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Sustainability Awareness in Urban Transformation Projects: The Case of Ankara

Kentsel Dönüşüm Projelerinde Sürdürülebilirlik Farkındalığı: Ankara Örneği

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ABSTRACT

With rapid urbanization and the global challenges of population growth and environmental degradation, sustainable urban transformation projects have become essential solutions to challenges. In Türkiye, these projects are gaining prominence as cities strive to balance economic development, environmental preservation, and social equity. This research focuses on Ankara's transformation projects, aiming to assess the level of sustainability awareness and the factors influencing stakeholders' understanding and application of sustainability principles. The study draws on a comprehensive literature review and empirical data collected through surveys and expert interviews with key stakeholders, including local government officials and practitioners involved in urban transformation projects in Ankara. The findings reveal that, despite a general recognition of sustainability's importance, actual implementation is hindered by insufficient awareness, unclear regulations, and financial constraints. The research proposes targeted strategies to enhance understanding and the implementation of sustainability practices, aiming to address these challenges comprehensively. When effectively implemented, these strategies have the potential to significantly improve the current situation, laying the foundation for a sustainable and resilient future. The findings underscore the pivotal role of municipal authorities in fostering sustainable urban transformation. Through policies that advocate for green building standards, efficient resource utilization, and community involvement, municipal authorities can significantly influence the sustainability of their cities. This research enhances the understanding of sustainable urban transformation in developing country contexts and offers actionable insights for policymakers and practitioners. These insights can be instrumental in their efforts to build resilient and livable cities for future generations, emphasizing the critical role of each stakeholder.

Keywords: Awareness; sustainable urban transformation; sustainability; stakeholder engagement; urban policy.

ÖZ

Kentsel dönüşüm projeleri, hızla artan kentleşme, nüfus artışı ve çevresel bozulma gibi zorlukların üstesinden gelmek için kritik mekanizmalar haline gelmiştir. Türkiye'de, ekonomik kalkınmayı sağlarken çevresel etkileri en aza indirmek ve sosyal eşitliği teşvik etmek amacıyla sürdürülebilir kentsel dönüşüm kavramı giderek daha fazla önem kazanmaktadır. Bu çalışma, kentsel dönüşüm projelerinde sürdürülebilirlik farkındalığı düzeyini Ankara örneği üzerinden incelemeyi amaçlamaktadır. Çalışma, bu projelerde yer alan paydaşların sürdürülebilirlik ilkelerine olan anlayış ve uygulamalarını etkileyen faktörleri belirlemeyi hedeflemektedir. Araştırma, kapsamlı bir literatür taraması ve Ankara'daki kentsel dönüşüm projelerinde yer alan yerel yönetim yetkilileri, şehir plancıları ve hak sahipleri gibi kilit paydaşlarla yapılan anketler ve uzman görüşmeleri yoluyla toplanan ampirik verilere dayanmaktadır. Bulgular, sürdürülebilirliğin önemine dair genel bir farkındalık olmasına rağmen, farkındalığın artmasındaki eksiklikler, net düzenlemelerin olmaması ve finansal kısıtlar gibi çeşitli faktörlerin sürdürülebilirlik ilkelerinin uygulanmasını engellediğini göstermektedir. Çalışma, sürdürülebilirlik farkındalığını ve uygulamalarını artırmaya yönelik stratejiler önermekte ve entegre planlama, paydaş katılımı ve sağlam politika çerçevelerinin gerekliliğini vurgulamaktadır. Sonuçlar, sürdürülebilir kentsel dönüşümü teşvik eden politikalar aracılığıyla yerel yönetimlerin rolünün kritik olduğunu ortaya koymaktadır; bu politikalar arasında yeşil bina standartları, verimli kaynak kullanımı ve topluluk katılımının teşvik edilmesi bulunmaktadır. Bu çalışma, gelişmekte olan ülkeler bağlamında sürdürülebilir kentsel dönüşüm anlayışına katkıda bulunmakta ve gelecekteki nesiller için dirençli ve yaşanabilir şehirler yaratmayı amaçlayan politika yapıcılar ve uygulayıcılar için pratik öneriler sunmaktadır.

Anahtar sözcükler: Farkındalık; sürdürülebilir kentsel dönüşüm; sürdürülebilirlik; paydaş katılımı; kentsel politika.

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1. Introduction

The significant environmental impact of urban areas, with the built environment responsible for approximately one-third of total energy consumption (IEA, 2022), necessitates reductions in resource use. Consequently, new strategies integrating ecological balance with economic development have gained prominence. Foundational to these efforts is the concept of sustainable development, famously defined by the Brundtland Report as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987). Over the past three decades, sustainability principles have been increasingly incorporated into policies across diverse sectors, including agriculture, food production, manufacturing, construction, environmental management, and real estate. International bodies like the United Nations (UN) and the European Commission continue to prioritize sustainability, shaping global policies and initiatives. Notably, 'sustainable cities and communities' constitute one of the 17 key objectives within the UN's 2030 Sustainable Development Goals (SDGs). Achieving urban sustainability, thereby contributing to a viable future for subsequent generations, represents a critical global objective. This necessitates the implementation of sustainable urban development practices across all scales, from local neighborhoods to global frameworks (Wheeler, 1998).

By restructuring existing urban infrastructure, transformation projects offer opportunities to establish foundations for a sustainable and livable future. Sustainable urban transformation aims to mitigate diverse urban challenges which, according to Ernst et al. (2016), encompass issues prevalent in developing countries such as low income, dense populations, inadequate housing and infrastructure, and poor hygiene, alongside challenges often accentuated in developed nations like social segregation, rising social tensions, traffic congestion, substantial solid waste generation, and high energy and material consumption. These urban issues are intrinsically linked to broader global concerns, including climate change, ecological degradation, environmental pollution, and resource depletion (McCormick et al., 2013). Fundamentally, urban transformation involves not only physical restructuring but also the crucial integration of environmental, economic, and social dimensions. Consequently, sustainability is now recognized as a core principle for such projects. The goal of sustainable urban transformation is therefore to create resilient and equitable urban frameworks that minimize environmental degradation, foster social inclusion and participation, stimulate economic development, and secure the well-being of future urban inhabitants.

Ensuring effective stakeholder participation throughout urban transformation projects necessitates a thorough analysis and understanding of their respective interests and needs. Stakeholder definitions in project management literature vary, encompassing both broad and narrow interpretations. Specifically, within urban transformation, stakeholders are often defined as 'individuals or groups that contribute to and are impacted by the achievement of project objectives' (Jia & Chen, 2002; Ma et al., 2017). However, narrower interpretations of this definition may potentially exclude relevant actors such as media outlets and civil society organizations (Jia et al., 2011). Prior research commonly categorizes urban transformation stakeholders into distinct groups, including local governments, regulatory bodies, property owners, investors, end-users, consultants, civil society organizations, and the media (Ju et al., 2021). Recognizing the significant influence stakeholders exert on project outcomes, accessibility, and public perception, this study adopts a categorization distinguishing between leading, potential, and marginal stakeholders (Fig. 1).

Both local governments and central administrations bear the responsibility for ensuring urban transformation projects are executed effectively and sustainably. Central government influence often shapes urbanization policies, even where private initiatives are prevalent. Furthermore, effective implementation of measures like housing subsidies and incentives within urban transformation frequently necessitates collaboration between local governments and the central administration due to inherent local challenges (Sezik, 2020). Within Türkiye specifically, municipalities possess significant authority delegated for effective urban planning, positioning them as principal actors in local urban land and housing development (Keleş, 1996). The impact of public policy on these projects is undeniable; criteria set by public authorities significantly shape the sustainability outcomes of urban transformations. While existing literature often emphasizes post-transformation sustainability (Sezik, 2020; Keleş, 1996), the importance of sustainability throughout the entire project lifecycle—before, during, and after—is increasingly recognized as critical. Achieving feasible and successful sustainable urban transformation hinges upon stakeholders possessing the necessary experience and expertise. Therefore, this research aims to assess the level of sustainability awareness among stakeholders involved in urban transformation practices in Türkiye. It is also noted that public policies themselves can influence housing demand (Kılıç & Özel, 2006).

This study investigates sustainability awareness within urban transformation projects, utilizing Ankara as a case study. Following this Introduction, the paper proceeds as follows: Section 2, Theoretical Framework, establishes the context by reviewing relevant literature and discussing sustainability criteria and their application in urban transformation. Section 3, Research Design, details the research design and methodology, outlining the survey and interview techniques used to assess stakeholder awareness in Ankara. Section 4, Results, presents the findings derived from the collected data, analyzing key results and evaluating barriers and opportunities related to sustainability awareness and practices. Finally,

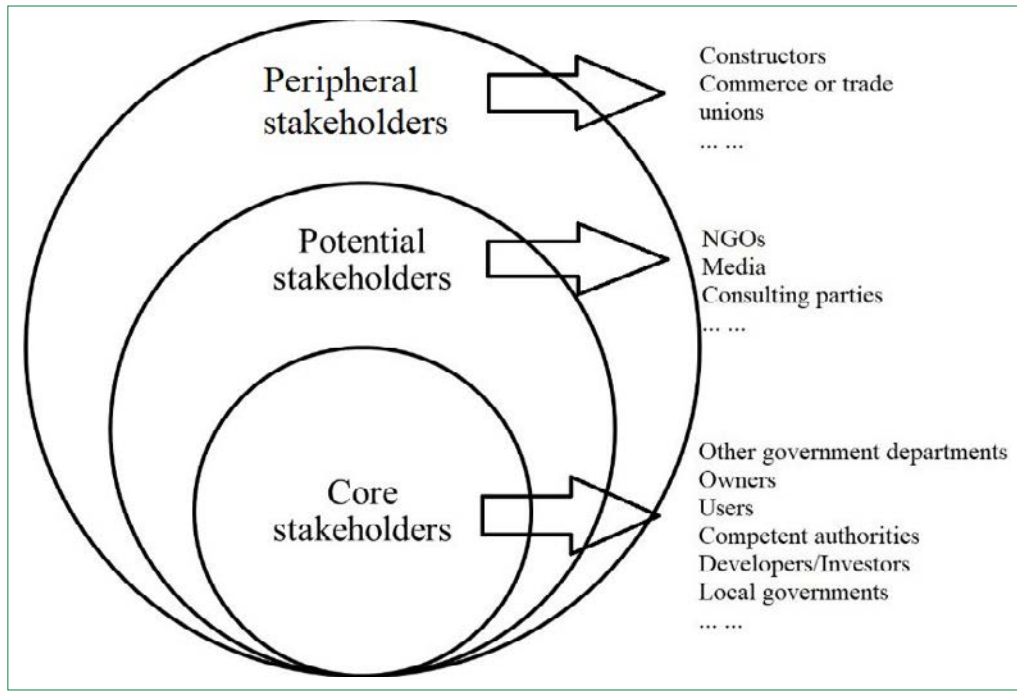

Figure 1. Distinction of stakeholders in urban transformation projects (Ju et al. 2021).

Section 5, Conclusion and Recommendations, presents the study's main conclusions and proposes actionable strategies, along with policy guidance, for enhancing the implementation of sustainable urban transformation.

2. Theoretical Framework

Scholarly analysis examines urban transformation projects through various sustainability perspectives. Central to this examination is the need for clear definitions of both 'sustainability' and 'sustainable urban transformation.' Different frameworks identify key factors for achieving sustainable urban transformation; for instance, Wolfram et al. (2016) highlight factors including policy, planning, capacity, and geography, while McCormick et al. (2013) emphasize the government-planning relationship, cooperation, infrastructure, and resilience. Assessing the sustainability contributions of such projects involves diverse methodologies, such as environmental assessment techniques, multi-criteria analyses, and cost-benefit analyses. Common approaches disaggregate sustainability into its social, economic, and environmental dimensions, identifying distinct criteria for evaluation within each (Ivaniec et al., 2019; Yang, 2010; Chen & Lee, 2007; Yıldız et al., 2020; Crane et al., 2020).

The crucial role of stakeholders in sustainable urban transformation is widely recognized in the literature, which also explores stakeholder perceptions of sustainability through various analytical lenses (Yi et al., 2017; Zheng & Shen, 2017; Zhuang et al., 2017; Yıldız et al., 2018; Chu et al., 2020; Bai et al., 2023; Ma, Utaberta & Zainordin, 2023). Such analyses often concentrate on the viewpoints of specific groups like local governments, end-users, developers, and designers. Within the Turkish context, existing research predominantly focuses on defining sustainability criteria, modeling stakeholder interests, or evaluating sustainability via case studies (Kocabaş, 2014; Çiftçi, 2016; Hamurcu & Buldurur, 2017; Yıldız, 2018; Korkmaz et al., 2019; Özel & Yalçıner Ercoşkun, 2019; Sipahi & Tavşan, 2019; Tekedar, 2020; Özaydın & Baz, 2021; Hamurcu, 2023). Building upon this foundation, the present study addresses an identified gap concerning the need for a systematic approach to understanding and enhancing sustainability awareness among stakeholders involved in Turkish urban transformation projects.

2.1. Conceptual Framework for Sustainable Urban Transformation

The UN's 2030 SDGs include specific targets under the theme 'Sustainable Cities and Communities.' Achieving this goal involves addressing several key areas, such as:

- Urban upgrading and sustainable transportation development;
- Capacity building and the protection of natural and cultural heritage;
- Enhancing urban resilience to natural disasters and reducing associated economic losses;
- Mitigating adverse environmental impacts while ensuring access to green and public spaces;
- Fostering robust economic, social, and environmental links between urban and rural areas;

- Implementing comprehensive disaster management strategies;
- Promoting sustainable and resilient building practices.

Successful urban transformation projects aim to promote environmental and social welfare, foster economic development, and enhance adaptive capacity for future changes. Despite this, such projects are frequently perceived primarily as economic renewal initiatives, potentially neglecting the necessary balance between social, economic, and environmental dimensions. Consequently, projects lacking integration across these three essential pillars are unlikely to achieve long-term success. Attaining urban sustainability fundamentally requires applying relevant criteria within transformation projects. Projects optimized for positive economic, environmental, and social outcomes, while also ensuring stakeholder harmony and participation, demonstrate a higher likelihood of success and contribution to sustainable urban development. Therefore, integrating these three dimensions is crucial for ensuring the sustainability of urban transformation efforts (Chan & Lee, 2008; Morano et al., 2021).

2.2. Sustainability Criteria

The literature elaborates evaluation criteria to clarify the contribution of sustainability to urban transformation. These criteria are typically grouped under three dimensions:

- Environmental sustainability encompasses elements like energy efficiency, renewable resource utilization, waste management, and ecological protection.
- Social sustainability involves criteria such as social participation, accessibility, social equity, and the protection of cultural heritage.
- Economic sustainability includes criteria like cost-effectiveness, economic resilience, and support for local economies (Colantonio, 2009; Peng et al., 2015; Xuili & Maliene, 2021).

Within this framework, urban transformation fosters sustainable urbanization through the renewal of existing building stock and enhancements in spatial planning. Specific practices, including the construction of energy-efficient buildings, modernization of infrastructure, and expansion of green spaces, enable holistic support for environmental, social, and economic sustainability (Gospodini, 2008).

To operationalize sustainability criteria and evaluate the performance of urban transformation projects, researchers have developed various methodological frameworks and scoring models. For example, Yang (2010) identified six criteria for sustainable urban transformation, validating them with quantitative and qualitative data from three cities. Using Nichelino, Italy, as a case study, Bootero et al. (2007) applied multi-criteria decision-making methods to evaluate relevant sustainability criteria. In other work, Gerundo et al. (2016) developed a composite index specifically for assessing such projects.

Sustainable urban transformation aims to advance social and environmental justice alongside economic development. It considers the influence of the physical environment on social behavior and promotes active participation and collaboration during project planning and implementation to foster public ownership of the transformation process. Enhancing the quality of life is a key objective, pursued partly through the creation of employment opportunities. From a physical perspective, the focus is on environmental protection—achieved via sustainable construction materials, local resource utilization, and sustainable energy production—as well as on improving accessibility through local transportation networks. Furthermore, sustainable transformation seeks to develop vibrant, attractive urban spaces by effectively integrating social facilities (Avelino et al., 2024).

Sustainable urban transformation encourages the participation of diverse groups by engaging all stakeholders. It adheres to criteria such as ensuring a clean environment, reducing noise pollution, improving air and water quality, maintaining reasonable distances between workplaces and residences, providing public spaces and accessible housing, offering public transportation, and ensuring access to healthy, sustainable food and agricultural products. It also focuses on safety, protecting monuments and cultural symbols, providing diverse educational and cultural options, and utilizing renewable energy sources (Çiftçi, 2016). Sustainable urban transformation is a multidimensional process involving economic, environmental, and social elements. It integrates economic vitality, environmental protection, and social justice simultaneously (Weinberg, 2000). The literature identifies various sustainability criteria for urban transformation areas (Table 1).

However, evaluations of transformation practices in Türkiye often adopt a narrow interpretation of sustainability. Notably, social sustainability aspects are frequently neglected, partly driven by financing models that necessitate increased building density. Acknowledging the need for a comprehensive approach, this study systematically groups the sustainability criteria identified through the literature review under three main categories for evaluation, as detailed in Table 2.

3. Research Design

This study employed a methodology designed to assess sustainability awareness among key stakeholders engaged in Turkish urban transformation practices. The research first identified the core components and criteria defining sustainable urban transformation. Subsequently, expert opinions regarding awareness levels were gathered from a diverse group

Table 1. Different indicators for sustainability across countries (Gençer Özdemir, 2019)

Country	Sustainability indicators
Sweden	Efficiency, participation, equity, adaptability, and creating resources and value for future generations
United Kingdom	Enhancing quality of life
France	Increased employment and productivity, minimized externalities, reduced inequalities, adaptability to unforeseen situations, and efficient resource use and management
Germany	Sustainability of the ecological environment alongside social, cultural, and economic dimensions
United States of America	Effective use of resources to ensure availability for future generations
Canada	Availability of a working-age population and economic output
Switzerland	- 'Capital indicators' assess the status and potential of social, economic, and environmental resources - 'Level indicators' evaluate how well the needs of individuals and society are met - 'Input-Output indicators' measure capital loss or gain - 'Descriptive criterion indicators' assess the responsible (social), economic, and environmental use of capital - 'Response indicators' include social and policy measures

Table 2. Sustainability criteria (created by authors)

Economic sustainability	Environmental sustainability	Social sustainability
Increasing social welfare (per capita income growth)	Minimizing noise pollution	Promoting social interaction among residents
Enhancing public transportation facilities	Maintaining a clean environment	Enhancing social and cultural activities
Maximizing land resource efficiency	Utilizing renewable energy sources	Facilitating stakeholder participation
Creating new employment opportunities	Enhancing air and water quality	Producing accessible housing
Facilitating new investment opportunities	Expanding green areas	Preserving cultural heritage and local characteristics
	Protecting and enhancing natural resources	Enhancing living conditions
	Establishing walking and cycling paths	Increasing public green space per capita
	Increasing green certification rates	Ensuring access to healthcare
	Improving sustainable material utilization rate	Providing educational opportunities (quality and number of schools)
	Conserving natural plant and animal life	
	Increasing waste recycling rates	

of stakeholders involved in Türkiye's urban transformation sector. This group included representatives from the central administration, local governments, the private sector, non-governmental organizations, and practitioners such as urban planners and architects. Finally, the collected data underwent analysis to ascertain the prevailing levels of sustainability awareness within this context.

The research process followed several key steps. Initially, a comprehensive literature review was conducted. Based on the findings from this review, specific sustainability criteria were determined, which informed the structuring of the survey questions. Concurrently, relevant stakeholder groups were defined, and their contact information was compiled. The questionnaire was then distributed to these participants. Following the data collection phase, the gathered information was analyzed, forming the basis for developing subsequent policy recommendations.

3.1. Research Area

The research focuses on Ankara, where informal settlements established primarily since the 1990s are concentrated within eight key districts: Çankaya, Altındağ, Etimesgut, Gölbaşı, Keçiören, Mamak, Sincan, and Yenimahalle. Urban transformation approaches vary across these districts; Gölbaşı,

Table 3. Projects carried out by TOKİ in Ankara Province (Keskin, Tanrıvermiş & Tanrıvermiş, 2023)

Project type	Total cost (TL)	Ongoing projects	Completed projects	Number of housing units
Disaster housing	41,160,000.00	1	-	726
Lower ıncome group	45,735,780.00	-	2	1,644
Revenue shared	452,193,485.00	3	3	4,116
Urban transformation and development	674,099,000.00	21	29	28,502

Keçiören, and Sincan primarily utilize rehabilitation zoning plans, while Çankaya, Altındağ, Mamak, Etimesgut, and Yenimahalle implement projects under existing rehabilitation zoning frameworks (Yıldız, 2018; Eke & Uğurlar, 2004). The legislative and institutional landscape for urban transformation in Türkiye has evolved significantly. Key developments include the enactment of the North Ankara Entrance Urban Transformation Project Law (Law No. 5104) in 2004 and the granting of authority to municipalities to designate transformation areas via Article 73 of the Municipal Law (Law No. 5393) in 2005. Also in 2005, following the Land Office's closure, the Housing Development Administration of the Republic of Türkiye (TOKİ) assumed relevant authorities. Subsequent regulations in 2009 further authorized TOKİ to draft and implement zoning plans and Law No. 6306 concerning the Transformation of Areas under Disaster Risk later empowered TOKİ to designate such transformation areas (Uşaklıgil, 2014). An overview of completed and ongoing TOKİ projects in Ankara Province is provided in Table 3.

To date, the Ankara Metropolitan Municipality reports having transformed 55 distinct areas. Urban transformation projects in the region are not solely undertaken by the Metropolitan Municipality and the Ministry of Environment, Urbanization, and Climate Change; district municipalities, TOKI, and various private institutions are also active participants in these initiatives.

3.2. Research Method and Data

To assess sustainability awareness levels, this research collected primary data from stakeholders engaged in Turkish urban transformation practices via a semi-structured questionnaire designed to elicit expert opinions. The targeted stakeholder groups included:

- Central Administration: Ministry of Environment, Urbanization, and Climate Change (including its Urban Transformation Directorate).
- Local Governments: Ankara Metropolitan Municipality and various district municipalities within Ankara.
- Private Sector: Relevant private entities involved in urban transformation.
- Non-Governmental Organization (NGO): Urban Transformation and Urbanism Foundation.
- Practitioners: Professional urban planners and architects.

This research employed a qualitative approach centered on expert opinions, gathered using a semi-structured questionnaire as the primary data collection instrument. While sometimes termed the "expert opinion method," the approach aligns with qualitative research utilizing semi-structured data collection, incorporating elements potentially suitable for a Delphi framework analysis. The questionnaire comprised 17 questions designed to evaluate awareness related to the economic, environmental, and social dimensions of sustainability. It included both closed-ended questions and open-ended questions, allowing participants to elaborate freely on their perspectives. For applicable closed-ended questions requiring rated responses, a 5-point Likert scale was employed, where 1 represented 'Strongly Disagree' and 5 represented 'Strongly Agree.' Data collection utilized digital tools. The questionnaire was administered online via Google Forms and distributed by email to experts across relevant disciplines (including sustainability, urban planning, architecture, and law) involved in urban transformation. Telephone contact facilitated follow-up with experts initially unreachable by email, ensuring personalized tracking of the participation process. This data collection phase spanned approximately 1.5 months. Ethical considerations were paramount throughout the research process. All relevant principles and standards were strictly adhered to, with participant voluntariness, anonymity, and data confidentiality forming the foundation of the ethical protocol. Preliminary analysis of the collected data involved generating descriptive statistics and conducting correlation analyses to explore the perceived importance assigned by experts to different sustainability dimensions.

To ensure diverse perspectives from experts actively engaged in urban transformation across private and public sectors, a total of 54 individuals participated in the study. The participants represented a range of professional backgrounds, including urban planning (n=6), civil engineering (n=9), law (n=2), survey technology (n=1), survey engineering (n=1), architecture (n=2), landscape architecture (n=1), geological engineering

Table 4. Descriptive statistics of survey results (created by authors)

Survey question	Count	Unique	Most common response	Frequency
Education	54	4	Graduate	32
Occupation	54	48	Architect	4
Total years of professional experience	54	10	10–20	24
Experience in current institution/organization	54	10	10–20	18
Number of urban transformation projects implemented by your institution/organization	54	10	More than 5	30
Planned urban transformation practices by your institution/organization	54	4	Yes	34
Are sustainability studies conducted in urban transformation projects in Türkiye?	54	10	No	30
Primary issue faced in urban transformation projects	54	36	Lack of awareness on sustainability	14
Dimension of sustainability addressed by your practices	54	20	Spatial	12

(n=1), and other related fields (n=4). Institutionally, the sample comprised individuals from district municipalities (n=8), the Ankara Metropolitan Municipality (n=6), the Urban Transformation Directorate (n=3), the Ministry of Environment, Urbanization, and Climate Change (n=3), non-governmental organizations (n=1), and the private sector (n=6). Participants were specifically targeted based on their experience in urban transformation. The experience levels within the sample were distributed as follows: 0–5 years (11.1%), 5–10 years (14.8%), 10–20 years (44.4%), and over 20 years (29.6%) (Table 4).

This study utilized the Delphi method for the systematic collection and evaluation of expert opinions. This method was deemed suitable for gathering structured opinions from diverse experts on the complex topic of sustainability awareness, where achieving consensus through other means might be challenging. The Delphi method involves an iterative process of data collection and analysis designed to facilitate expert consensus on a specific topic (Dalkey & Helmer, 1963; Gordon, 1994; Hsu & Sandford, 2007). While drawing on Delphi principles for structured expert input, this study employed a single round of the semi-structured questionnaire for data collection. Within this research, initial analysis involved deriving sustainability criteria scores from the expert responses provided via the semi-structured questionnaire. Subsequent analysis of these findings aimed to identify and consolidate common viewpoints among the participating experts.

4. Results

Analysis of the survey data highlights several primary challenges confronting urban transformation practices. These include: parcel-based transformation approaches, increased building density driven by high costs, a lack of transparency coupled with low participation rates in the transformation process, insufficient sustainability awareness among both the public and involved stakeholders, and the inadequate implementation of relevant legal regulations. When queried about potential solutions to these challenges, participants placed particular emphasis on the need to enhance sustainability awareness.

Regarding the concept of 'sustainability in urban transformation,' participant responses indicated a multidimensional understanding. Respondents generally linked sustainability to the UN's 2030 SDGs and recognized its essential nature, encompassing environmental, social, and economic dimensions. This viewpoint reflects a core understanding consistent with the global definition of sustainability—balancing the needs of present and future generations.

As detailed comparatively in Table 5, the survey results reveal varying levels of emphasis placed by participants on different economic, environmental, and social sustainability factors. The findings indicate a particular focus on economic and environmental dimensions. Specifically, participants attributed significant importance to elements like the creation of new employment opportunities and achieving green building certifications. Conversely, the data suggest insufficient emphasis was placed on factors such as accessible housing production and waste recycling rates. Within the social dimension, respondents highlighted stakeholder participation and cultural heritage preservation as essential components. These results pinpoint specific aspects of sustainability where awareness and practical application appear to require enhancement.

Table 5. Comparison of emphasis levels on economic, environmental, and social sustainability factors based on survey results (Created by authors)

Category	Factor	Emphasis level according to survey results
Economic sustainability	Ensuring social welfare (increase in per capita income)	Medium - Participants emphasized improving quality of life.
	Improving public transportation facilities	Low - Not directly addressed.
	Effective use of land resources	High - Issues with high density and land use were noted.
	New employment opportunities	High - Job creation in transformation projects was emphasized as a priority.
	New investment opportunities	Medium - Investment opportunities and financial barriers were indirectly addressed.
Environmental sustainability	Reducing noise pollution	Low - Not directly addressed.
	Use of renewable energy sources	Medium - Renewable energy usage was proposed but not widely implemented.
	Improving air and water quality	High - Environmental pollution and emission reduction were emphasized.
	Existence of green areas	Medium - The importance of green spaces was partially highlighted.
	Enhancing natural resources	Medium - Protection of natural resources was addressed under environmental sustainability.
	Green certification ratios	High - Green building certifications were encouraged, though broader environmental measures were lacking.
	Sustainable material utilization rate	High - The use of sustainable materials was limited due to cost considerations.
	Percentage of waste recycled	Medium - Recycling rates were insufficient.
Social sustainability	Ensuring the interaction of the people living in the region	High - Lack of participation was a major issue for social sustainability.
	Improving social and cultural activities	Medium - Participants noted the need for additional social and cultural amenities.
	Ensuring stakeholder participation	High - Essential for project success, according to participants.
	Accessible housing production	Medium - Accessible housing production was deemed insufficient.
	Preservation of cultural heritage and local characteristics	High - Seen as essential for maintaining social sustainability.
	Improving living conditions	High - Improving living conditions was frequently emphasized by participants.
	Public green area per capita	Medium - The increase in public green spaces was noted as necessary.
	Access to healthcare	Medium - Not directly addressed but relevant to social sustainability.
	Educational opportunities (number and quality of schools)	Low - Not directly mentioned in the survey results

Data analysis identified several correlations (Fig. 2). A notable example is the strong positive correlation found between the design quality of urban public spaces and their utilization for social interaction. This suggests that well-designed public spaces actively foster social engagement. Such spaces appear crucial for strengthening social ties, thereby underscoring the importance of social sustainability within urban transformation initiatives. The analysis similarly re-

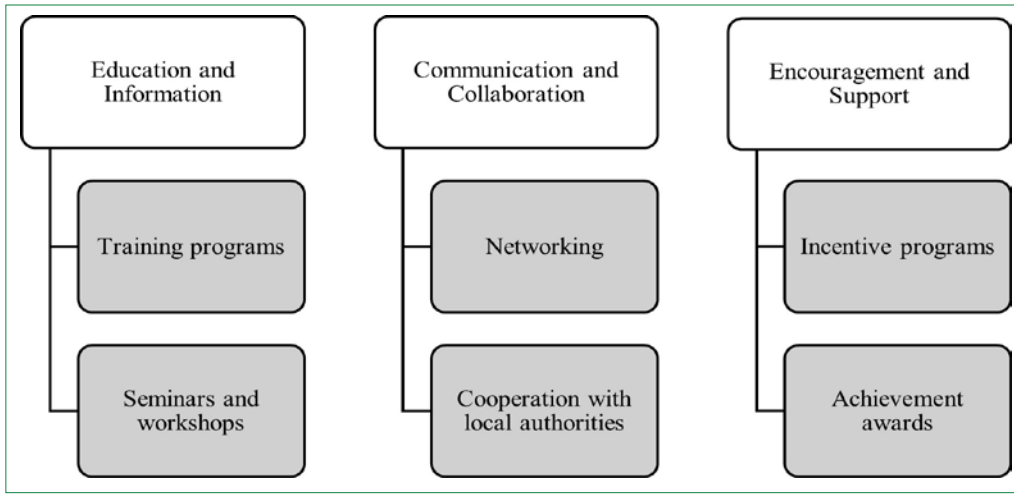

Figure 2. Strategies to increase awareness (created by authors).

vealed a strong correlation between the preservation of 'memory spaces' and the successful transmission of intangible cultural heritage to subsequent generations. This latter correlation implies a need for urban transformation projects to extend beyond physical restructuring to fully integrate social and cultural sustainability components.

Environmental sustainability emerged as a prominent theme in participant responses. Factors such as reducing carbon emissions, using scarce resources efficiently, and prioritizing environmentally friendly materials were highlighted, underscoring the perceived need to minimize environmental impacts during urban transformation. This focus implies that participants view sustainable transformation as extending beyond mere physical renewal.

Participants assessed social and economic sustainability based on criteria including the improvement of social facilities, quality of life enhancement, and the assurance of spatial justice. They emphasized the employment potential inherent in transformation projects, noting the expectation that these initiatives should yield tangible social and economic benefits.

When asked, "Which of the objectives of urban transformation has the highest priority?", the majority of respondents (59.3%) selected "livability and welfare improvement". Other responses included "sustainability" (22.2%), "urban aesthetics" (11.1%), and "participation and governance" (7.4%). These findings reveal the priorities assigned by participants to different transformation objectives. The prevalence of "livability and welfare improvement" as the top choice highlights an expectation that urban transformation projects should primarily enhance the quality of life and well-being of residents. This emphasis underscores the perceived critical role of social dimensions in such projects.

"Sustainability" emerged as another frequently emphasized priority. Participants generally regarded the integration of environmental, economic, and social dimensions within urban transformation projects as a crucial objective. This viewpoint suggests a long-term perspective among respondents, reflecting a belief that transformation efforts must extend beyond improving current conditions to create sustainable living environments for the future. This emphasis on a multifaceted approach aligns with data presented in Table 3 concerning projects undertaken by TOKİ in Ankara. As shown in Table 3, the majority of these TOKİ projects fall under the category of 'Urban Transformation and Development,' a designation inherently requiring the integration of social, economic, and environmental sustainability dimensions.

Responding to the question, "Do you believe that specific sustainability studies are generally incorporated into urban transformation projects?", only 18.5% of participants answered affirmatively. An equal percentage (18.5%) indicated they had no opinion, while a significant majority (63%) responded "no." Respondents who answered negatively primarily attributed the perceived absence of sustainability-related activities to insufficient awareness, stemming from a lack of education and budgetary constraints. The answers to this specific question shed light on the level of perception regarding sustainability's practical application in Türkiye's urban transformation projects. The high proportion of negative responses indicates that most participants, particularly this group, believe current sustainability efforts within these projects are inadequate. This finding suggests a prevailing critique that sustainability concepts have yet to be sufficiently integrated or established in practice.

Participants identified "insufficient awareness" and "budget constraints" as primary obstacles hindering the implementation of sustainability efforts. These factors represent major barriers to achieving sustainability goals within urban transformation projects. The issue of "insufficient awareness" suggests a lack of full understanding regarding sustainability's importance among both the broader society and key decision-makers. Concur-

rently, "budget constraints" point to the perception that sustainability-focused projects require greater financial investment.

Evaluating these fundamental problems alongside the considerable scale of projects (in number and budget) detailed in Table 3 reveals a potential disconnect. It suggests that many transformation projects may prioritize physical renovation without sufficiently integrating crucial sustainability elements, such as social participation, cultural heritage protection, and the minimization of environmental impacts. This gap is particularly evident in social sustainability, highlighted by participants' emphasis on the low production of accessible housing and inadequate public participation, even within large-scale initiatives that reportedly produced 28,502 housing units in total.

Additional barriers frequently mentioned by participants include "insufficient education," "lack of legislation," "short-term thinking," and concerns over "urban windfall gains." These responses collectively point towards the need for a more holistic approach to implementing sustainability. Such an approach would necessitate improvements across multiple areas, including public awareness, institutional frameworks, educational systems, and legal regulations.

Participants were also asked, "What are the most critical problems encountered in urban transformation?". The most frequently cited problem was "insufficient sustainability awareness" (37%), followed by "high density" (33.3%), "information gaps" (14.8%), "compliance issues" (11.1%), and "poor building quality" (3.8%). That the largest proportion of responses highlighted insufficient sustainability awareness suggests this issue is perceived as inadequately integrated into urban transformation projects. Furthermore, it implies that the long-term environmental, social, and economic consequences of these projects may often be overlooked during their planning and execution.

The most frequently cited issue, "insufficient sustainability awareness," represents a fundamental gap potentially jeopardizing the success of urban transformation projects. Such a gap can negatively impact environmental sustainability outcomes and compromise the projects' economic and social dimensions.

Other commonly reported problems include "high density," "poor building quality," and "coordination challenges." High density can intensify pressure on existing infrastructure, adversely affecting residents' overall quality of life. Poor building quality poses safety risks and diminishes the long-term durability of structures. Furthermore, "coordination challenges"—stemming from inadequate communication and collaboration among diverse project stakeholders—can significantly reduce the effectiveness and ultimate success of transformation initiatives.

Collectively, insufficient sustainability awareness, high density, poor building quality, and adaptation challenges constitute the most significant problems confronting urban transformation projects according to participants. These factors represent critical threats to the short-term and long-term success of such initiatives.

Overall, participants expressed general support for the sustainability concept and highlighted its importance within urban transformation projects. This support extended to the value placed on community involvement; specifically, a significant majority (71%, n=38) either agreed or strongly agreed with the statement: "Getting the support/opinion of the people in the region during urban transformation will help to prevent potential problems in the future." This finding demonstrates a strong perception among participants that public participation constitutes a critical success factor for urban transformation initiatives.

Responses were mixed, however, regarding satisfaction with current sustainability efforts. When presented with the statement, "The results of sustainability efforts in urban transformation so far are satisfactory," approximately 43% of participants expressed disagreement (selecting either 'Strongly Disagree' or 'Disagree'). This level of disagreement suggests either a perception that sustainability efforts to date have been inadequate or a general lack of clear consensus on their effectiveness.

Environmental sustainability aspects were frequently emphasized. A positive perception was suggested by the high level of agreement (57% scoring highly) with the statement, "Buildings that comply with green building certification are encouraged." In contrast, responses to the statement, "Measures are taken to recycle waste," were less positive, with 43% assigning low scores (1 or 2 points on the scale used). This pattern indicates a perception that while green building certification might be encouraged, waste recycling measures are considered insufficient or ineffectively implemented.

Participants also assessed the economic dimensions of urban transformation projects. They widely recognized the economic benefits related to job creation, with a majority (64%) assigning high scores (4 or 5 points on the scale used) to the statement, "Urban transformation projects create employment opportunities." However, a contrasting perception emerged regarding housing provision; 39% of respondents assigned low scores (1 or 2 points) to the statement, "Transformation projects produce low-cost, comfortable, and accessible housing." This finding suggests a view that economic sustainability, particularly concerning affordable housing, has yet to be fully achieved. Such a discrepancy might stem from a perceived imbalance between the financial returns and the broader social benefits generated by urban transformation projects.

Regarding social sustainability, responses indicated concern about dedicated community spaces. Specifically, 39% of participants assigned low scores (1 or 2 points on the scale used) to the statement, "There is sufficient space for social reinforcement areas in urban transformation projects." Con-

versely, a strong majority (71%) assigned high scores (4 or 5 points) to the statement, "Urban transformation projects pay attention to the development of public spaces," suggesting a perceived emphasis on public space development as important for social sustainability. These contrasting results highlight a potential imbalance, pointing towards limited perceived availability of specific 'social reinforcement areas' compared to a greater focus on general public open spaces.

The survey results also revealed some potentially contradictory perceptions among participants. For instance, a considerable portion (43%) assigned low scores (1 or 2 points on the scale used) to the statement, "Legal regulations on sustainability are adequate," suggesting these regulations are viewed as insufficient. Concurrently, a similar proportion (39%) assigned low scores (1 or 2 points) to the statement, "Awareness of sustainability has been raised in public institutions," indicating a perceived lack of institutional awareness. Taken together, this might imply a situation where even if existing regulations were theoretically adequate, a lack of awareness within public institutions could be undermining their effective implementation.

A further discrepancy emerged regarding environmental sustainability practices. While a majority (57%) assigned high scores (4 or 5 points) to the statement, "Construction of buildings that comply with green building certification is encouraged," indicating perceived support for this specific measure, a significant minority (43%) gave low scores (1 or 2 points) to the broader statement, "A business environment based on sustainable development, use of renewable energy types, and respect for environmental values is encouraged." This contrast suggests that although specific initiatives like green building certification receive encouragement, wider support for embedding broader environmental sustainability principles within the general business environment may be lacking.

Evaluating the main problems identified through the survey reveals direct links to the sustainability criteria framework presented in Table 2. For instance, the most emphasized issue—lack of sustainability awareness—corresponds closely with social sustainability elements like 'educational opportunities' and 'stakeholder engagement.' Similarly, reported issues such as the lack of accessible housing and insufficient budgets suggest shortcomings in meeting economic sustainability criteria like 'low-cost housing production' and potentially related criteria such as 'employment opportunities.' Furthermore, participant opinions regarding the inadequate implementation of measures for 'increasing recycling rates' and 'protection of natural resources' align directly with criteria under environmental sustainability.

Such insufficient awareness, particularly prevalent among public institutions and stakeholders, constitutes a major obstacle to successfully implementing sustainability efforts and achieving long-term project success. Addressing this requires a more integrated strategy encompassing raised public awareness, strengthened legal regulations, and enhanced stakeholder engagement. Global trends indicate that transformative learning approaches, especially within higher education, play a crucial role in improving sustainability awareness. These educational strategies, particularly when combined with comprehensive city-wide mitigation and adaptation measures, can significantly advance the cause of urban sustainability (Leal Filho, 2023; Gupta & Shukla, 2024).

The research findings also illuminate the perceived extent to which sustainability is genuinely considered within urban transformation projects. Survey data indicate that only 18.5% of respondents believe current sustainability efforts are sufficient, whereas a substantial majority (63%) view these efforts as insufficient. Furthermore, the study observed low levels of awareness across the environmental, economic, and social dimensions of sustainability. This low awareness appears correlated with limited practical application, particularly evident in areas such as recycling, accessible housing production, and stakeholder participation. Taken together, these results strongly suggest that sustainability principles are neither adequately integrated into existing projects nor effectively implemented in practice.

Achieving the full implementation of sustainability within urban transformation projects necessitates a more holistic approach. Enhancing the likelihood of success requires a balanced consideration of legal regulations, economic benefits, social advantages, and environmental sustainability imperatives. Critically, this must be coupled with increased awareness among all stakeholders, especially those directly involved in project implementation. Therefore, advancing sustainability in this context demands both enhancing the effectiveness of existing practices and intensifying efforts to raise awareness across the board.

5. Conclusion and Recommendations

This study assessed the level of sustainability awareness within Ankara's urban transformation projects and, based on the findings, proposes concrete strategies for its enhancement (Fig. 3). The research indicates that while stakeholders generally acknowledge the importance of sustainability, its effective implementation is hindered by several significant barriers. Key obstacles identified include insufficient awareness, financial limitations, inadequate legal frameworks, and poor stakeholder collaboration.

Based on these findings, this study proposes the development of a scoring system designed to monitor and evaluate sustainability awareness levels systematically. Such a system could assess awareness levels related to different sustainability criteria, incorporating the flexibility to weight or categorize these criteria based on their determined significance for a specific project context. Implementing this approach would facilitate a clearer identification of strengths and weaknesses

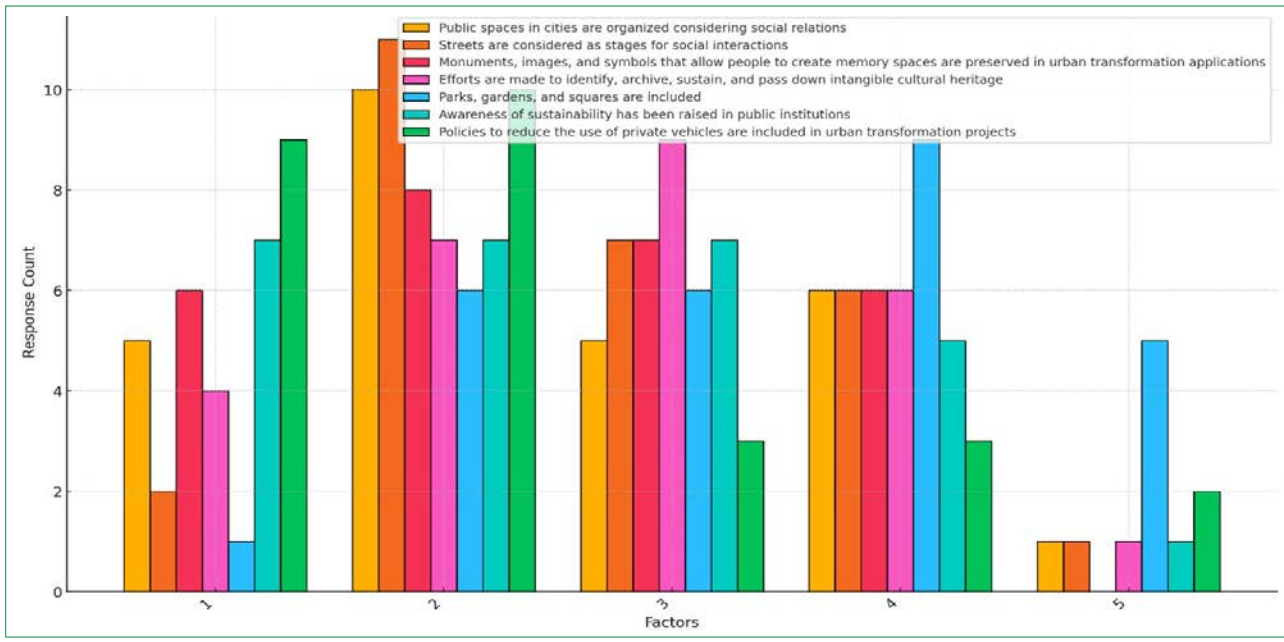

Figure 3. Frequency of responses for key factors in urban transformation and sustainability (created by authors).

in current sustainability practices, thereby highlighting specific areas requiring targeted improvement efforts.

Digital technologies offer effective means for raising sustainability awareness and fostering participation. For instance, augmented reality (AR) can provide detailed project visualizations during the design phase, facilitating earlier identification of potential sustainability gaps and opportunities for improvement. Similarly, building information modeling (BIM) allows for digital project simulation, engaging designers and practitioners concurrently and enabling the integration of sustainable solutions from initial stages. Furthermore, such digital tools hold the potential to lower costs and enhance participation, thereby helping to drive progress towards achieving sustainability goals.

Based on the preceding analysis identifying key barriers and opportunities, this study recommends several strategies to improve sustainability awareness and practice in urban transformation. Leveraging the potential of tools like the proposed scoring system and digital technologies, these recommendations are presented under the following thematic categories:

Education and Information:

- Training Programs: Collaborative efforts between municipalities, the private sector, and civil society organizations could establish comprehensive training programs centered on sustainability. Curricula should encompass key topics like energy efficiency, green building standards, waste management, and the application of environmentally friendly construction materials. Such training would enhance practitioners' knowledge, promoting more effective implementation of sustainability principles.
- Seminars and Workshops: Organizing seminars and workshops featuring sustainability experts can foster knowledge sharing and deepen practitioners' expertise. These events also serve as valuable platforms for disseminating best practices within the field.

Communication and Collaboration:

- Networking: Establishing dedicated networks is essential for facilitating information exchange among all stakeholders engaged in urban transformation. Such networks can significantly enhance collaboration by supporting the sharing of experiences, collaborative problem-solving, and the wider dissemination of best practices, thereby increasing the likelihood of projects achieving sustainability goals.
- Collaboration with Local Authorities: Building strong partnerships with municipalities and local governments is vital for advancing sustainable urban transformation projects. Active engagement with these authorities helps ensure projects align with local needs and priorities, thus boosting their effectiveness in meeting sustainability objectives.

Incentives and Support:

- Incentive Programs: Implementing financial incentives could encourage projects to incorporate sustainable practices. Examples include tax credits for green building certifications, subsidies for energy-efficient initiatives, and low-interest financing options. Such strategies can promote the broader adoption of environmentally responsible approaches.
- Achievement Awards: Organizing competitions to recognize and reward exemplary sustainable projects repre-

sents another effective strategy. These initiatives serve to showcase successful sustainability efforts, potentially inspiring other projects to adopt similar best practices.

In conclusion, this research contributes an original, stakeholder-focused assessment of sustainability awareness within the planning and design phases of Turkish urban transformation projects, a perspective distinct from prior post-implementation evaluations. The findings highlight a critical gap: while the importance of sustainability is acknowledged, its practical application faces significant barriers including insufficient awareness, financial constraints, inadequate legal frameworks, and poor stakeholder cooperation. Key recommendations focus on enhancing awareness and implementation through structured monitoring (like scoring systems), leveraging digital technologies (such as augmented reality (AR) and building information modelling (BIM)), targeted education, improved collaboration, and supportive incentives. The study acknowledges limitations regarding sample size, suggesting future research could benefit from larger samples and comprehensive field studies to further deepen understanding. Ultimately, fostering effective cooperation with local governments and implementing robust incentive programs are crucial for advancing sustainable urban transformation practices in Türkiye.

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Informed consent: All participants were informed about the purpose and scope of the study, and written informed consent was obtained in accordance with ethical principles.

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