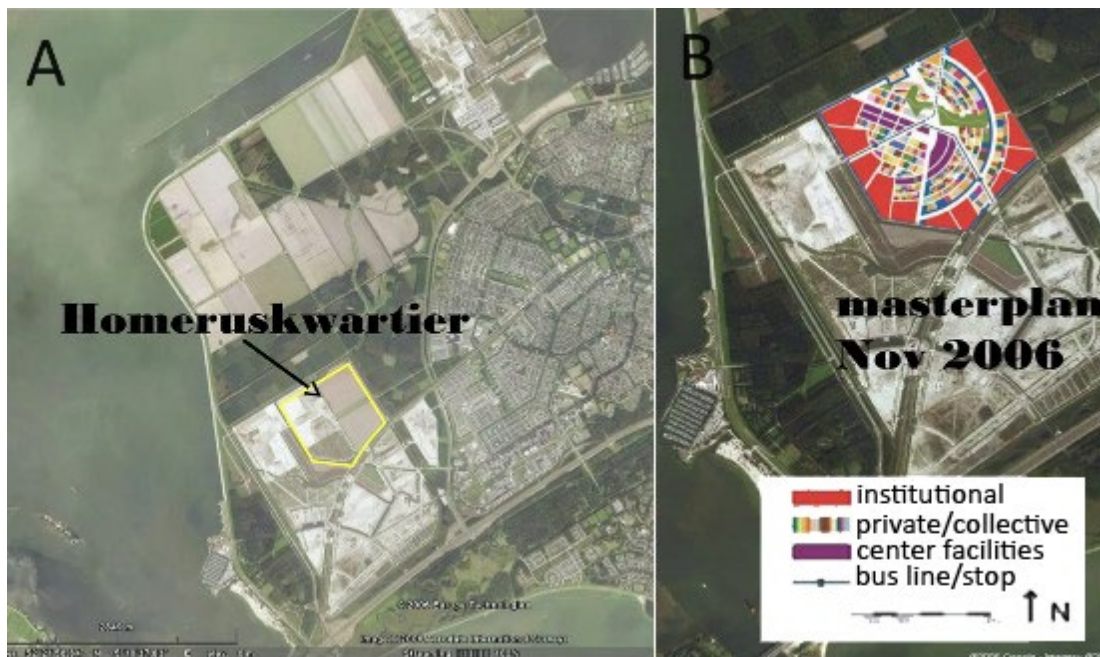

Figure 7 Almere 2.0 Concept Plan (Duivesteijn, n.d.)

3.2.1. Land Acquisition

In Homeruskwartier, as in the rest of the Netherlands, the municipality plays an active role in the land development process. With the establishment of the municipality in 1984, the land became municipal property. Thus, the municipality is the owner of all land in Homeruskwartier (Bossuyt, 2021). According to the 2006 plan, 40% of the housing stock in the neighborhood was planned to be self-built, 20% collectively built, and the remaining 40% with other models (co-commissioning) (Figure 8). In the self-built model, households provide the land themselves, while in the collective built model, households are required to form an association before purchasing land and housing. In collective models, the acquisition and responsibility for land through joint operations are carried out by a developer or housing community. However, the design process largely belongs to households.

A physical office and municipal body were established to facilitate land acquisition and provide construction guidance (Bossuyt et al., 2018). After the development of the municipal plan, approximately half of the land was put up for sale (Tellinga, 2013). The lands put up for sale and the project were introduced to the purchasing public in the office established by the municipality. The stores and facilities built by the households that would collectively build themselves were initially envisaged for the center of Homeruskwartier. In other words, the areas that are central in the plan are based on collective construction. In these collective construction areas, the density of construction is higher and commercial functions are allowed. On the other hand, who will be together in the plots to be built collectively is again approved by the municipality. For example, the

municipality, which allows different households to build together, does not allow construction with relatives. It can be said that the municipality tries to preserve diversity here.

The densely built areas that were to be built collectively and included commercial functions did not attract as much attention as expected, could not be sold and attracted the attention of commercial entrepreneurs. In 2012, the municipality allowed the unsold vacant lands to be purchased and developed by private developers or architects. Thus, the residence requirement that was previously present in all parcels was abolished (Bossuyt et al., 2018). As of 2014, more than 90% of the lands were sold (Portschy, 2016).
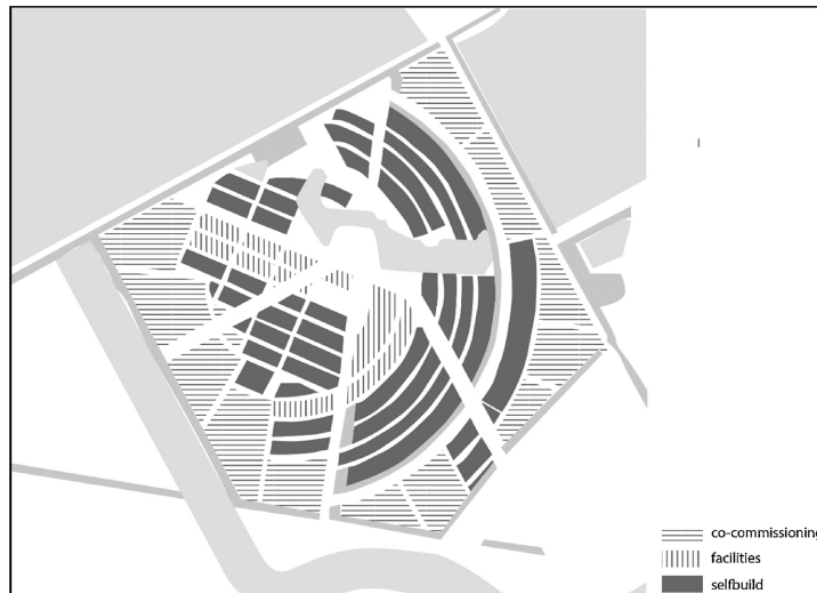
Figure 8 Homeruskwartier Construction Plan (Bossuyt et al., 2018)

3.2.2. Financing

The land prices for the households in the project are quite reasonable compared to the market. Since the project is a social housing need, it includes low mortgage interest and low construction costs. In the city of Almere, land is relatively more affordable compared to its surroundings. In 2018, housing prices in Homeruskwartier increased by 6.3% compared to 2012, when the real estate value for the neighborhood was first estimated. These affordable plots account for 30% of the total number of detached plots sold annually in Almere (Bossuyt et al., 2018). The low-cost housing offer has attracted the attention of those in need of social housing. While the construction of a household depends on the household income, developers needed at least 70% pre-sale and bank loans (Davies, 2021). Since the project predates the 2008 financial crisis, developers who stopped construction during the crisis as well as self-builders continued the process. In other words, since self-building is tied to household income, it is less vulnerable to economic downturns than large-scale projects.

The project particularly encouraged home ownership for former social housing tenants and affordable housing tenants. However, this also limited the extent to which they could own their own homes, depending on the amount of money they had mortgaged or put up (Bossuyt, 2021). Homeruskwartier targeted affordable housing for low-income households at €20,000 (£14,500) per year, due to the cost savings of self-build compared to conventional housing. Thus, in 2007, the cost of the smallest 86 m2 plot was around £25,000 (British Pounds Sterling), while a 1000 m2 plot cost £290,000 (Davies, 2021). Small plots were preferred by middle and low-income households, while large plots were preferred by developers. Individual construction accounted for more than half of Almere's land revenue (Bossuyt et al., 2018).

3.2.3. Land Preparation

With the establishment of the municipality in 1984, the ownership of the land was transferred to the municipality, and the fact that the land was completely owned by the municipality accelerated the service and infrastructure processes. Within the scope of the project, the municipality determined the construction conditions for certain parcel groups. These construction conditions include building lines, building height, minimum and maximum building area. In addition, in some cases, construction rules such as material details were specified. Land passports, which define the construction rules and rights on the land, include guidelines, limitations and regulations for construction. These documents do not only determine the conditions and design rules; they also define what can be done and is possible on a land. In other words, it is necessary to comply with the national and local restrictions for the land. The infrastructure located outside the land was previously carried out by the local municipality to increase the housing demand in the city. The creation of the parcels within the scope of the project was also prepared by the municipality.

3.2.4. Land Disposal

The land passport application in the Netherlands includes binding conditions in the transfer deeds of individual plots. With this model, everything from legal regulations to morphological limitations is collected in a single document (Bossuyt et al., 2018). With the purchase of the plots, the land passports prepared for the plots are transferred to the self-constructing households. During this process, households generally follow two approaches. The first of these is to determine their needs first, create a design draft and buy a plot accordingly, or to buy a plot according to their economic conditions and build accordingly. The application of creating land passports in self-building has been interpreted by researchers not as restrictive, but as a guide for what can be done on the plot (Bossuyt, 2021).

The process of land disposal, in this example, differs from the traditional model in the land development process. While in the traditional model, the land disposal is between developers, here there is a direct transfer from the municipality to the property owner. Therefore, the land disposal stage can also be seen as a property transfer.

On the other hand, the municipality organized a competition for areas other than self-building (co-commissioning) in the neighborhood. Developers made offers within the scope of this competition. However, local people were not included in the negotiation processes in the competition results. For this reason, households did not approach the projects and there was no demand. Thus, it was decided to develop large areas of land in a traditional way (Bossuyt et al., 2018). In other words, parcels in the neighborhood that could not be sold or were not foreseen for self-building were transferred to developers in the traditional model and capital flow was provided. Although there was an effort for participation by organizing a competition here, the participation of local people in the competition was tried to be ensured by the companies that would submit offers, not by public forces, but by the companies that would submit offers, but this was unsuccessful.

3.2.5. Construction and Property Transfer

Within the scope of the project, the basic construction rules of the neighborhood were determined by the municipality. However, people building their own houses has enabled the emergence of structures that meet their own needs and increased diversity. Households that built themselves generally used the maximum indoor construction permit granted to them. For example, since there is no statement about the basement in areas with a single-story construction permit, households also built a basement (Bossuyt, 2021). The tendency for maximum construction has led to a tendency to build row houses with front and back gardens instead of detached houses with a draw distance. A catalog was created for households to guide construction, and some households benefited from it. This construction catalog includes details such as exemplary design models, plot arrangement, and building materials. Again, some households purchased architectural and

contracting services during the process. During this process, facilitating catalogs such as the list of architects were published by the municipality. It is not mandatory for architects to work in the project. Approximately one-fourth of those who built themselves worked with an architect (Bossuyt et al., 2018). The design of the buildings was generally based on the catalogue or the contractor. On the other hand, the municipality did not actively participate in the construction process, but rather remained in the role of a guide and facilitator for the self-builders.

There was no property transfer phase for self-building in the project, this process was realized in the land acquisition. However, in places where self-building is carried out and traditional models are followed, property transfer is realized through sales. In the distribution of 186 million Euros of income in 2012, self-builders had 62%, developers 34% and the center 4% (Tellinga, 2013). Today, the construction process of the neighborhood is finished and completed.

4. Exploring the Participation Aspect

In the previous section, the land development processes of Almere Homeruskwartier were examined. As a result of the examination, data regarding participation in the six stages of land development were determined. In this section, the participation levels of each stage were evaluated (Table 1).he project was not carried out with the participation of local people and recipient stakeholders in the land acquisition stage, and the municipality was the dominant power. For this reason, an active participation cannot be mentioned. However, since the project was developed to meet the need for social housing, it respects the rights of different segments of the society. In addition, encouraging households to self-organize by becoming an institutional organization such as an association in areas where it will be realized collectively is also among the participation efforts. However, these efforts do not have sanctions such as affecting the process within the balance of power or revision. It was determined that the participation of citizens was at the level of informing (3) by presenting the land supply for social housing and establishing a physical office for the purpose of introducing and informing the public about the project. At this stage, encouraging self-organization, especially for the collective, strengthens participation in the future stages rather than ensuring participation in the land acquisition stage of the land development process.

In another stage of the land development process, financing, low and medium economic level households were tried to be directed with low land prices and low mortgage interest. Although disadvantaged groups in the society were taken into consideration at this stage, the financing model was in the form of making decisions on their behalf instead of consulting them. In other words, there is no balance of power between the actors in the creation of the project's financial model, instead, there is decision-making and acting as if they were them. This situation is at the level of therapy (2) since participation involves role-playing and the decision-maker putting himself in the citizen's shoes. In other words, there is no active participation at this stage, and the citizen is presented with attractive offers.

The stage of land preparation is the stage with the lowest level of participation in the whole process. This stage was carried out entirely by the local municipality. Local people and citizens were not consulted in the preparation of the neighborhood plans and parcels. In addition, many of the data in the preparation of the land are based on plans from years ago and the Almere 2.0 Program. This situation shows that the central powers are behind the local government, which seems to be preparing the land. The fact that the local people were not included in the process at this stage shows that the level of participation in the preparation of the land, in the case of Homeruskwartier, remained at the level of manipulation (1).

The stage of disposal of the land that comes after the preparation of the land is not included in this project for self-building plots. However, a competition was organized for the area on the outer perimeter of Homeruskwartier, which was developed with traditional methods. Although the organization of the competition was a positive development for participation, local people were not included in the competition; the companies that participated in the competition as candidates

tried to communicate with the public themselves. This situation shows that participation in areas where the traditional land development model is applied with the competition is limited to the companies' own efforts. On the other hand, there is no sanction for companies to get the opinions of the citizens. The use of these ideas in the development and revision of the project is at the initiative of the company. This situation mentioned means that participation in the disposal process of the land is at the level of consultation (4).

The construction phase stands out as the most important phase in the land development process of Homeruskwartier. This phase allows the project to differentiate itself from other housing development projects and gain a characteristic feature. The construction phase is completely left to the public. However, the municipality has determined the most basic construction conditions. In addition, instead of playing an active role in the construction phase, the municipality has a supervisory role. The municipality has taken a supportive position in the construction process, such as creating a catalogue and sharing lists of professionals who can receive assistance with the public. This situation has ensured that the public has a high level of say and implementation in the physical environment. The active participation of the public in the process and decision-making process shows that there is a participation dimension of delegation of authority (7) during the construction phase. This phase is the most participatory phase of Homeruskwartier. Again, the participation dimension followed in this phase makes the project stand out.

The property transfer phase can be considered together with the land disposal phase. There is no approach towards participation at this stage. Moreover, at this stage the project envisages those in need of social housing to own and reside in the property, but the tenants are not involved in the process. In other words, it is seen that the participation and voice of the social housing tenants is still limited. This situation shows that participation at this level is at the lowest level of manipulation (1).

Table 1 Homeruskwartier's Land Development Stages (Table by author)

		Non-Participation Levels		Degrees of Tokenism			Degrees of Citizen Power		
		1 Manipulation	2 Therapy	3 Informing	4 Consultation	5 Placation	6 Partnership	7 Delegated Power	8 Citizen Control
Land Acquisition	Land owned by the municipality Sale to the public and developers (40% self-build - 20% collective, 40% other) Establishment of associations for collective construction Physical office (promotion) and municipal body			X					
Financing	Affordable land sales Low mortgage interest		X						
Land Preparation	Made by the municipality (ten sites) The construction decisions were made by the municipality.	X							
Land Disposal	This stage is not present in self-building. In co-commissioning (traditional) there is competition but no public participation. Later on the traditional model				X				
Construction	People do it themselves Guided by catalogue Municipality is not active Anyone who wants to can buy architecture and contracting services - licensed companies are shared by the municipality							X	
Property Transfer	None or sale (no mention of rent)	X							

When the theoretical approach of the land development process, specifically for Homeruskwartier, is examined under Arnstein's citizen participation ladder, it is seen that the highest level of participation is at the construction stage with the transfer of authority (7). At this stage, the municipality does not play an active role, the public shapes the process and decisions. However, at this stage, the public is not given full authority for decisions, and the municipality again acts as a supervisor. For this reason, it cannot be said that we are at the "citizen control" stage where citizens have full power in the balance of power. On the other hand, since there is no disposal of the land in the land development model suitable for the construction stage where participation is at the highest, and since partial participatory processes are applied with competition for other models in the project, disposal of the land is the second highest level with consultation (4). However, it should not be overlooked that the participation here is not by the local authority, but by the initiatives of the private sector. In the process, the preparation of the land and property transfer have the lowest participation levels.

5. Discussion and Conclusion

The planning process of Almere has evolved significantly, reflecting the common approaches and market dynamics of each period. Initially an agricultural area, it was opened to development in the 70s with a cautious, people-oriented approach. From the 80s to 2000s, influenced by neo-liberal policies and the Amsterdam Metropolitan Region, urbanization intensified, and the local municipality gained planning power, focusing on real estate development through traditional Dutch methods. Post-2000s, the financial crisis spurred experimentation with social housing models, emphasizing self-organization, community involvement, and participatory planning. Almere has become a laboratory for innovative housing solutions, supporting Amsterdam's competitiveness.

The land development process of Almere Homeruskwartier reveals varying levels of citizen participation across its stages, assessed through Arnstein's ladder of participation. The initial stages, such as land acquisition, preparation, and property transfer, exhibit minimal participation, often limited to manipulation (1), with decisions dominated by the municipality or central powers and little to no input from local citizens. The financing stage reflects a therapy level (2), where decisions were made on behalf of citizens without consultation, despite efforts to cater to disadvantaged groups. In contrast, the construction phase demonstrates the highest participation, reaching the delegation level (7), as the municipality played a supportive role while citizens shaped the process and made decisions within predefined limits. Land disposal achieved consultation (4) via competitive processes, albeit driven by private sector initiatives rather than local government.

Self-building, which is one of the last points that participatory planning has reached in housing production, is actually frequently used to meet the housing needs of low-income households. Although self-building is aimed at meeting the housing needs of households in an illegal way such as squatter houses in our country (Korkmaz & Balaban, 2020), self-building has been an important public policy in the Netherlands since the 1980s. Self-building reduces costs for public housing production needs. On the other hand, the demand for social housing production and the attempt to solve this demand with current participation approaches have led to the development of the Homeruskwartier project in Almere. The region has developed with the strategies of central and local governments, especially after the 2000s. Self-building stands out as a characteristic feature of Homeruskwartier. The project supports not only households that need social housing to build themselves, but also collective production. However, as a result of the examination, it is seen that there is a shift towards traditional land development processes in the project and participation in this process has decreased.

Although there is intense participation in the Homeruskwartier project, this participation is mostly in the construction phase, and the participation dimensions of other stages of the land development process are ignored. Although the organization of the competition in the disposal of the land seems like an input for participation, the efforts for participation were made by private companies participating in the competition, but it could not be concluded. This situation shows that

the people in the project are actually only interested in their own houses, and that interventions in the environment they live in are not their priorities. In addition, the fact that the people do not participate in the development of the environment outside their own houses can also be interpreted as a weak sense of belonging in the newly started project. However, it should not be forgotten at this point that the stage of the project's introduction, which is the acquisition of the land, is emphasized as being a homeowner and building your own house. The project has been emphasizing this aspect strongly from the very beginning, and the other stages of the land development process always serve the construction process. The fact that participation was low or almost non-existent in other stages of the project may have caused this sense of belonging not to be formed, and citizens not to be interested in the environment outside their own houses. However, Homeruskwartier is a very important example with its high degree of participation in housing production and the implementation of high participation in the construction process rather than in the provision of land, unlike traditional housing production.

As a result of the study, it was determined that participation in the land development process for housing production purposes can be at different levels. On the other hand, stages where participation is low can discourage people from participating at unexpected points. This study sets an example for decision-makers in the development of participation models. The study shows that when participation is provided not only by persuasion but also by taking an active role in the process, not only the needs of the citizens are met; it also helps to relieve the financial burden on local governments that have the obligation to produce social housing. When secondary sources are used in the case analysis in this study, the results obtained remain in the form of interpretation. In order to develop the study and test the accuracy of the results, it is recommended that future studies follow a method that includes the actors involved in the development and implementation of the project. In addition, future studies should be based on the production of a model on the extent and type of participation in the stages of the land development process with different case studies, which will form a basis for implementation.

Acknowledgements

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Resume

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