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Kazalo

Uvodnik

Vita ŽLENDER.....3
Urbana struktura v različnih pogledih

Članki

Gaukhar AIDARKHANOVA, Gaukhar AUBAKIROVA, Laura KENESPAYEVA, Damira TAZHIYEVA, Gaukhar KAIRANBAYEVA, Farabi YERMEKOV.....5
Celostna analiza družbene trajnosti v Severnokazahstanski oblasti v Kazahstanu

Sümeyye KAHRAMAN, Burak KORKMAZYUREK, Erkan POLAT 19
Izbor lokacije avtobusne postaje na podlagi hibridnega modela večkriterijskega odločanja v Uşaku v Turčiji

Sahar POUYA SÖNMEZ, Gamze ÖNER, Sima POUYA.....33
Mestni odprti prostori kot rekreacijska območja in zatočišča v primeru izrednih razmer: spoznanja po potresu v Malatyi

Nermina ZAGORA, Sabina MUJKIĆ, Lejla KAHROVIĆ-HANDŽIĆ, Edib PAŠIĆ 48
Modernistična arhitektura kot del sodobne identitete mest: Plečnik in Ravnikar v Ljubljani ter Grabrijan in Neidhardt v Sarajevu

Zaldy F. CORPUZ.....62
Oblikovanje in začetna validacija lestvice obnovitvene zmožnosti urbanih okolij: izsledki s Filipinov

Predstavitve in informacije

Zhen XU.....78
Javno zdravje kot alternativni vidik za razumevanje urbanističnega načrtovanja

Contents

Editorial

Vita ŽLENDER.....4
Urban form in diverse contexts

Articles

Gaukhar AIDARKHANOVA, Gaukhar AUBAKIROVA, Laura KENESPAYEVA, Damira TAZHIYEVA, Gaukhar KAIRANBAYEVA, Farabi YERMEKOV.....81
A comprehensive assessment of social sustainability in the North Kazakhstan Region of Kazakhstan

Sümeyye KAHRAMAN, Burak KORKMAZYUREK, Erkan POLAT 95
Selecting a bus terminal location in Uşak, Turkey, using a hybrid multicriteria decision-making model

Sahar POUYA SÖNMEZ, Gamze ÖNER, Sima POUYA..... 108
Urban open spaces as recreational areas and emergency shelters: Lessons from the Malatya earthquake

Nermina ZAGORA, Sabina MUJKIĆ, Lejla KAHROVIĆ-HANDŽIĆ, Edib PAŠIĆ 122
Modernist architecture as part of contemporary urban identity: Plečnik and Ravnikar in Ljubljana, and Grabrijan and Neidhardt in Sarajevo

Zaldy F. CORPUZ..... 136
Development and initial validation of the Urban Restorative Potential Scale: Evidence from the Philippines

Presentations and information

Zhen XU..... 150
Public health as an alternative perspective on decoding urban planning

Urbana struktura v različnih pogledih

Uvodnik: Vita Žlender

Urbana struktura izraža trdnost in stabilnost, saj mora grajeno okolje vzdržati fizične vplive, in sicer s svojo materialno obstojnostjo, prostorsko logiko in zgodovinskimi odtisi. Zgradbe, ulična mreža, spomeniška dediščina in infrastrukturni sistemi imajo dolgo življenjsko dobo in nenehno vplivajo na to, kako se ljudje gibljejo, zbirajo, počutijo varne ali oblikujejo identiteto. Hkrati je urbana struktura prilagodljiva v smislu, da se prostori, politike in raba lahko prilagajajo spreminjajočim se družbenim, kulturnim in funkcionalnim potrebam. Neprožnost v tem pogledu lahko vodi do nevzdržnih razvojnih vzorcev, omejitev mobilnosti, ranljivosti javnega zdravja ali oddaljevanja kulturne dediščine od sodobne identitete. Na tem mestu se postavlja vprašanje za bralce, ki je tudi izhodišče za raziskovanje v tej številki revije Urbani izziv: Kdaj je stabilnost urbane strukture koristna za ljudi in kdaj prilagajanje postane nujno?

Zbirka člankov v tej številki obravnava urbano strukturo iz več zornih kotov: trajnostnosti, mobilnosti, dediščine, odzivanja na naravne nesreče, psihološke obnove in javnega zdravja. Skupna tema, ki jo obravnavajo, je vpliv urbanega okolja na ljudi – njihovo varnost, mobilnost, občutek identitete, zdravje in obnovitveno izkušnjo. Analiza družbene trajnostnosti v Kazahstanu kaže, kako dolgoletni demografski vzorci in neenak dostop do storitev ustvarjajo stabilno, a neenako družbeno geografijo, ki jo mora načrtovanje upoštevati, ne da jo prezre. Študija, ki se osredotoča na izbor lokacije avtobusne postaje v Uşaku, kaže, kako prometno omrežje, uveljavljeni vzorci družbenih dejavnosti in značilnosti grajenega okolja določajo razmere, v katerih mora biti nova prometna infrastruktura umeščena, da lahko učinkovito deluje. Raziskava odprtih prostorov v Malatyi kaže, da lahko prostori, namenjeni prostemu času, v kriznih razmerah, kot je potres, zadovoljijo razne potrebe, in poudarja, da so kapaciteta, prostorska konfiguracija in večnamenskost ključne tako za podporo rekreacijskih namenov kot za reševanje odprtih vprašanj v kriznih razmerah. Članek o Ljubljani in Sarajevu ponazarja, kako trajen pečat modernističnih arhitektov še naprej oblikuje urbano identiteto, in tako kaže, da lahko trajnost urbane strukture zagotavlja kontinuiteto in kulturno identiteto. Članek s poudarkom na oblikovanju lestvice obnovitvene zmožnosti mestnih okolij razkriva, kako ljudje interpretirajo tipe urbanih okolij, in dokazuje, da prostorske in okoljske lastnosti postanejo obnovitvene, odvisno od tipa okolja. Kratek mnenjski članek v rubriki Predstavitve in informacije ponuja pogled na urbanistično načrtovanje z vidika javnega zdravja, in poudarja, da fizična struktura vpliva na kakovost zraka, mobilnost, intenziteto in vzorce izpostavljenosti, še preden začnejo veljati ukrepi politik.

V vseh prispevkih so mesta predstavljena kot kraji, kjer se nenehno prepletajo stabilne fizične strukture in spreminjajoče se človeške potrebe. Urbana struktura je odvisna tako od trdnosti kot od prilagodljivosti, prispevki v tej številki pa prispevajo k razmisleku o tem, kako lahko mesta ostanejo obstojna v svojih zgodovinskih odtisih in fizičnih strukturah, hkrati pa dovolj prilagodljiva, da se lahko odzivajo na sedanje in prihodnje potrebe.

Urban form in diverse contexts

Editorial by Vita Žlender

Urban form expresses solidity and stability because the built environment must endure physical impacts through its material persistence, spatial logic, and historical layers. Buildings, street networks, heritage sites, and infrastructure systems have long lifespans and a constant influence on how people move, gather, feel safe, or form their identity. At the same time, urban form is or should be adaptable in the sense that spaces, policies, and uses can adjust to shifting social, cultural, and functional needs. Inflexibility in this regard may lead to unsustainable development patterns, mobility constraints, public health vulnerabilities, or heritage becoming detached from its contemporary identity. This raises a question for readers, and one that underlies the explorations in this issue of *Urbani izziv*: When does stability in urban form serve people, and when does adaptation become essential?

The articles featured in this issue approach urban form from various perspectives: sustainability, mobility, heritage, disaster response, psychological restoration, and public health. What they have in common is that they all explore how urban environments affect people – their safety, mobility, sense of identity, health, and restorative experience. The assessment of social sustainability in Kazakhstan shows how long-standing demographic patterns and uneven access to services create a stable yet unequal social geography that planning must work with rather than override. The bus terminal study in Uşak, Turkey, demonstrates how the current circulation network, established activity patterns, and the characteristics of the built environment set the conditions in which new mobility infrastructure must be positioned to function effectively. The investigation of open spaces in Malatya, Turkey, shows that places designed for leisure can accommodate various needs during crises such as earthquakes, and it highlights capacity, spatial configuration, and multifunctionality as essential to supporting both recreational and emergency roles. The article on Ljubljana and Sarajevo illustrates how the lasting imprint of modernist architects continues to shaping urban identity and thus shows that urban form's persistence can offer continuity and cultural identity. The contribution focusing on the development of an urban restorative potential scale in the Philippines reveals how people interpret various types of urban environments, demonstrating that distinct spatial and environmental qualities become restorative depending on the scene type. Finally, the short opinion article in the Presentation and Information section offers a view on urban planning from a public-health perspective to underscore that physical structures shape air, mobility, density, and exposure patterns long before policy interventions take effect.

Across all articles, cities are presented as places where stable physical structures and shifting human needs constantly interact. Urban form depends on both solidity and adaptability, and the articles in this issue contribute to the ongoing dialogue on how cities can remain grounded in their histories and physical structures while remaining flexible enough to address present and future needs.

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Celostna analiza družbene trajnosti v Severnokazahstanski oblasti v Kazahstanu

Zaradi čedalje večjih prostorskih razlik se v Kazahstanu veča potreba po sistematični analizi družbene trajnosti na subregionalni ravni. V članku je na podlagi 15 kazalnikov, razvrščenih v pet ključnih komponent (demografija, zdravstvo, izobraževanje, kakovost življenja in družbena vključenost), oblikovan in preizkušen sestavljeni indeks družbene trajnosti. Uporabljena metodologija vključuje normalizacijo podatkov, združevanje kazalnikov in prostorsko analizo z orodji GIS. Analiza je pokazala stabilno, a izrazito nesimetrično prostorsko zgradbo družbene trajnosti: za regionalno središče Petropavl so bile ugotovljene razmeroma visoke vrednosti večine komponent, za večino podeželskih območij pa so značilni odseljevanje, socialna ranljivost ter slab dostop do osnovnih storitev in infrastrukture. Analiza občutljivosti je potrdila uporabnost predstavljenega modela v primerih nepopolnega statističnega poročanja. Na podlagi izsledkov so avtorji oblikovali tipologijo okrožij in predlagali usmeritve za prostorsko usmerjeno socialno politiko. Predlagana metodologija se lahko uporablja za spremljanje razlik med regijami, oceno socialnih tveganj in utemeljevanje trajnostnih razvojnih prednostnih nalog v regijah s spreminjajočo se demografsko strukturo.

Ključne besede: družbena trajnost, demografska struktura, prostorske razlike, Severnokazahstanska oblast, GIS, trajnostni indeks, cilji trajnostnega razvoja

1 Uvod

V okviru izvajanja ciljev trajnostnega razvoja, ki jih je uvedla OZN, in trenutnih družbeno-gospodarskih izzivov postaja regionalna družbena trajnost čedalje pomembnejše vprašanje. Sodobne raziskave poudarjajo, da je družbena trajnost veliko več kot zgolj zadovoljevanje osnovnih potreb, saj vključuje tudi vidike, kot so enakost, vključenost, prilagodljivost skupnosti in prostorska pravičnost. Ključna je analiza na regionalni ravni, saj poddržavne ravni pogosto razkrivajo največje razlike v dostopu do storitev in razvojnih priložnosti. Navedeni izzivi so dobro ponazorjeni v Severnokazahstanski oblasti v Kazahstanu, za katero so značilni upadanje prebivalstva, infrastrukturne vrzeli in izseljevanje. Kljub državnim prizadevanjem za spodbujanje trajnostnega razvoja ostajajo prostorske razlike v družbeni trajnosti med kazahstanskimi oblastmi premalo raziskane.

Avtorji so na podlagi sestavljenega indeksa kvantitativno proučili družbeno trajnost v okrožjih Severnokazahstanske oblasti. Poudarek je bil na izbiri ustreznih kazalnikov, usklajenih s cilji trajnostnega razvoja in regionalnimi razmerami, na uporabi metod normalizacije podatkov in na kartografski analizi. Določili so prostorske razlike in oblikovali podlago za oblikovanje diferencirane regionalne politike, ki bi spodbujala trajnostni prostorski razvoj.

Pojem družbene trajnosti v akademskem diskurzu pridobiva čedalje večji analitični pomen v okviru regionalnih strategij trajnostnega razvoja. Izsledki raziskav kažejo, da družbena trajnost pomeni veliko več kot zgolj zadovoljevanje osnovnih potreb, saj obsega tudi vidike vključenosti, enakosti, soudeležbe in sposobnosti skupnosti, da se prilagodijo spremembam. Eizenberg in Jabareen (2017) sta predlagala konceptualni okvir družbene trajnosti kot hibridne kategorije, ki združuje vrednote, kot so pravičnost, varnost, priznanje (ranljivih skupin) in soudeležba, z močnim poudarkom na prostorsko-družbenih strukturah. Njuna raziskava je postavila temelje za vključevanje družbene trajnosti v urbanistično in regionalno načrtovanje, zlasti na robnih območjih.

Pomemben je teoretični prispevek Vallancea idr. (2011), ki razlikujejo tri razsežnosti družbene trajnosti: razvoj, vzdrževanje in prilagoditve. Navajajo, da podcenjevanje kulturnih in simbolnih vidikov vodi v oblikovanje poenostavljenih modelov, s katerimi ni mogoče razložiti trajnosti v zapletenih lokalnih kontekstih. Shirazi in Keivani (2020) sta analizirala družbeno trajnost v kontekstu urbanizacije, pri čemer sta izpostavila pomen družbene vključenosti, stanovanjske pravičnosti in dostopa do priložnosti. Njun pristop je uporaben za proučevanje prostorske neenakosti v mestnih okoljih ter za analizo razlik med Petropavlom in podeželskimi okrožji Severnokazahstanske oblasti.

Na mednarodni ravni je bil dosežen pomemben napredek pri formalizaciji sistemov sestavljenih indeksov. Geniaux idr. (2009) so sisteme kazalnikov trajnostnega razvoja razvrstili glede na stopnjo agregacije, prostorsko pokritost in analitični namen. Njihova razvrstitev je uporabna za primerjavo pristopov, ki se uporabljajo v Kazahstanu. Lacmanović in Tijanić (2025) sta na podlagi indeksa družbenega napredka proučili napredek socialne politike EU, Wang in Chen (2022) pa sta družbeno trajnost proučevala z analizo glavnih komponent, pri čemer sta dokazala njeno učinkovitost pri zmanjševanju števila večdimenzionalnih podatkov. Letno poročilo ameriške neprofitne organizacije Social Progress Imperative (2025) vsebuje najnovejše podatke in metodologije za proučevanje družbenega napredka, s poudarkom na pravicah, zdravju in priložnostih, poročilo OZN (2025) o svetovnem družbenem razvoju pa daje okvir za proučevanje družbene trajnosti z vidika enakosti in solidarnosti. Poročilo o trajnostnem razvoju, ki ga pripravlja mreža SDSN (2024), utemeljuje kazalnike za merjenje doseganja ciljev trajnostnega razvoja in daje podlago za oblikovanje primerljivih poddržavnih indeksov. Primeri regionalne diferenciacije družbene trajnosti kažejo potencial za uporabo tehnologij GIS in daljinskega zaznavanja na tem področju.

Kazahstanski raziskovalci so pomembno prispevali k razvoju metodologij za proučevanje trajnostnega razvoja. Nyussupova idr. (2021) so pokazali, da se GIS lahko uporablja za spremljanje kazalnikov ciljev trajnostnega razvoja, kar je še zlasti pomembno za prostorske analize socialne infrastrukture v Severnokazahstanski oblasti. Kuanova idr. (2023) so na podlagi državnih statističnih podatkov in metod normalizacije razvili indeks regionalne trajnosti za Kazahstan, Aidarkhanova idr. (2025) pa so na podlagi sistemov poslovne inteligence izdelali napovedni model demografskih procesov. Bektemyssova idr. (2025) in Satybaldin idr. (2022) so predstavili metode razvrščanja v skupine in prilagodljivega vrednotenja pri proučevanju regionalne trajnosti, s poudarkom na večdimenzionalnih indeksih in primerjalnih prostorskih analizah. Poročila Ekonomske in socialne komisije ZN za Azijo in Pacifik (UNESCAP, 2023) poudarjajo pomen prostorskih analiz na področju trajnostnega upravljanja in spodbujajo vključevanje geografskih informacijskih platform v regionalne politike trajnostnega razvoja. Pregled do zdaj uporabljenih pristopov k proučevanju družbene trajnosti potrjuje potrebo po oblikovanju regionalno prilagojenega modela, ki upošteva demografske, infrastrukturne in družbeno-gospodarske značilnosti Severnokazahstanske oblasti.

Novost raziskave, predstavljene v tem članku, je v tem, da je bila v njenem okviru prvič opravljena analiza družbene trajnosti na ravni okrožij za katero koli kazahstansko oblast. V nasprotju s prejšnjimi raziskavami, ki so bile omejene na primerjave med

oblastmi, predlagana metodologija omogoča prepoznavanje skritih razlik v okviru oblasti in njihove povezave s cilji trajnostnega razvoja. Izsledki dopolnjujejo ugotovitve mednarodnih raziskav gospodarstev na prehodu in zagotavljajo izhodišče za redno spremljanje kazalnikov na ravni lokalnega upravljanja. Hipoteza raziskave je, da je treba za regionalno diferenciacijo družbene trajnosti v Severnokazahstanski oblasti izvajati ciljno usmerjene programe trajnostnega razvoja, katerih namen je zmanjševanje prostorskih razlik in izboljšanje kakovosti življenja prebivalcev. Avtorji so hipotezo preverili tako, da so izračunali sestavljeni indeks družbene trajnosti in analizirali prostorsko razporeditev njegovih vrednosti v Severnokazahstanski oblasti.

2 Gradivo in metode

Raziskava je temeljila na kvantitativni analizi družbene trajnosti v upravnih okrožjih Severnokazahstanske oblasti, za kar so avtorji razvili poseben sestavljeni indeks. Empirična osnova za analizo so bili uradni statistični podatki kazahstanskega državnega statističnega urada (ang. *Bureau of National Statistics of the Republic of Kazakhstan*, v nadaljevanju: BNS). Regionalni podatki so bili zbrani s spletnega mesta informacijskega in analitičnega sistema Taldau (BNS Taldau, b. d.) ter nacionalne platforme za poročanje o doseganju ciljev trajnostnega razvoja (Sustainable ..., b. d.), in sicer za 13 okrožij in mesto Petropavl za obdobje 2011–2023.

Sestavljeni indeks je bil oblikovan na podlagi 15 skrbno izbranih kazalnikov, te so avtorji razvrstili v pet tematskih sklopov: demografija, zdravstvo, izobraževanje, kakovost življenja in osnovna infrastruktura ter družbena vključenost in varnost. Taka zgradba odraža večdimenzionalno naravo družbene trajnosti, saj vključuje pet ključnih dejavnikov vpliva na kakovost življenja v proučevani oblasti. Med temi kazalniki se štirje v celoti ujemajo z uradnimi ciljnimi kazalniki ciljev trajnostnega razvoja: stopnjo brezposelnosti (kazalnik cilja trajnostnega razvoja 8.5.2), razpoložljivostjo zdravnikov (kazalnik cilja trajnostnega razvoja 3.c.1), deležem gospodinjstev z dostopom do pitne vode (kazalnik cilja trajnostnega razvoja 6.1.1) in stopnjo kriminala na 100.000 prebivalcev (kazalnik cilja trajnostnega razvoja 16.1.4). Avtorji so devet kazalnikov opredelili kot alternativne ali nadomestne (npr. splošna stopnja rodnosti, ki ustreza kazalnikom ciljev trajnostnega razvoja, povezanim z reproduktivnim zdravjem, in stopnja digitalne pismenosti, ki odraža kompetence odraslih na področju informacijsko-komunikacijskih tehnologij). Dva nadaljnja kazalnika (splošna stopnja umrljivosti in starostna struktura prebivalstva) nista neposredno vključena v okvir ciljev trajnostnega razvoja, se pa pogosto uporabljata v mednarodnih analizah odpornosti prebivalstva, tudi v poročilih Programa Združenih narodov za razvoj in Organizacije za gospodarsko sodelovanje in razvoj (preglednica 1). Glavni merili za izbor kazalnikov sta bili razpoložljivost podatkov za vsa okrožja Severnokazahstanske oblasti in uradna potrjenost kazalnikov v kazahstanskih nacionalnih statističnih sistemih.

Pri tematskem sklopu »družbena vključenost in varnost« so avtorji uporabili objektivne kazalnike: stopnjo brezposelnosti, razmerje med povprečno plačo in pragom revščine ter stopnjo kriminala. Navedeni kazalniki odražajo uradne razmere na področju gospodarske vključenosti in javne varnosti, razvidne iz razpoložljivih uradnih okrožnih statističnih podatkov za obdobje 2011–2023. Avtorji priznavajo, da so tudi subjektivni vidiki, kot so življenjsko zadovoljstvo, zaznana družbena povezanost, zaupanje in občutek varnosti, pomembne sestavine družbene trajnosti, vendar jih zaradi pomanjkanja reprezentativnih podatkov na ravni okrožij niso vključili v izračun vrednosti oblikovanega indeksa.

Zaradi pomanjkanja regionalnih podatkov o vpisu v poklicne in visoke šole so avtorji kot nadomestni kazalnik uporabili stopnjo digitalne pismenosti, ki odraža poznavanje osnovnih veščin na področju informacijsko-komunikacijske tehnologije in se lahko uporabi kot približni kazalnik izobraževalnega kapitala. Da bi zapolnili časovne vrzeli v podatkih, so izračunali povprečja za leta 2018, 2020 in 2021. Izbrani kazalniki tako odražajo globalna načela ciljev trajnostnega razvoja in hkrati kažejo praktične omejitve regionalnih statističnih zbirk, pri čemer vzpostavljajo ravnovesje med analitično natančnostjo in dostopnostjo podatkov ter zagotavljajo ustreznost indeksa za spremljanje razmer in prostorsko primerjavo.

Normalizacija je temeljila na linearnem skaliranju (od 0 do 1), ki omogoča primerljivost kazalnikov in zagotavlja, da višje vrednosti pomenijo višjo raven družbene trajnosti. Agregacija je bila izvedena v dveh korakih: najprej so avtorji izračunali podindekse za vsak tematski sklop, nato pa še indeks družbene trajnosti kot srednjo vrednost podindeksov, s čimer so pridobili celovito oceno za posamezno okrožje in regionalno središče Petropavl. Za oceno robustnosti končnih rezultatov so opravili analizo občutljivosti uteži podindeksov, s katero so preverili, kako bi se razvrstitev okrožij spremenila, če bi uporabili drugačne sisteme uteževanja. Poleg osnovnega modela z enakimi utežmi (20 % za vsak podindeks) so preverili še dve alternativni konfiguraciji:

a) uporabo uteži, sorazmernih faktorskim utežem prve glavne komponente, ki odražajo statistično pojasnjeno varianco vsakega tematskega sklopa;
b) uporabo uteži, ki so jih določili strokovnjaki in odražajo zaznano pomembnost vsakega podindeksa z vidika regionalnih razvojnih izzivov: 30 % za zdravstvo, 25 % za izobraževanje, 20 % za kakovost življenja, 15 % za demografijo ter 10 % za družbeno vključenost in varnost.

Preglednica 1: Ključni kazalniki indeksa družbene trajnosti za Severnokazahstansko oblast

Kazalnik	Cilj trajnostnega razvoja	Usklajenost z globalnim okvirom ciljev trajnostnega razvoja	Funkcija v okviru trajnostnega razvoja
A. Demografija			
a1: Splošna stopnja rodnosti	3.1	Alternativa cilju trajnostnega razvoja 3.7.2 (stopnja rodnosti med mladostniki)	Odraža raven reprodukcije prebivalstva, usklajena je z mednarodno demografsko prakso.
a2: Splošna stopnja umrljivosti	3.2	–	Temeljni kazalnik za oceno zdravstvenih tveganj in staranja prebivalstva.
a3: Selitveni prirast s tujino	10.7	–	Kaže obseg izseljevanja zaradi dela ali izobraževanja.
a4: Deleža otrok (0–14 let) in starejših (nad 65 let)	3.c	–	Razkriva starostno strukturo in obremenitev delovno aktivnega prebivalstva.
B. Zdravstvo			
b1: Stopnja umrljivosti novorojenčkov (mlajših od enega leta)	3.2.1	Alternativa cilju trajnostnega razvoja 3.2.2 (umrljivost novorojenčkov, starih med 0 in 27 dni)	Ključni kazalnik zdravja otrok, občutljiv na kakovost zdravstva in življenjske razmere.
b2: Razpoložljivost zdravnikov	3.c.1	Popolna skladnost s ciljem trajnostnega razvoja 3.c.1 (število zdravstvenih delavcev na 10.000 prebivalcev)	Odraža dostop do zdravstvenih storitev in zmogljivost zdravstvenega sistema.
C. Izobraževanje			
c1: Število predšolskih ustanov	4.2	Alternativa cilju trajnostnega razvoja 4.2.2 (vključenost v predšolsko izobraževanje)	Kazalnik zgodnjega razvoja otrok, ki je izhodišče za nadaljnje učenje.
c2: Digitalna pismenost prebivalstva	4.4	Alternativa cilju trajnostnega razvoja 4.4 (veščine rabe informacijsko-komunikacijske tehnologije med odraslimi prebivalci)	Odraža raven temeljnih kompetenc in kognitivnega kapitala.
D. Kakovost življenja in osnovna infrastruktura			
d1: Stanovanjska oskrba	11.1	–	Odraža bivalne razmere in stopnjo prenatrpanosti.
d2: Gospodinjstva s priključkom na vodovod	6.1.1	Alternativa cilju trajnostnega razvoja 6.1.1 (delež prebivalcev z varno oskrbo s pitno vodo)	Kazalnik je povezan z infrastrukturo, vendar ne odraža kakovosti vode.
d3: Gospodinjstva z dostopom do sanitarne ureditve	6.2.1	Alternativa cilju trajnostnega razvoja 6.2.1 (dostop do ustrezne sanitarne ureditve in higiene)	Odraža osnovne sanitarne in higienske pogoje, ki omogočajo spodoben življenjski standard in ustrezno raven zdravja.
E. Družbena vključenost in varnost			
e1: Stopnja brezposelnosti	8.5.2	Popolna skladnost s ciljem trajnostnega razvoja 8.5.2 (stopnja brezposelnosti)	Kazalnik gospodarske vključenosti prebivalstva.
e2: Razmerje med povprečno plačo in pragom revščine	1.2.1	Alternativa cilju trajnostnega razvoja 1.2.1 (nacionalna stopnja revščine)	Odraža raven relativne zadostnosti dohodka in tveganje revščine.
e3: Stopnja kriminala	16.1.4	Alternativa cilju trajnostnega razvoja 16.1 (zmanjšanje nasilja)	Kazalnik javne varnosti in socialne kohezije.

Strokovne uteži so bile določene na podlagi posvetovanja s petimi akademskimi strokovnjaki s področja demografije, regionalnega razvoja in družbene geografije s Kazahstanske nacionalne univerze Al-Farabija. Vsi so imeli bogate izkušnje s proučevanjem človeškega kapitala in regionalne trajnosti v Kazahstanu, na podlagi njihovih mnenj pa so lahko avtorji uravnotežili statistični in kontekstualni vidik pri določanju pomembnosti tematskih sklopov.

Uporabljeni sistem uteževanja se ujema s pristopi, uporabljenimi v prejšnjih raziskavah trajnosti, ki so vključevale mnenja strokovnjakov (Gan idr., 2017; Mikulić idr., 2015; Abreu idr., 2022; OECD, 2008). Primerjava razvrstitev okrožij glede na tri načine uteževanja je pokazala visoko robustnost rezultatov. Spearmanova koeficienta korelacije med osnovnim modelom in alternativnima modeloma sta znašala 0,89 (korelacija osnovnega modela z modelom z utežmi, ki so temeljile na analizi glavnih komponent) oziroma 0,77 (korelacija osnovnega modela z modelom z utežmi, ki so jih določili strokovnjaki), kar potrjuje zanesljivost in ponovljivost indeksa.

Avtorji so uporabili tri preproste diagnostične kazalnike za določitev okrožij z morebitno nestabilno medletno dinamiko indeksa družbene trajnosti v obdobju 2011–2023: koeficient variacije letnih vrednosti indeksa, število prehodov med petimi ravnmi indeksa in delež odstopanja od povprečja, opredeljen kot delež let, v katerih se je absolutno odstopanje od dolgoročnega povprečja okrožja zmanjšalo v primerjavi s predhodnim letom. Okrožja z vrednostjo koeficienta variacije 0,12 in/ali štirimi prehodi med ravnmi ali več so bila obravnavana kot močno nestabilna. Avtorji so kratkoročne spremembe pojasnili kot nihanja, ki ne trajajo dolgo in se po navadi vrnejo k dolgoročnemu povprečju posameznega okrožja. Navedeni kazalniki pomagajo pri interpretaciji rezultatov in preprečujejo čezmerno posploševanje zaradi učinkov majhnega števila primerov pri občutljivih kazalnikih (npr. stopnji umrljivosti novorojenčkov in kriminala), niso pa namenjeni formalnemu statističnemu testiranju.

Avtorji so število ravni družbene trajnosti določili s Sturgesovo formulo, ki se po navadi uporablja za razvrščanje majhnih vzorcev v statistično smiselne razrede. Končne vrednosti sestavljenega indeksa so bile enakomerno razdeljene v pet intervalov. Na tej podlagi so bila okrožja razvrščena v skupine z nizko, podpovprečno, povprečno, nadpovprečno ali visoko stopnjo družbene trajnosti. Na podlagi porazdelitve končnih vrednosti sestavljenega indeksa družbene trajnosti so bili za Severnokazahstansko oblast določeni intervali z naslednjimi mejnimi vrednostmi: 0,000–0,380 za nizko, 0,381–0,490 za podpovprečno, 0,491–0,600 za povprečno, 0,601–0,710 za nadpovprečno in 0,711 ali več za visoko stopnjo družbene trajnosti.

Navedeni pristop zagotavlja doslednost in primerljivost klasifikacije skozi čas, kar omogoča stabilno razvrstitev v prihodnjih ciklih spremljanja. Avtorji so prostorsko analizo z uporabo metod kartografske vizualizacije in geografsko-informacijskega modeliranja izvedli v programu ArcGIS 10.8. Z vključitvijo prostorskih podatkov v sistem so izdelali tematske karte, ki prikazujejo porazdelitev vrednosti sestavljenega indeksa in njegovih podindeksov po upravnih enotah. Kartografski prikazi so omogočili določitev geografskih vzorcev, ki razkrivajo tako trajnostna kot ranljiva območja okrožij v proučevani oblasti.

3 Rezultati

3.1 Dolgoročni trendi (2011–2023)

Med letoma 2011 in 2023 je bila dinamika vrednosti sestavljenega indeksa družbene trajnosti zapletena in spremenljiva. V začetnih letih proučevanega obdobja so bile v večini okrožij vrednosti indeksa razmeroma nizke, kar je bila posledica predvsem upada prebivalstva, infrastrukturnih primanjkljajev in gospodarskih omejitev. Od leta 2015 pa so vrednosti začele postopno naraščati. To izboljšanje je bilo povezano z uvedbo programov posodobitve v socialnem sektorju, večjim dostopom do zdravstva in izobraževanja ter delno stabilizacijo infrastrukturnega razvoja. Rast so kljub temu omejevali stalni demografski pritiski: upad prebivalstva zaradi naravnega upada in izseljevanja je bil še naprej velika strukturna omejitev (UNDP Kazakhstan, 2020). Med letoma 2027 in 2019 so se vrednosti indeksa posameznih okrožij začele zbliževati, kar je pomenilo, da je trajnost na več območjih začela stagnirati. V tem obdobju se je nadaljnje izboljševanje upočasnilo, razlike med okrožji pa so se umirile. Pandemija COVID-19, ki je dosegla vrh v letih 2020 in 2021, je povzročila kratkoročne motnje v dotedanji dinamiki. Vrednosti indeksa so padle, zlasti zaradi slabših zdravstvenih kazalnikov (večje umrljivosti in obremenitve zdravstvenega sistema) in začasnega poslabšanja kakovosti življenja (Svetovna banka, 2021). Do leta 2022 so se razmere vseeno delno stabilizirale, vrednosti ključnih podindeksov pa so se vrnile na predpandemične ravni. Kljub vsemu se je demografska slika še naprej slabšala, zaradi česar se vrednosti sestavljenega indeksa niso nikoli popolnoma obnovile.

Posledično je bila v celotnem proučevanem obdobju za indeks Severnokazahstanske oblasti značilna zmerno pozitivna dinamika, brez znakov izrazitega izboljšanja. Izboljšave na področjih izobraževanja, zdravstva in kakovosti življenja so večinoma izravnale negativne vplive takratnih demografskih trendov. Po uradnih podatkih se je v zadnjem desetletju število prebivalcev v proučevani oblasti zmanjšalo za skoraj 9 % (BNS, b. d.), kar omejuje možnosti za trajno rast vrednosti sestavljenega indeksa. Opazovana dinamika tako odraža stabilen, a prostorsko

neenakomerno porazdeljen pozitiven trend, ki ga v zadnjih letih zaznamuje stagnacija. Med okrožji z visoko in nizko stopnjo družbene trajnosti ostaja izrazit razkorak, ki kaže na potrebo po ciljno usmerjenih politikah in naložbah, ki bi okrepile odpornost najranljivejših območij Severnokazahstanske oblasti.

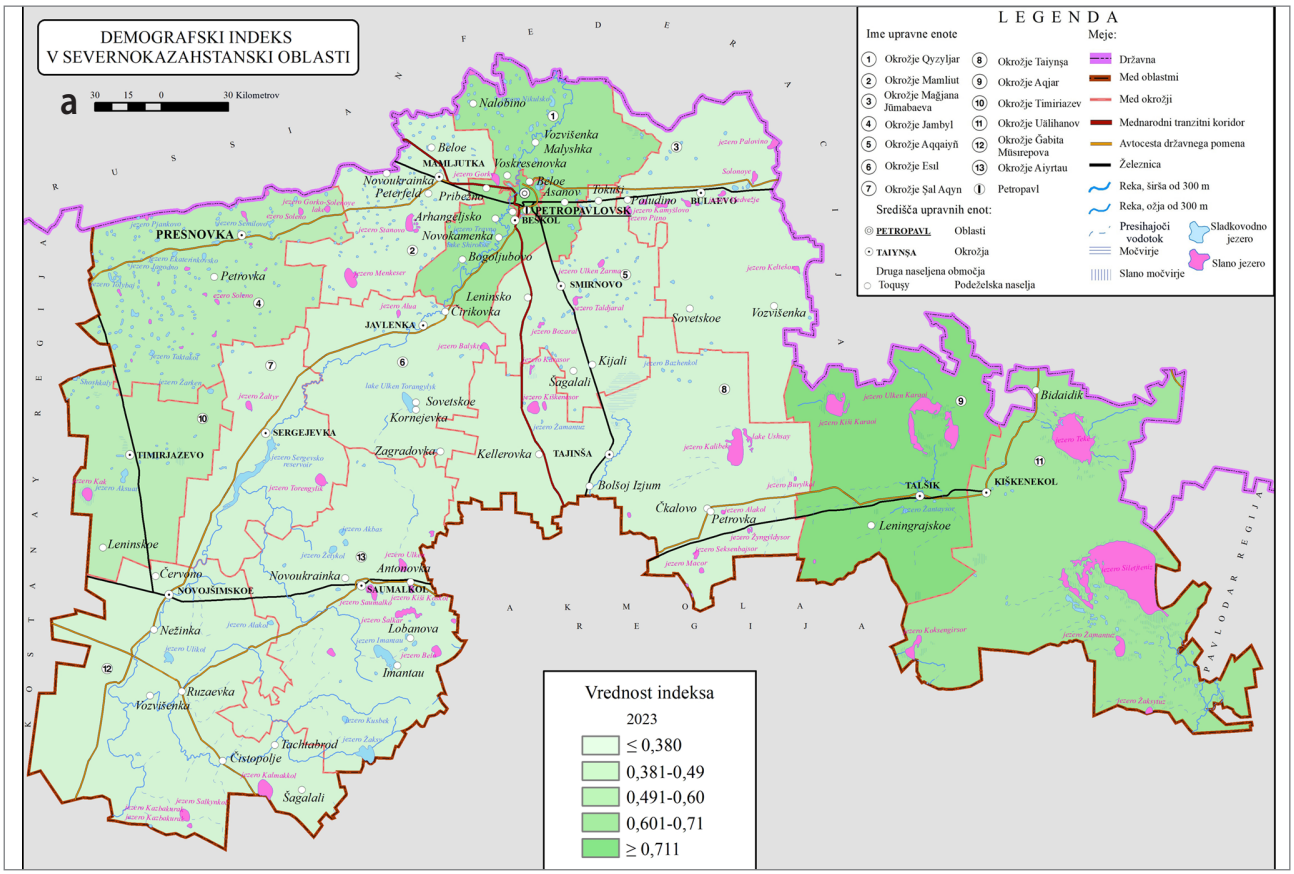
3.2 Razvrščanje območij v skupine glede na stopnjo družbene trajnosti

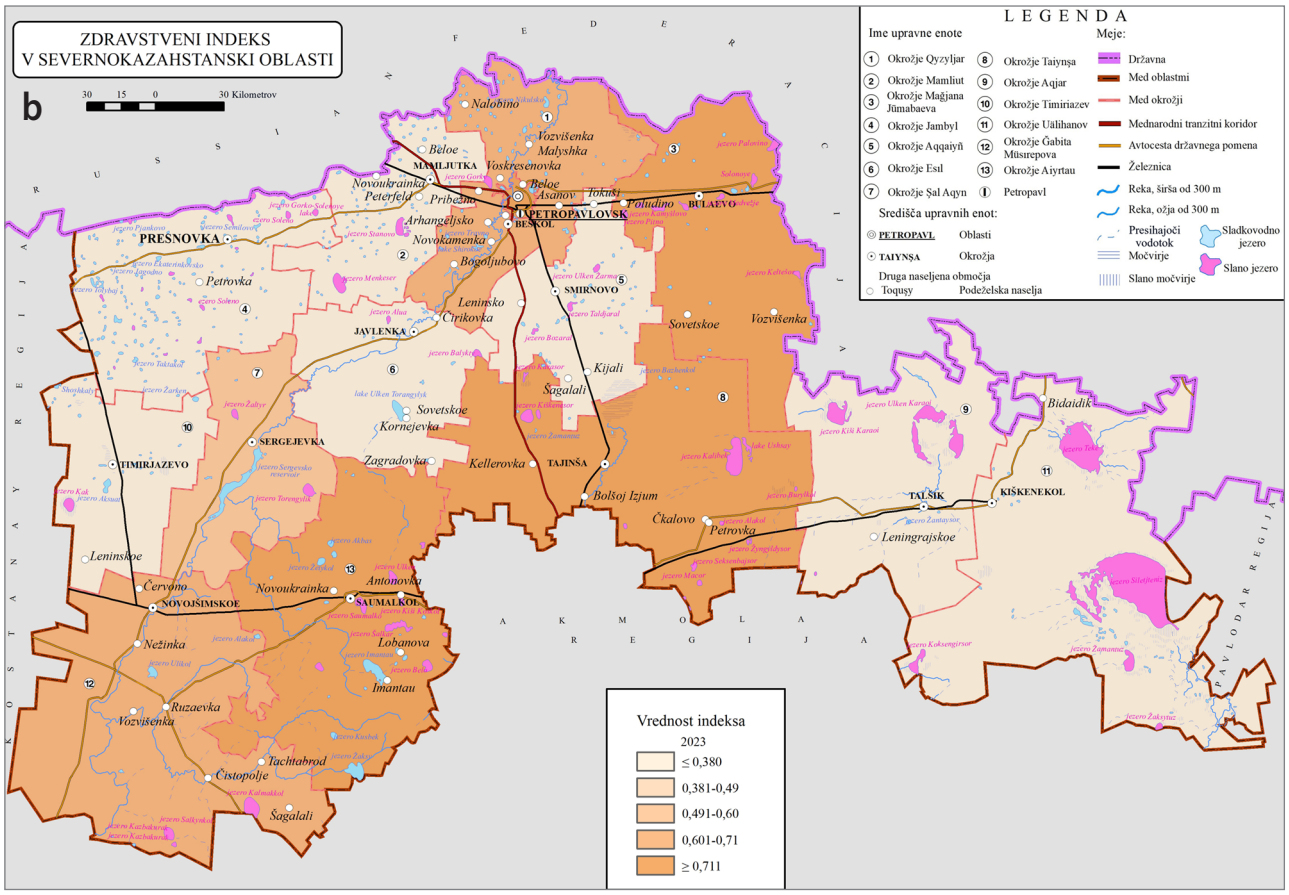
Do konca leta 2023 so avtorji vseh 13 okrožij in mesto Petropavl razvrstili v pet kategorij glede na stopnjo njihove družbene trajnosti, določeno na podlagi sestavljenega indeksa. Kategorije tako razkrivajo območja s podobnimi značilnostmi z vidika ključnih podindeksov (tj. demografije, zdravstva, izobraževanja, kakovosti življenja in družbene vključenosti). Visoka stopnja družbene trajnosti je bila ugotovljena samo v Petropavlu, ki je pri glavnih komponentah prekosil vsa okrožja. Razlogi za to so visoka koncentracija družbeno-gospodarskih virov v mestu, njegova velika institucionalna zmogljivost in dobro razvita infrastruktura. Dober dostop do zdravstva in izobraževanja, zanesljiva oskrba s plinom in vodo ter razmeroma nizka stopnja revščine in brezposelnosti prispevajo k njegovemu celovitemu in odpornemu trajnostnemu stanju.

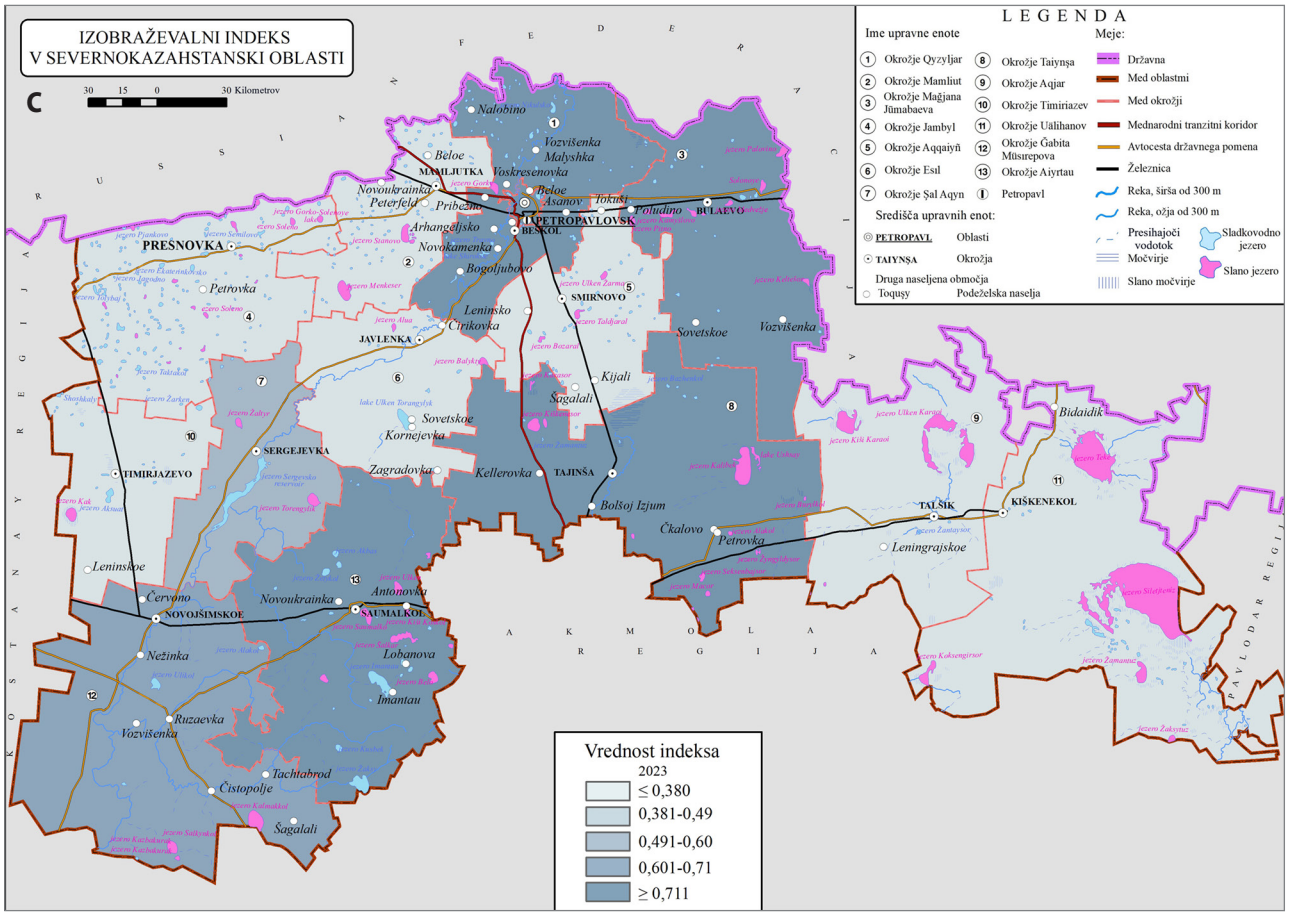
V skupino z nadpovprečno stopnjo družbene trajnosti spadata okrožji Qyzyljar in Ğabita Müsırepova. Na prvega pozitivno vpliva bližina regionalnega središča, drugo pa izstopa po kmetijsko-industrijskih temeljih in nedavnih izboljšavah socialne infrastrukture. Obe okrožji sta dosledno dosegali visoke vrednosti pri podindeksih zdravstvo, izobraževanje in kakovost življenja (slika 1).

Srednja stopnja družbene trajnosti je bila ugotovljena v okrožjih Taiynşa, Aiyrtau, Jambyl in Mamliut. Ta okrožja so dosegla uravnotežene rezultate pri vseh komponentah, brez izrazitih dosežkov ali hudih pomanjkljivosti. Vrednosti podindeksov nihajo blizu regionalnega povprečja, kar odraža razmeroma stabilno družbeno-demografsko sliko, ki pa ni nič posebnega. V skupino s podpovprečno stopnjo družbene trajnosti spadata okrožji Aqqaiyñ in Mağjana Jūmabaeva, ki ju zaznamujejo razmeroma šibki demografski kazalniki, omejen dostop do kakovostnega zdravstva in pomanjkanje osnovne infrastrukture. Zaradi kopičenja socialnih izzivov imata okrožji nižji vrednosti sestavljenega indeksa (Institute of Economic Research, 2021). Skupina z nizko stopnjo družbene trajnosti vključuje okrožja Aqjar, Uälihanov in Şal Aqyn. Ta oddaljena in redko poseljena podeželska območja so pri vseh komponentah indeksa dosegla zelo nizke vrednosti. Zanje so značilni infrastrukturna izolacija,

Slika 1: Prostorska porazdelitev vrednosti podindeksov družbene trajnosti v okrožjih Severnokazahstanske oblasti, 2023: a) demografski indeks, b) zdravstveni indeks, c) izobraževalni indeks, č) indeks kakovosti življenja in infrastrukture in d) indeks družbene vključenosti in okoljske varnosti (karte: avtorji, na podlagi uradnih statističnih podatkov)




ZDRAVSTVENI INDEKS
V SEVERNOKAZAHSTANSKI OBLASTI
b
30 15 0 30 Kilometrov
LEGENDA
Ime upravne enote
1 Okrožje Qyzyljar
2 Okrožje Mamliut
3 Okrožje Mağjana Jümabaeva
4 Okrožje Jambyl
5 Okrožje Aqqaiyň
6 Okrožje Esıl
7 Okrožje Şal Aqyn
8 Okrožje Taiynşa
9 Okrožje Aqjar
10 Okrožje Timiriazev
11 Okrožje Ülihanov
12 Okrožje Ğabita Müsirepova
13 Okrožje Aiyrtau
Petropavl
Meje:
Državna
Med oblastmi
Med okrožji
Mednarodni tranzitni koridor
Avtocesta državnega pomena
Železnica
Reka, širša od 300 m
Reka, ožja od 300 m
Presihajoči vodotok
Sladkovodno jezero
Močvirje
Slano jezero
Slano močvirje
Središča upravnih enot:
PETROPAVL Oblasti
TAIYNŞA Okrožja
Druga naseljena območja
Toqusy Podeželska naselja
Vrednost indeksa
2023
≤ 0,380
0,381-0,49
0,491-0,60
0,601-0,71
≥ 0,711
PREŠNOVKA
MAMLJUTKA
PETROPAVLOVSK
BESKOL
BULAEVO
SMIRNOVO
JAVLENKA
SERGEJEVKA
TIMIRJAZEVO
TAJINŠA
TALŠIK
KIŠKENEKOL
NOVOJŠIMSKOE
SAUMALKOL
Nalobino
Vozvišenka
Malyshka
Voskresenovka
Beloe
Novoukrainka
Peterfeld
Pribežno
Asanov
Tokuši
Poludino
Arhangeljsko
Novokamenka
Bogoljubovo
Petrovka
Leninsko
Čirikovka
Sovetskoe
Kijali
Šagalali
Kornejevka
Zagradovka
Kellerovka
Bolšoj Izjum
Čkalovo
Bidaidik
Leningrajskoe
Leninskoe
Červono
Antonovka
Nežinka
Lobanova
Imantau
Ruzaevka
Tachtabrod
Čistopolje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12 Okrožje Ğabita Müsirepova
13 Okrožje Aiyrtau
Petropavl
Meje:
Državna
Med oblastmi
Med okrožji
Mednarodni tranzitni koridor
Avtocesta državnega pomena
Železnica
Reka, širša od 300 m
Reka, ožja od 300 m
Presihajoči vodotok
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Močvirje
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Asanov
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Petrovka
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Sovetskoe
Kijali
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Zagradovka
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Bolšoj Izjum
Čkalovo
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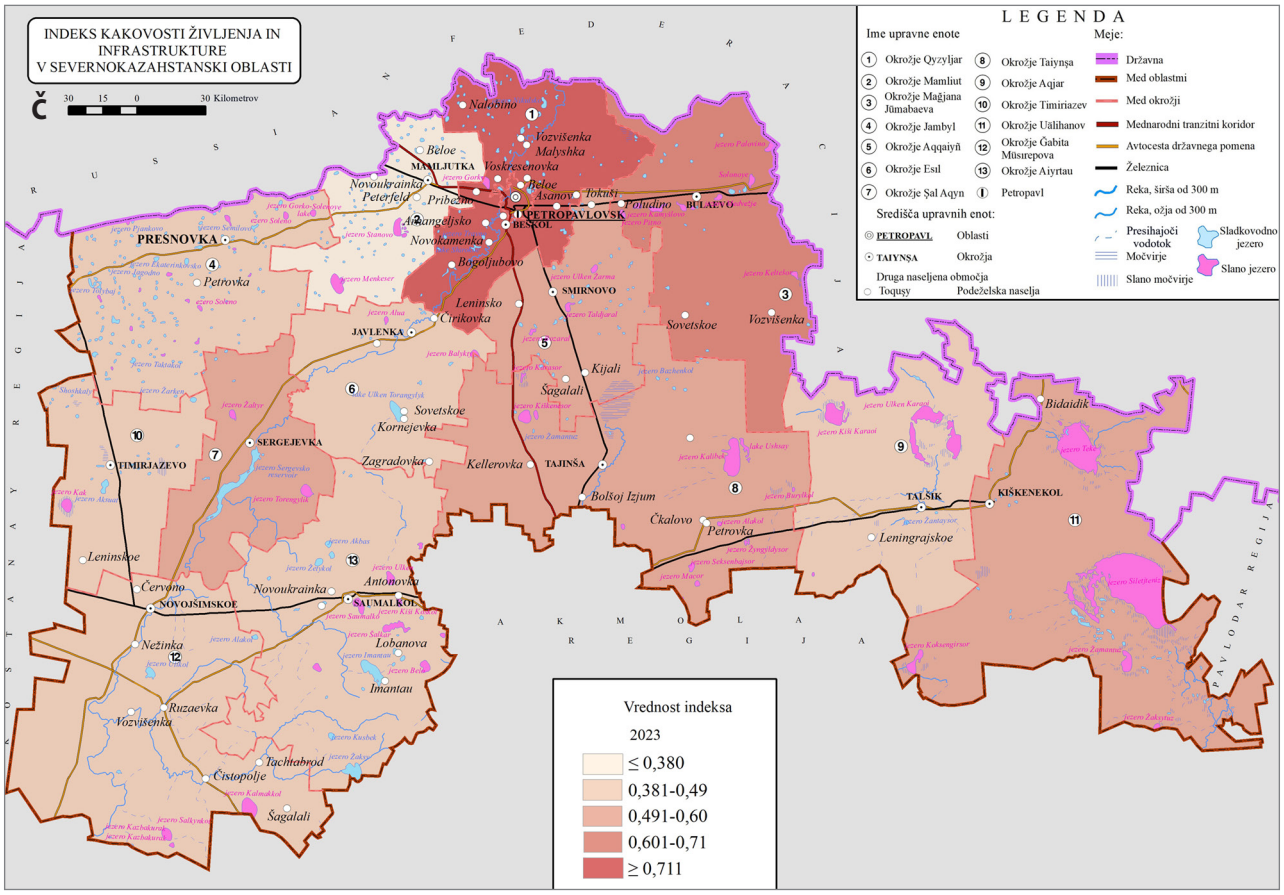
Antonovka
Nežinka
Lobanova
Imantau
Ruzaevka
Tachtabrod
Čistopolje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Petropavl
Meje:
Državna
Med oblastmi
Med okrožji
Mednarodni tranzitni koridor
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PETROPAVL Oblasti
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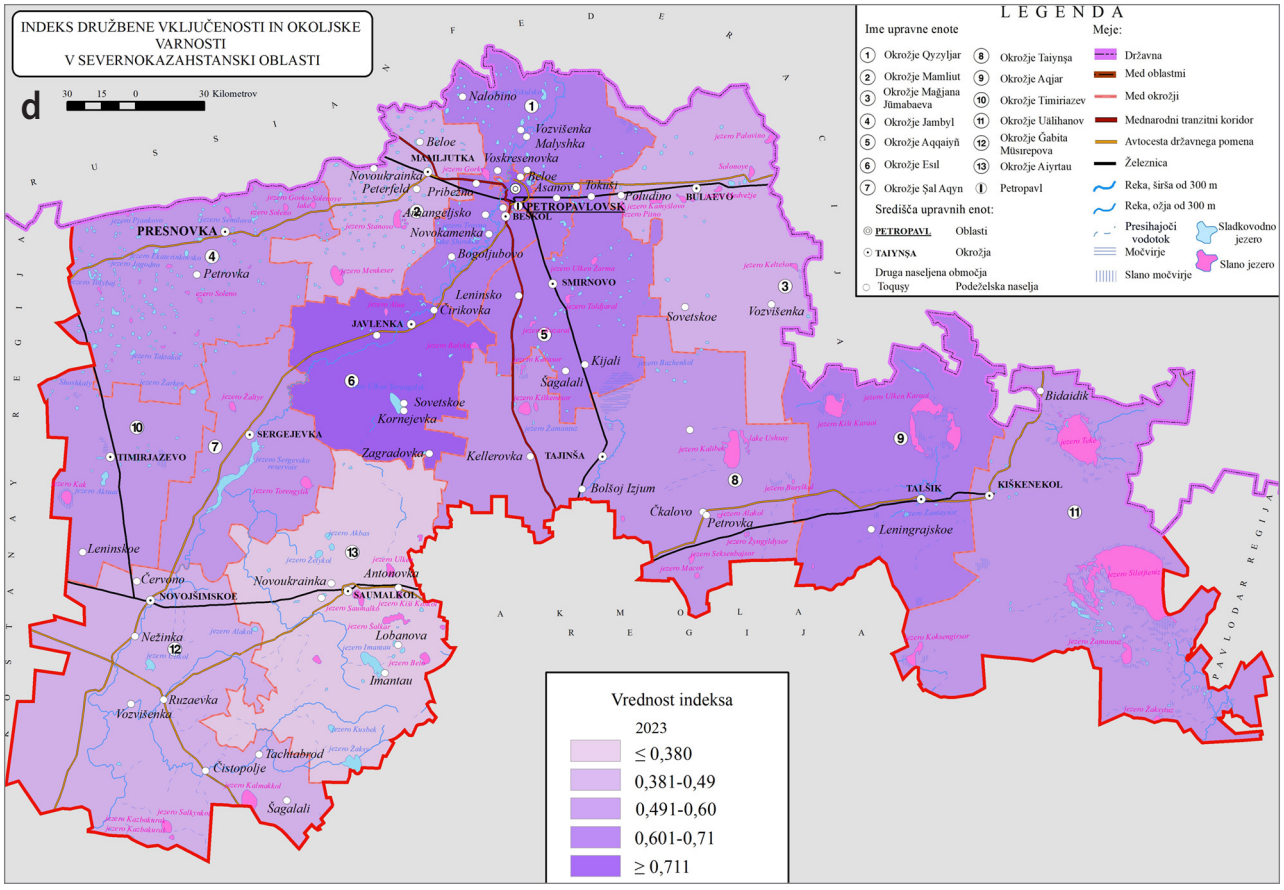
INDEKS DRUŽBENE VKLJUČENOSTI IN OKOLJSKE VARNOSTI V SEVERNOKAZAHSTANSKI OBLASTI
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Petropavl
Meje:
Državna
Med oblastmi
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Reka, širša od 300 m
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Sladkovodno jezero
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Središča upravnih enot:
PETROPAVL Oblasti
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PRESNOVKA
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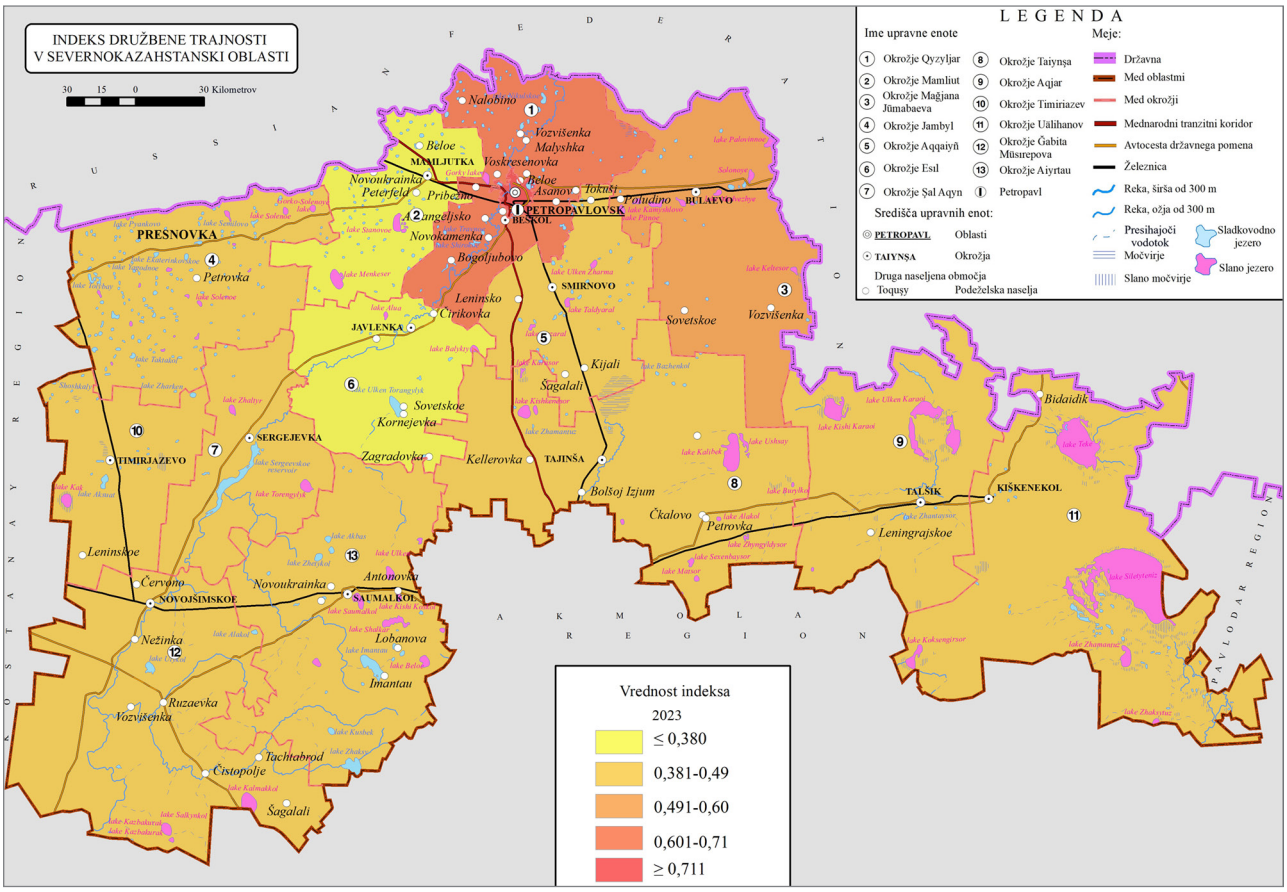


Slika 2: Prostorska porazdelitev vrednosti indeksa družbene trajnosti v okrožjih Severnokazahstanske oblasti, 2023 (ilustracija: avtorji, na podlagi uradnih statističnih podatkov)

upadanje prebivalstva in malo zaposlitvenih priložnosti – dejavniki, ki skupaj prispevajo k trajni socialni ranljivosti. Dostop do zdravstva, izobraževanja in osnovnih bivalnih razmer v teh okrožjih ostaja močno pod regionalnim povprečjem.

Navedena prostorska porazdelitev družbene trajnosti potrjuje, da je regionalni razvoj osredotočen na mesta. Petropavl tvori izrazito središče družbene odpornosti, bolj oddaljena okrožja pa ostajajo trajno ranljiva. Večina podeželskih območij je nekje vmes, kar poudarja potrebo po prostorsko diferencirani regionalni politiki, ki odpravlja prostorske razlike in krepi lokalne zmogljivosti.

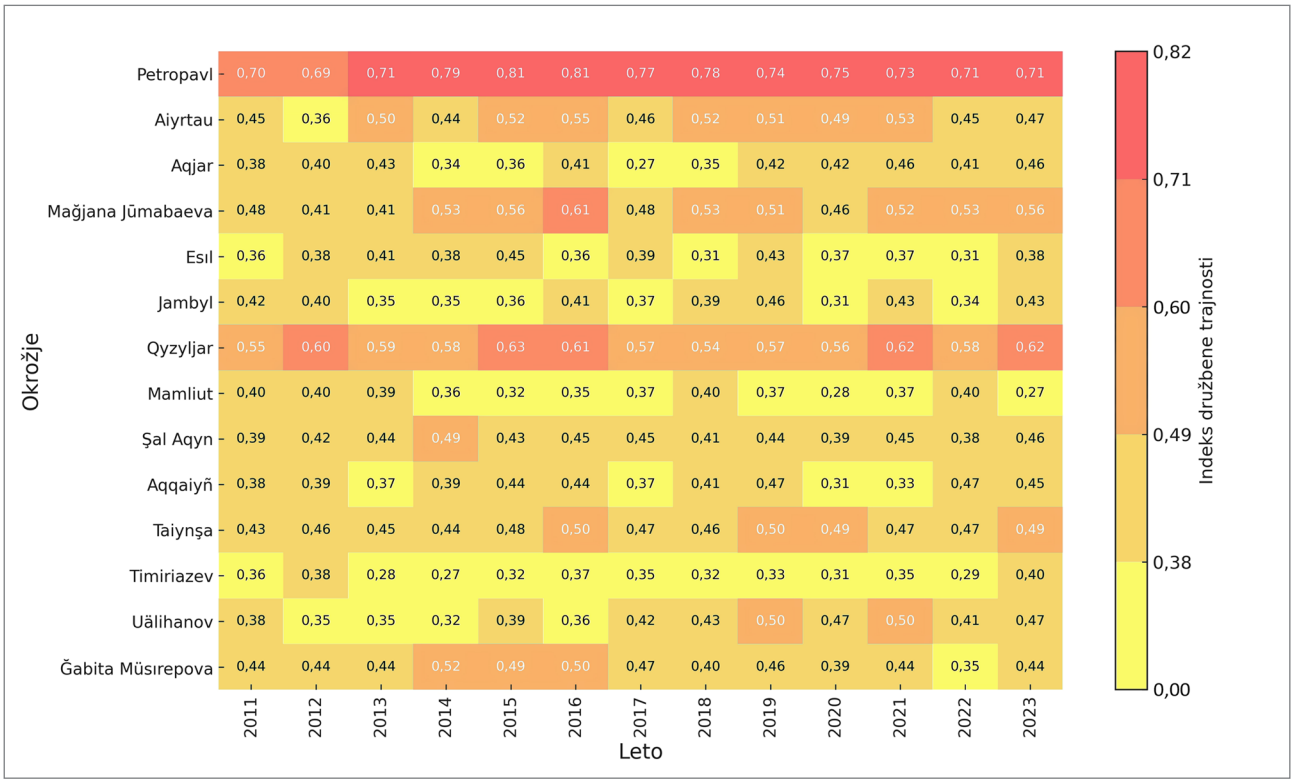
3.3 Zgradba indeksa

Analiza zgradbe sestavljenega indeksa razkriva prostorske posebnosti družbene trajnosti. Izbranih pet podindeksov določa skupno oceno, vendar so med okrožji z najvišjimi vrednostmi in tistimi z nižjimi rezultati precej velike razlike.

Petropavl ima uravnotežen in enakomeren indeks družbene trajnosti, saj so vrednosti vseh njegovih podindeksov višje od regionalnega povprečja (slika 2). Pri treh (tj. izobraževanje, zdravstvo in kakovost življenja) ima celo najvišje vrednosti v celotni oblasti. Petropavl zaseda vodilni položaj na področju izobraževanja zaradi veliko vrtcev in višješolskih ustanov.

Mesto je na prvem mestu tudi v zdravstvu, kar je posledica visoke stopnje razpoložljivosti zdravstvenih delavcev, prisotnosti specializiranih ustanov in ugodnih vrednosti demografskih kazalnikov, kot sta umrljivost novorojenčkov in pričakovana življenjska doba (Sustainable ..., b. d.). Na visoko kakovost življenja v Petropavlu vpliva dobra pokritost mesta s komunalnimi storitvami: več kot 95 % gospodinjstev je priključenih na centralni vodovod in sistem daljinskega ogrevanja, velik delež jih ima tudi dostop do plina. K visokim vrednostim na področju infrastrukture prispevata še aktivna stanovanjska gradnja in razpoložljivost stanovanj v večstanovanjskih stavbah.

Pri podindeksu družbene vključenosti ima mesto zmerno visoke vrednosti, ki so posledica nizke stopnje brezposelnosti in razmeroma majhnega deleža prebivalcev pod pragom revščine. Edini šibkejši vidik je varnost, saj je stopnja prijavljenega kriminala v mestu od nekdaj višja kot na podeželskih območjih, zaradi česar je končna vrednost podindeksa družbene vključenosti nekoliko nižja (BNS, b. d.).



Slika 3: Spremembe v vrednosti indeksa družbene trajnosti po okrožjih Severnokazahstanske oblasti, 2011–2023 (karta: avtorji, na podlagi uradnih statističnih podatkov)

V nasprotju s Petropavlom v okrožjih, kot sta Uälihanov in Aqjar, vrednosti vseh podindeksov ostajajo nizke, brez izrazitih kompenzacijskih prednosti (slika 2). Demografski podindeks znižuje vrednost sestavljenega indeksa zaradi stalno visoke umrljivosti, ki je višja od rodnosti, in aktivnega izseljevanja. Na zdravstveni podindeks negativno vplivajo pomanjkanje zdravstvenih delavcev, oddaljenost zdravstvenih ustanov in slabši zdravstveni izidi. Izobraževanje je večinoma omejeno na osnovno in srednješolsko izobraževanje, delež prebivalcev z visoko izobrazbo pa je precej manjši kot v regionalnem središču. Infrastruktura je slabo razvita: mnoge vasi nimajo zanesljive oskrbe z vodo niti daljinskega ogrevanja, ceste so v slabem stanju, oskrba s plinom je minimalna. Družbena vključenost je oslabljena še zaradi velikega deleža prebivalcev pod pragom revščine, omejenega dostopa do trga dela in splošne gospodarske stagnacije. V takih razmerah niti razmeroma nizka stopnja kriminala ne more izboljšati skupne vrednosti sestavljenega indeksa.

V okrožjih z najvišjimi vrednostmi vsak podindeks krepi učinek drugih, kar ustvarja sinergijo in zvišuje končno vrednost sestavljenega indeksa. V okrožjih s slabšimi rezultati pa negativni dejavniki na več področjih hkrati kumulativno znižujejo skupno stopnjo družbene trajnosti. Zaradi navedenega neravnovesja je potreben diferenciran pristop politike. V primeru Petropavla je glavna naloga ohranjanje dosežene ravni trajnosti in okrepitev odpornosti na prihodnje šoke, medtem ko obrobna okrožja potrebujejo ciljno usmerjene krepe na najranljivejših področjih (zlasti v infrastrukturi, zdravstvu in demografski stabilnosti), da bodo lahko odpravila strukturne slabosti in zmanjšala razlike v trajnosti.

3.4 Tipologija okrožij Severnokazahstanske oblasti glede na stopnjo družbene trajnosti

Analiza sprememb v vrednosti indeksa družbene trajnosti po okrožjih Severnokazahstanske oblasti med letoma 2011 in 2023 je razkrila tako trajno stabilna kot izrazito nestabilna območja. Pri tem je stabilnost opazna tako v zgornjem kot spodnjem koncu trajnostnega spektra. Petropavl je med celotnim proučevanim obdobjem ohranjal najvišjo vrednost sestavljenega indeksa. Na nasprotnem koncu pa so bila prepoznana okrožja, ki so imela nizke vrednosti. Okrožji Uälihanov in Şal Aqyn sta bili v celotnem obdobju v najnižjem kvintilu regionalne lestvice. Manjša medletna nihanja niso vplivala na njuno skupno razvrstitev, kar kaže na močno uveljavljene družbeno-gospodarske razlike in odsotnost učinkovitih mehanizmov prilagajanja demografskim in infrastrukturnim izzivom.

Nekatera okrožja so imela stalno visoko ali nizko stopnjo družbene trajnosti, v drugih pa je bila ta precej spremenljiva. Okrožje Taiynşa je bilo na primer sprva razvrščeno med okrožja s srednjo stopnjo družbene trajnosti, zaradi naložb v socialni sektor, posodobitve izobraževalne in prometne infrastrukture

ter odprtja novih industrijskih obratov pa je v začetku dvajsetih let 21. stoletja napredovalo v nadpovprečno kategorijo (Prime Minister ..., 2020). Obratno je bilo ugotovljeno za okrožje Mağjana Jūmabaeva, ki je bilo v prvi polovici proučevanega obdobja blizu regionalnega povprečja, po letu 2017 pa se je njegov položaj izrazito poslabšal. Zaradi povečanega izseljevanja, krčenja mreže socialnih storitev in propadanja osnovne infrastrukture so se vrednosti njegovih podindeksov znižale, tako da je bilo uvrščeno v kategorijo s podpovprečno stopnjo trajnosti (MTRK, 2021; slika 3).

Za redko poseljena okrožja je značilno večje medletno nihanje v vrednosti indeksa družbene trajnosti. Na podlagi meril, opredeljenih v drugem poglavju, je bilo več okrožij prepoznanih kot izrazito nestabilnih, pri čemer lahko majhne absolutne spremembe v vrednosti občutljivih spremenljivk (npr. stopnja umrljivosti novorojenčkov ali kriminala) povzročijo vidne spremembe normaliziranih vrednosti. V večini teh primerov spremembe niso trajale dlje od enega leta ali dveh, nato pa je bila vrednost indeksa podobna dolgoročnemu povprečju. Z vidika politike ta vzorec utemeljuje ohranjanje in postopno izboljšanje položaja v okrožjih s stalno visoko stopnjo trajnosti ter uvedbo stabilizacijskih ukrepov (npr. večletnih ciklov financiranja, zagotovljenih delovnih mest za zdravnike in učitelje ter prostorsko usmerjenih upravljavskih instrumentov) v izrazito nestabilnih okrožjih, ki lahko ublažijo izrazita nihanja in zmanjšajo izpostavljenost šokom.

4 Razprava

4.1 Interpretacija izsledkov

Celovita analiza družbene trajnosti v okrožjih Severnokazahstanske oblasti med letoma 2011 in 2023 je pokazala veliko prostorsko polarizacijo, z izrazitimi razlikami med mestnimi in podeželskimi območji. Najvišje vrednosti sestavljenega indeksa so bile ugotovljene za Petropavl, kar potrjuje, da je trajnostni razvoj v proučevani oblasti usmerjen predvsem v mestna območja, na katerih je zaradi visoke gostote prebivalcev, visoke koncentracije virov in razpoložljivosti ustreznih ustanov zagotovljena visoka raven socialnih storitev. Uravnotežene vrednosti vseh podindeksov kažejo na celostni urbani razvoj, kljub nekoliko višji stopnji kriminala. Med podeželskimi območji pa so precejšnje razlike. Nekatera osrednja in južna okrožja (npr. Qyzyljar in Ğabita Müsırepova) kažejo pozitivne trende, na katere vplivajo bližina regionalnega središča in naložbe, stopnja družbene trajnosti v severovzhodnih in obmejnih okrožjih pa ostaja nizka. Navedeno je posledica trenutnih družbeno-gospodarskih razmer in strukturnih težav še od prej: upadanja prebivalstva, neustrezne infrastrukture ter slabe prometne in digitalne povezanosti.

Analiza podindeksov je pokazala, da so nižje vrednosti v okrožjih z ugotovljeno nizko stopnjo družbene trajnosti posledica sistemskih pomanjkljivosti: upadanja prebivalstva, omejenega dostopa do storitev, infrastrukturnih vrzeli in revščine. Navedeni dejavniki se medsebojno krepijo in ustvarjajo skupno ranljivost. Z vidika sprememb skozi čas je razvidno, da se je položaj v urbanih središčih in nekaterih okrožjih z leti izboljšal, drugje (npr. v okrožjih Aqjar, Uälihanov in Şal Aqyn) pa stopnja družbene trajnosti ostaja nizka. Navedena stagnacija kaže na strukturno upiranje spremembam in pomanjkanje prilagodljivih politik. Splošna stabilnost ugotovljenih vrednosti sestavljenega indeksa potrjuje njegovo robustnost in izrazite prostorske neenakosti.

4.2 Primerjava s prejšnjimi raziskavami

Navedeni izsledki se ujemajo z ugotovitvami prejšnjih raziskav prostorske odpornosti in regionalnih razlik v državah nekdanje Sovjetske zveze in državah v razvoju. Kot ugotavljajo Gan idr. (2017) in Abreu idr. (2022), na odpornost območij vplivajo tako formalni makroekonomski kazalniki kot strukturna uravnoteženost dostopa do osnovnih socialnih storitev, demografski potencial in kakovost okolja. S tega vidika se ugotovljeni vodilni položaj regionalnega središča in ranljivost bolj odmaknjenih okrožij skladata z nesimetričnim regionalnim razvojem drugje po svetu (npr. v Srednji Aziji, Vzhodni Evropi in Latinski Ameriki).

V primeru Kazahstana izsledki potrjujejo in nadgrajujejo ugotovitve drugih raziskav (npr. UNDP Kazakhstan, 2020; Institute of Economic Research, 2021; Zhanibayeva, 2022), ki poudarjajo strukturno neenakost mestnih in podeželskih območij. Zlasti težave, kot so omejen dostop do osnovnih storitev, pomanjkanje delovne sile in nizka raven dohodkov na podeželskih območjih severnih kazahstanskih oblasti, so bile že prepoznane kot ključne ovire za doseganje trajnostnega regionalnega razvoja (OECD, 2008). V nasprotju s pristopi, ki se osredotočajo na analize na ravni oblasti ali makroregij, so avtorji v tej raziskavi kartirali družbeno trajnost na ravni okrožij (tj. na mikroravni). Z navedenim pristopom je mogoče določiti splošne razvojne vzorce in razlike v okviru proučevanih skupin, ki so pri skupnih kazalnikih pogosto zakrite. Poleg tega uporaba sestavljenega indeksa z občutljivostno analizo uteži pomaga ublažiti metodološko pristranskost, kar poveča zanesljivost medregionalnih primerjav. Podobni modeli so bili uporabljeni v raziskavah v Indiji, Turčiji in Latinski Ameriki, kjer so se analize na ravni okrožij ali občin izkazale za izjemno učinkovite pri določanju lokalnih žarišč družbene ranljivosti (CEEW, 2020; DST-GoI, 2024; Tanır idr., 2022; IPEA, 2015; Menezes idr., 2018; León-Cruz idr., 2024). Dobljeni rezultati se torej skladajo z mednarodnimi trendi, hkrati pa z visoko prostorsko ločljivostjo in celovitim računskim modelom

pomembno prispevajo k boljšemu razumevanju razmer v Kazahstanu, zaradi česar so primerni za vključitev v oblikovanje politik in regionalne upravljavske prakse.

4.3 Prednosti in omejitve uporabljenega pristopa

Predlagani pristop k proučevanju družbene trajnosti ima več pomembnih metodoloških in praktičnih prednosti. Združuje pet med seboj povezanih podindeksov, ki omogočajo celovito analizo družbenih razmer na ravni okrožij, s čimer presega razdrobljene analize in omogoča celostno razumevanje trajnosti. Pomembni prednosti sta pregledna normalizacija podatkov in uporaba več sistemov uteževanja hkrati. Z analizo občutljivosti je bilo potrjeno ujemanje ocen okrožij ne glede na uporabljeni način uteževanja, kar povečuje zanesljivost rezultatov in zmanjšuje morebitno pristranskost, skladno z mednarodnimi smernicami (Gan idr., 2017; OECD, 2008). Vrednosti indeksa in njihove spremembe so bile prikazane z uporabo orodij GIS in zlasti programa ArcGIS, s čimer so avtorji lahko določili prostorske vzorce in območja povečanega tveganja. Tovrstni vizualni prikazi povečujejo dostopnost rezultatov tako za strokovnjake kot odločevalce.

Uporabljeni pristop ima tudi nekatere omejitve. Zaradi zanašanja na uradne statistične podatke na ravni okrožij je težko zajeti razlike v okviru okrožij, zlasti med mesti in odmaknjenimi vasmi, kar lahko vpliva na pristranskost pri združevanju podatkov. Poleg tega za nekatere dejavnike (npr. neformalne ustanove, zaznano pravičnost ali kakovost upravljanja) ni razpoložljivih podatkov, zato bi bilo treba opraviti dodatne kvalitativne raziskave. Časovni okvir raziskave (2011–2023) je primeren za kratkoročne in srednjeročne analize, hkrati pa omogoča samo delni vpogled v dolgoročne vplive strukturnih reform. V prihodnjih raziskavah bi bilo treba časovni okvir razširiti in vključiti napovedi, ki temeljijo na več scenarijih. Kljub navedenim omejitvam je uporabljena metodologija učinkovita, kadar so razpoložljivi podatki omejeni, in zagotavlja trdno izhodišče za spremljanje družbene trajnosti in oblikovanje regionalne politike.

Zaradi odsotnosti primerljivih subjektivnih kazalnikov na ravni okrožij, kot so življenjsko zadovoljstvo, družbena kohezija in zaupanje, podindeks družbene vključenosti ni popoln. Avtorji za prihodnje cikle spremljanja družbene trajnosti predlagajo: 1. uvedbo anketnega modula z osmimi do desetimi vprašanji in letnim stratificiranim vzorcem 300–400 anketirancev, 2. razširitev indeksa z latentno spremenljivko »družbena angažiranost« (s potrditveno faktorsko analizo), ki bi jo primerjali s kazalniki brezposelnosti, dohodka in stopnje kriminala, in 3. redno vključevanje občinskih upravnih podatkov za analizo posrednih kazalnikov (npr. sodelovanja pri prostovoljnih dejavnostih).

4.4 Vplivi na politiko in načrtovanje

Pridobljeni rezultati neposredno povezujejo začetno raziskovalno hipotezo s potrebo po ciljno usmerjenih programih trajnostnega razvoja na podregionalni ravni. Kartiranje indeksa družbene trajnosti je razkrilo stabilno jedro (Petropavl in sosednje občine), okoli njega pa trajno ranljiva območja (oddaljena, redko poseljena okrožja). To kaže, da splošni ukrepi za odpravljanje razlik med njimi niso dovolj – potrebni so diferencirani svežnji ukrepov, ki združujejo infrastrukturne naložbe (v vodovod, oskrbo s plinom, ceste in digitalno povezanost), krepitev človeškega kapitala na področju zdravstva in izobraževanja ter gospodarske spodbude, zaradi katerih bi mladi in visoko kvalificirani kadri ostali na teh območjih. V praksi to pomeni prehod k pripravi načrtov trajnosti na ravni okrožij, v katerih so cilji in financiranje usklajeni z ugotovljenimi vrednostmi podindeksov, spremljanje pa temelji na letnem posodabljanju vrednosti kazalnikov indeksa družbene trajnosti.

Za uskladitev izsledkov s praktičnim izvajanjem lokalne politike je priporočljivo ukrepe opredeliti glede na stopnjo družbene trajnosti:

- jedro visoke stopnje trajnosti (Petropavl): ohranjanje doseženih ravni trajnosti s preventivnimi zdravstvenimi programi, pobudami za krepitev varnosti v mestu, izboljšanjem izobrazbe in spretnosti na področju informacijsko-komunikacijske tehnologije ter učinkovitim upravljanjem migracij in stanovanjske politike;
- območja s srednjo in nadpovprečno stopnjo trajnosti (okrožji Qyzyljar in Ğabita Müsırepova): uvedba pospeševalcev rasti, kot so izboljšanje infrastrukture, da ustreza sodobnim standardom mestnega življenja, povečanje dostopa do specializiranih zdravstvenih storitev, strokovnega izobraževanja in računalniških tečajev ter oblikovanje lokalnih zaposlitvenih programov;
- območja s podpovprečno in nizko stopnjo trajnosti (npr. okrožja Uälihanov, Aqjar in Şal Aqyn): izboljšave osnovne infrastrukture (oskrbe z vodo, sanitarne ureditve, cest in komunikacij), ciljno usmerjeno zaposlovanje zdravstvenih in pedagoških delavcev, vzpostavljanje lokalnih vozlišč gospodarske dejavnosti (npr. predelave in logistike malega obsega) in zagotavljanje podpore gospodinjstvom.

Izsledki raziskave imajo velik praktični pomen za regionalno politiko, zlasti z vidika zmanjševanja neenakosti (cilj trajnostnega razvoja 10), krepitve zdravja (cilj trajnostnega razvo-

ja 3) ter spodbujanja izobraževanja (cilj trajnostnega razvoja 4), dostopa do infrastrukture (cilj trajnostnega razvoja 11) in institucionalne zmogljivosti (cilj trajnostnega razvoja 16). Visoka stopnja družbene trajnosti v Petropavlu in njegovih predmestjih poudarja potrebo po spremembi enotne infrastrukturne politike. Zaradi strukturnih razlik na podeželskih območjih sta potrebna prilagojeno načrtovanje in ciljna podpora okrožjem s trajno nizkimi vrednostmi podindeksov, zlasti na področju zdravja, infrastrukture in demografije. Razvrščanje okrožij po stopnji trajnosti omogoča diferenciran pristop k oblikovanju politike. Na območjih z nižjo stopnjo družbene trajnosti so potrebne celostne strategije: posodobitev zdravstvenih in izobraževalnih ustanov, izboljšanje prometne in digitalne povezanosti ter spodbujanje zaposlovanja z razvojem lokalnih podjetij. Družbena podpora mora biti tesno povezana z gospodarskimi in infrastrukturnimi ukrepi.

Prednostna naloga je tudi institucionalizacija mehanizmov spremljanja. Oblikovani sestavljeni indeks se lahko vključi v regionalna razvojna orodja, kar bi omogočilo redno posodabljanje podatkov, njihovo vizualizacijo in povezovanje s programi financiranja. Poleg tega bi to olajšalo učinkovitejše načrtovanje naložb na podlagi dejanskih potreb. Obetavna okrožja, kot sta Taiynşa in Qyzyljar, ki kažeta pozitivne trende, so lahko pilotna območja za uvedbo inovacij na področju socialnih storitev in digitalnega gospodarstva. Širjenje uspešnih modelov ob njihovem hkratnem prilagajanju lokalnim potrebam lahko spodbudi oblikovanje bolj uravnoteženega in odpornega regionalnega sistema. Ta raziskava torej ne ponuja samo kratkega vpogleda v trenutne prostorske razlike, ampak tudi okvir za oblikovanje politik, s katerimi bi se zmanjšala prostorska neenakost in povečala prilagodljivost ranljivih okrožij.

5 Sklep

Na podlagi sestavljenega indeksa družbene trajnosti so bili v Severnokazahstanski oblasti prepoznani trajne prostorske razlike in dolgoročni trendi prostorske neenakosti. Najbolj trajnostna so urbanizirana in z viri bogata območja, kot so mesto Petropavl in okoliška naselja, za odmaknjena in redko poseljena okrožja pa je značilna strukturna ranljivost, ki je posledica izseljevanja, omejenega dostopa do osnovnih storitev in šibke gospodarske osnove. Navedeno potrjuje prostorske razlike, ki jih ni mogoče odpraviti z univerzalnimi političnimi ukrepi, temveč so za to potrebne strategije, prilagojene posameznim območjem. Prednost je treba nameniti stabilizaciji demografskih procesov, izboljšanju dostopnosti in kakovosti zdravstva in izobraževanja, posodobitvi infrastrukture ter podpori človeškemu kapitalu v obrobnih okrožjih. Poleg tega je za bolj usmerjeno in učinkovito odločanje ključna uporaba orodij prostorskega načrtovanja in digitalnih tehnologij.

Avtorji so tako potrdili hipotezo, da je treba za regionalno diferenciacijo družbene trajnosti v Severnokazahstanski oblasti izvajati ciljno usmerjene programe trajnostnega razvoja, katerih cilja sta zmanjševanje prostorskih razlik in izboljšanje kakovosti življenja prebivalcev. Navedeni izsledki raziskave so lahko podlaga za spremljanje regionalnih razlik, usmerjanje regionalnega razvoja in oblikovanje pravične socialne politike v okviru kazahstanskega programa trajnostnega razvoja. Predlagani sestavljeni indeks je mogoče prilagoditi za uporabo v drugih kazahstanskih oblasteh, vključiti v sistem spremljanja programov regionalnega razvoja in uporabiti za utemeljevanje prednostnega dodeljevanja virov. Predlagana tipologija okrožij in uporabljeni podindeksi pa omogočajo neposredno uporabo rezultatov analiz pri oblikovanju programov trajnostnega razvoja na ravni okrožij, finančnem načrtovanju in letnem spremljanju vrednosti ciljnih kazalnikov.

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Izbor lokacije avtobusne postaje na podlagi hibridnega modela večkriterijskega odločanja v Uşaku v Turčiji

Lokacije avtobusnih postaj so ključne za učinkovito storitev potniškega prometa in trajnostno mobilnost v mestih. Določajo možnost dostopa obiskovalcev do mesta ter varnost, dostopnost in ekonomičnost javnega prevoza. Poleg tega vplivajo na dostop prebivalcev do delovnih mest, šol, zdravstvenih in drugih osnovnih storitev ter posledično na splošno družbenogospodarsko blaginjo mesta. V članku je določena optimalna lokacija nove avtobusne postaje v turškem mestu Uşak, za kar so avtorji uporabili hibridni model večkriterijskega odločanja, ki vključuje presojo dvajsetih kriterijev in celovito analizo dostopnosti lokacij na podlagi mnenj strokovnjakov ter upošteva raznovrstne potrebe prebivalcev in lokalnih oblasti. S postopkom analitične hierarhije so merilom pripisali uteži, na podlagi česar so nato z metodami MOOSRA, ARAS in VIKOR sedem možnih lokacij razvrstili po primernosti. Izsledki so pokazali, katera lokacija bi bila najprimernejša, hkrati pa so potrdili robustnost uporabljenega modela in njegovo uporabnost v urbanističnem načrtovanju.

Ključne besede: avtobusna postaja, večkriterijska analiza, izbor lokacije, MOOSRA, ARAS, VIKOR

1 Uvod

Avtobusne postaje so ključne prvine državnega, regionalnega in lokalnega sistema potniškega prometa, na katerih lahko potniki prestopajo med avtobusnimi linijami (Rodrigue, 2024). Pri načrtovanju postaj je treba upoštevati njihovo ključno vlogo v prometnem omrežju in njihov pomen z vidika povezanosti območij z javnim prevozom ter dodano vrednost, ki jo ustvarjajo kot dinamični javni prostori. Avtobusne postaje so torej veliko več kot zgolj postajališča v sistemu mestnega potniškega prometa (Sun idr., 2017).

Ti objekti so ključne točke, na katerih potniki prestopajo med vrstami avtobusnih linij (Curzel idr., 2019). So pomembna vozlišča mobilnosti, kjer je dostop za vozila, pešce in kolesarje ključen za učinkovito delovanje javnega prometnega omrežja (Munir idr., 2024). Poleg tega kot sestavni del mestnega okolja vplivajo na ureditev prostora in družbeno interakcijo. Ob tem prispevajo k oblikovanju kraja in mestnega tkiva (Vigneau, 2019).

V današnjih mestih, ki se hitro širijo, so politike potniškega prometa in mobilnosti skupaj z vrstami prostorske rabe, kot so stanovanja, poslovne stavbe, izobraževalne ustanove in javna infrastruktura, postale neločljiv del urbanističnega načrtovanja. Izbira lokacij avtobusnih postaj je zato pomembna načrtovalska odločitev, ki vpliva na delovanje in učinkovitost prometnega omrežja in splošno dinamiko razvoja mest (Ayuningtyas idr., 2019).

Izbor primerne lokacije avtobusne postaje je zapletena in pomembna naloga. V ta namen so bili že predlagani raznovrstni pristopi, metode večkriterijskega odločanja pa se še vedno razmeroma redko uporabljajo. To je pomembna vrzel, saj so te metode primerne še zlasti za odločanje, ki vključuje več, pogosto nasprotujočih si kriterijev. Kot ugotavlja Nedeljković (2023), na izbor lokacije vplivajo tako kvantitativni podatki kot kvalitativni dejavniki, ki jih lahko metode večkriterijskega odločanja učinkovito združujejo. Podobno tudi Chakraborty idr. (2013) poudarjajo, da metoda večkriterijskega odločanja zagotavlja trden okvir za reševanje zapletenih težav, povezanih z lokacijami objektov, pri čemer je treba uravnotežiti številne prednostne naloge.

Za klasične metode večkriterijskega odločanja so značilne omejitve pri obravnavi zapletenih in medsebojno povezanih kriterijev odločanja, ki pogosto krnijo točnost in robustnost rezultatov. Hibridni model večkriterijskega odločanja združuje dve ali več takih metod, s čimer presežemo omejitve ene metode ter izboljšamo točnost, robustnost in interpretativnost rezultatov (Poklepović in Babić, 2014). Uporaba hibridnega okvira metod večkriterijskega odločanja zagotavlja celovitejšo in zanesljivejšo podlago za presojo možnih lokacij avtobusnih postaj. Sistemska vključitev kvantitativnih podatkov in kvalitativnih presoj zagotavlja, da vrednotenje temelji na podatkih, upošteva kontekst in je analitično uravnoteženo, kar omogoča natančnejše uteževanje kriterijev in razvrščanje alternativ v večdimenzionalnem kontekstu (Xu idr., 2024).

Raziskava, predstavljena v tem članku, je bila izvedena v okviru projekta izbora lokacije za avtobusno postajo v mestu Uşak v sodelovanju z upravo okrožja Uşak. V njej so avtorji z metodami večkriterijskega odločanja proučili več lokacij in določili najprimernejšo. Predpostavili so, da bodo z uporabo hibridnega modela večkriterijskega odločanja povečali analitično robustnost in metodološko zanesljivost raziskave, na podlagi česar bodo lažje določili optimalno lokacijo avtobusne postaje.

Določanje najprimernejše lokacije tako pomembne infrastrukturne naložbe, kot je avtobusna postaja, skupaj s presojo njene povezanosti z glavnimi prometnimi osmi v mestu, je zelo zapletena naloga. Take odločitve ni mogoče sprejeti zgolj z zanašanjem na enega posameznika, odločevalca ali na eno metodo. Avtorji so v raziskavi zato uporabili tri nove metode, ki zagotavljajo kompromisno rešitev.

Hibridne metode večkriterijskega odločanja so se izkazale za učinkovite pri reševanju raznovrstnih odločitvenih problemov, pri tem pa je opravljenih le malo raziskav, ki bi nadgradile ali združevale razne tehnike. V članku je predstavljen izpopolnjen metodološki okvir, ki nadgrajuje uveljavljene metode večkriterijskega odločanja in jih združuje v koherenten hibridni model. Okvir je bil preizkušen na primeru izbora lokacije avtobusne postaje, pri čemer je bila ponazorjena njegova uporabnost v praksi. Raziskava je pomembna z dveh vidikov: metodološko nadgrajuje uveljavljene metode in jih povezuje v nov hibridni model, hkrati pa empirično prikaže, kako se lahko ta novi pristop uporabi v praksi. Vključuje torej prizadevanje za razširitev razpoložljivih metodoloških orodij in študijo primera, s katero je prikazana učinkovitost uporabe hibridnih metod večkriterijskega odločanja.

Avtorji so analizirali sedem možnih lokacij avtobusne postaje v središču Uşaka in izbrali najboljšo na podlagi primerjave rezultatov, ki so jih pridobili s tremi metodami. Uprava okrožja Uşak je nato pregledala in upoštevala njihove izsledke ter začela graditi postajo. Raziskava je torej pomembna in izvirna tudi zato, ker presega teoretično analizo in omogoča praktično izvedbo rezultatov.

Mesta so sistemi, sestavljeni iz številnih podsistemov. Skoraj vsi podsistemi (npr. poslovni, trgovski, izobraževalni, zdravstveni, rekreacijski, upravni, industrijski in stanovanjski) so

med seboj povezani. Njihova mešana prostorska raba ustvarja večdimenzionalno in zapleteno urbano strukturo, na katero vplivajo demografske, socialne, gospodarske, upravne, naravne in prostorske spremembe. Povezovanje teh podsistemov je močno odvisno od mestnega prometnega omrežja, ki zagotavlja dostopnost. Ker sta raba prostora in prometni sistem medsebojno odvisna, vsaka raba prostora ustvarja specifične potovalne potrebe. Z izboljšanjem kakovosti in dostopnosti prevoza se povečuje vrednost prostora, kar povzroča spremembe v prostorski rabi. Navedeno sovplivanje poudarja potrebo po celostnem in strateškem prostorskem načrtovanju, ki omogoča doseganje usklajenega in trajnostnega urbanega razvoja (Oliveira in Hersperger, 2018; Hersperger idr., 2019).

Medkrajevni potniški promet povezuje mesta z drugimi kraji in krepi povezave med vrstami rabe prostora. Avtobusne postaje so ključni del tega sistema, saj opravljajo funkcijo vozlišč medkrajevnega in mestnega potniškega prometa. Morajo biti dostopne, varne, prilagodljive in učinkovite ter v idealnem primeru povezane z drugimi oblikami prevoza ali prometne infrastrukture (npr. letalskim in železniškim prometom, kolesarskimi potmi in pešpotmi) in zelenimi sistemi, kar zagotavlja celovito urbano mobilnost. Kot stičišča so ključne za učinkovito delovanje sistemov potniškega prometa (Arifa in Sholahuddin, 2022), kot pomembna vozlišča tranzitnih omrežij pa s svojo strateško lokacijo in zasnovo močno vplivajo na razvoj mest in gospodarsko rast okoliških območij (Memon, 2023; Abdullah idr., 2019).

Ker avtobusne postaje usmerjajo mestni in medkrajevni pretok ljudi, blaga in prometa, so zelo produktivne. Poleg omogočanja mobilnosti spodbujajo gospodarsko in prostorsko povezovanje, s čimer ustvarjajo nova delovna mesta (Mello in Silva, 2021). Njihove prostorske in funkcionalne značilnosti vplivajo na okoliško rabo prostora, pri čemer privlačijo ali odvračajo dejavnosti, odvisno od njihove velikosti in zgradbe.

Na splošno morajo avtobusne postaje: 1. biti prostori gibanja, ki na podlagi učinkovitega načrtovanja in upravljanja omogočajo dostop do drugih območij mesta, 2. biti povezane z javnimi prostori, 3. med ljudmi veljati za dobre kraje, 4. biti prostori, kjer se ljudje zbirajo, stičišča javnega prevoza oziroma prostori srečevanja pešcev in vozil, 5 povezovati panoge, kot so industrija, trgovina in turizem, 6. biti povezane s stanovanjskimi območji, kolesarskimi potmi in območji za pešce, 7. biti povezane z drugimi oblikami prevoza, 8. biti čakalna in prestopna območja za pešce in vozila ter 9. biti varne in udobne.

Avtobusne postaje so torej ključne prvine urbane mobilnosti in prometne infrastrukture. So dinamična vozlišča, ki omogočajo povezave med raznimi oblikami prevoza ter pomembno prispevajo k prostorski ureditvi in oblikovanju mestnih okolij (Zhang idr., 2022; Lindberg idr., 2021).

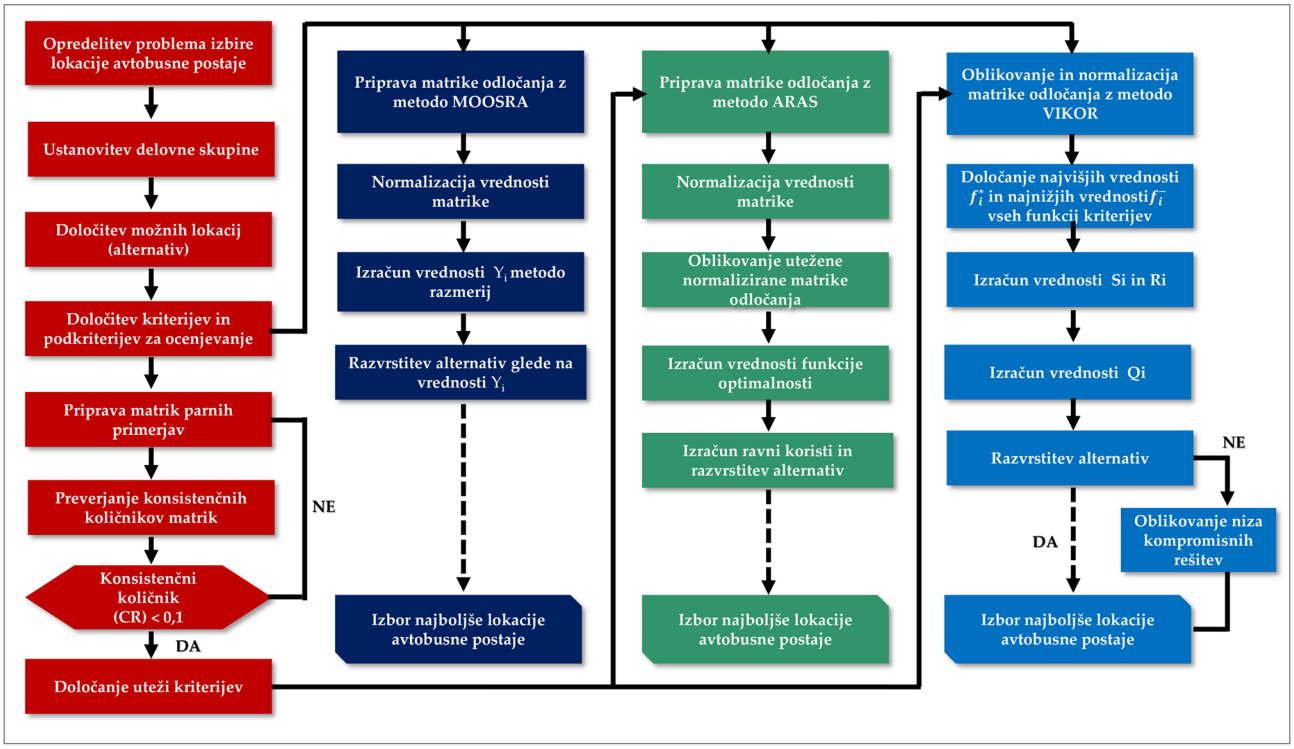
2 Gradiva in metode

Avtorji so oblikovali inovativni hibridni model večkriterijskega odločanja, ki združuje postopek analitične hierarhije, metodo večkriterijske optimizacije z analizo razmerij (ang. *multi-objective optimization by simple ratio analysis*, v nadaljevanju: MOOSRA), metodo aditivne ocene razmerij (ang. *additive ratio assessment*, v nadaljevanju: ARAS) ter metodo večkriterijske optimizacije in kompromisne rešitve (srb. *višekriterijumska optimizacija i kompromisno rešenje*, v nadaljevanju: VIKOR), da bi določili najprimernejšo lokacijo avtobusne postaje v Uşaku. Njihova raziskava je inovativna tudi zato, ker je v literaturi le malo primerov, pri katerih bi bile podobne metode uporabljene skupaj. Namen hibridnega modela je bil torej določiti najboljšo lokacijo avtobusne postaje (slika 1), izbran pa je bil zaradi svojih prednosti in učinkovitega združevanja metod.

V prvi fazi modela so avtorji s postopkom analitične hierarhije parno primerjali kriterije in določili njihovo pomembnost, na podlagi česar so lahko nato logično določili njihove uteži (Iswari idr., 2019; Nguyen, 2023). Združevanje postopka analitične hierarhije z drugimi metodami večkriterijskega odločanja izboljša zanesljivost teh metod, saj zagotavlja strukturiran pristop k določanju uteži. Pri vrednotenju primernosti prostora postopek analitične hierarhije omogoča natančne parne primerjave, ki zmanjšujejo pristranskost in povečujejo veljavnost rezultatov (Subiyanto idr., 2018). S pretvorbo kvalitativnih presoj v kvantitativne uteži poleg tega omogoča celovitejšo presojo alternativ (Yumoto, 2019). Uteži, ki odražajo relativno pomembnost posameznih kriterijev, so bili ključni vhodni podatki za uporabo metod MOOSRA, ARAS in VIKOR v postopku večkriterijskega odločanja, namenjenemu izboru optimalne lokacije avtobusne postaje.

Glavna značilnost metode MOOSRA je, da je mogoče z neposredno analizo razmerij obravnavati tako koristne kot nekoristne kriterije (Ulutaş idr., 2021). Tak pristop poenostavi odločanje in zmanjša vpliv negativnih vrednosti, ki lahko izkrivljajo rezultate pri drugih metodah večkriterijskega odločanja. Pri primerjavi z drugimi metodami večkriterijskega odločanja so bili z metodo MOOSRA pogosto doseženi podobni ali boljši rezultati pri razvrščanju alternativ (Jagadish, 2014).

Metoda ARAS omogoča izračun vrednosti funkcije koristnosti vsake alternative, ki se neposredno sklada z vrednostmi in utežmi kriterijev (Ecemiş in Coşkun, 2022). To je njena ključna prednost, saj poveča pomen funkcije koristnosti, hkrati pa



Slika 1: Osnovna zgradba uporabljenega hibridnega modela večkriterijskega odločanja (vir: avtorji)

omogoča uporabo raznovrstnih merskih lestvic, kar odpravlja neskladja, ki lahko nastanejo zaradi uporabe različnih merskih enot (Zavadskas idr., 2023). Pri vrednotenju alternativ metoda ARAS poenostavi zapletene odločevalske scenarije in omogoča jasno razvrščanje alternativ, saj izpostavi tiste, ki dosegajo boljše rezultate glede na uveljavljene referenčne vrednosti (Liao idr., 2019). Metoda se je izkazala za učinkovito na več področjih, med drugim pri izbiri mobilnih igric na podlagi uporabniških preferenc in pri presoji kriterijev družbene odgovornosti podjetij (Meidelfi idr., 2022).

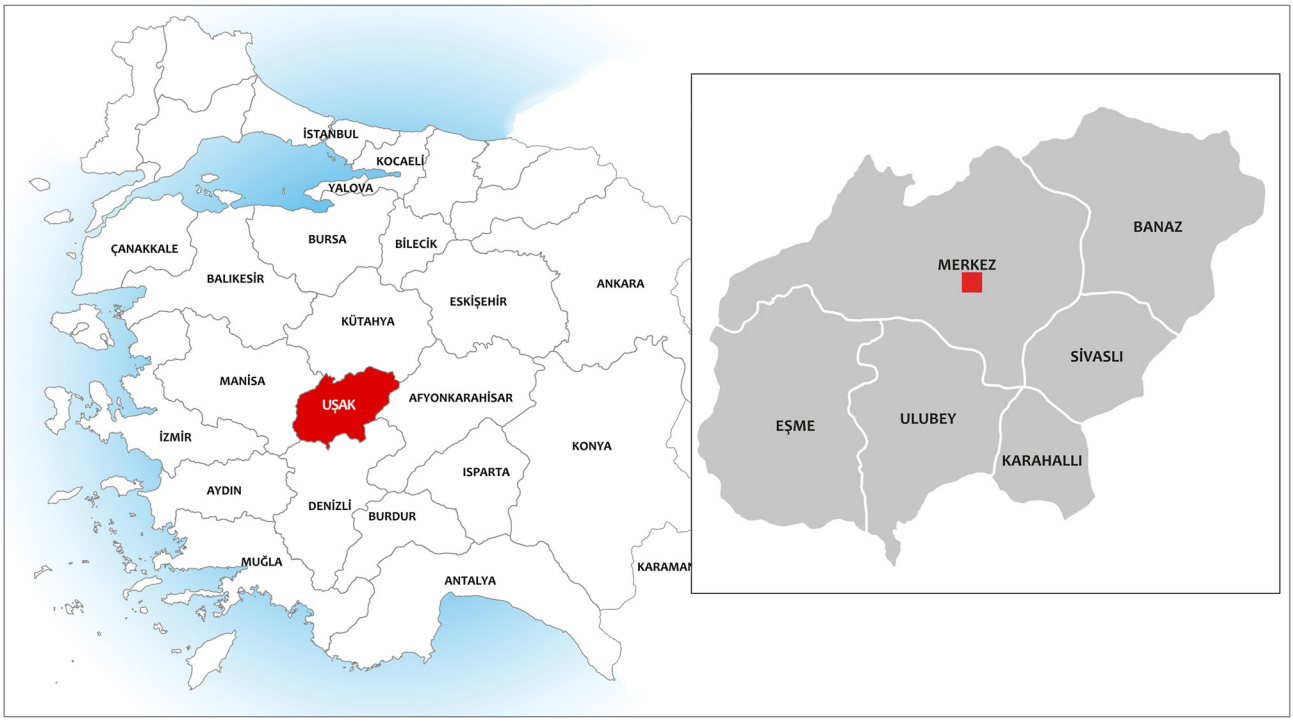
Glavna prednost metode VIKOR je doseganje kompromisa med največjimi skupnimi koristmi in najmanjšim odklonom vrednosti posameznega kriterija od njegove idealne vrednosti. To odločevalcem zagotavlja kompromisne rešitve, ki jih deležniki lažje sprejmejo (Elsotohy idr., 2023; Effatpanah idr., 2022). Metoda je bilo uspešno uporabljena na več področjih, med drugim pri izbiri dobaviteljev v jedrski industriji (Wu idr., 2016), izbiri cepiv med pandemijo covida-19 (Öztürk idr., 2021) in optimizaciji varilnih parametrov (Meikeerthy in Ethiraj, 2023). Več informacij o vsaki metodi je navedenih v prilogi[1].

1 Priloga je na voljo samo v spletni različici članka (op. uredništva).

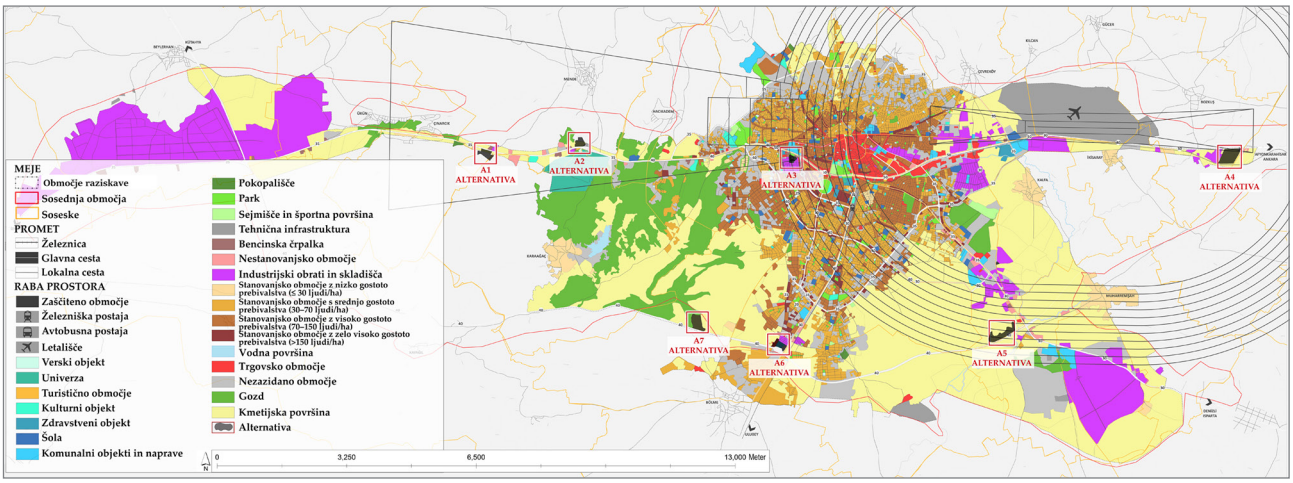
2.1 Oblikovanje delovne skupine

Za izbiro nove lokacije avtobusne postaje je bila oblikovana delovna skupina, sestavljena iz upravljavcev in strokovnjakov. Glavni cilj je bil zagotoviti znanstveno utemeljeno in sistematično organizirano odločanje, ki bi združevalo praktične izkušnje mestnih upravljavcev in akademsko znanje strokovnjakov. Namen vključitve višjih in oddelčnih vodij uprave okrožja Uşak je bil povečati učinkovitost odločanja. V skupini so sodelovali trije višji vodje, štirje vodje oddelkov in trije akademski strokovnjaki. Imeli so od osem do 30 let delovnih izkušenj, stari so bili od 30 do 52 let, vsi pa so imeli vsaj visokošolsko izobrazbo.

Uprava okrožja je sprva predlagala več možnih območij, vključno s praznimi zemljišči in zemljišči v javni lasti, vse te je delovna skupina pregledala. Njeni člani so pregledali literaturo in zbrali podrobne podatke o uspešnih projektih gradnje avtobusnih postaj po svetu in v Turčiji, ki bi jim lahko pomagali pri izbiri lokacije. Avtorji so zbrane podatke proučili v skladu s kriteriji raziskave, nato pa so na podlagi strokovnega znanja delovne skupine ter njenega poznavanja prostorskih, infrastrukturnih in okoljskih značilnosti mesta opredelili sedem alternativnih lokacij nove avtobusne postaje.



Slika 2: Lokacija Uşaka (vir: avtorji)



Slika 3: Raba prostora v Uşaku novembra 2023 in možne lokacije avtobusne postaje (ilustracija: avtorji, na podlagi podatkov GIS in aplikacije Google Maps)

2.2 Določitev alternativ

Mesto Uşak leži v zahodni Turčiji, med osrednjo Anatolijo in Egejsko pokrajino (slika 2). Provinca Uşak ima šest okrožij: Banaz, Eşme, Karahallı, Sivaslı, Ulubey in Uşak. Leta 2022 je v središču mesta živelo 236.366 ljudi (Turški statistični urad, 2023).

Avtorji so s terenskimi raziskavami opredelili trenutno rabo prostora in prostorsko zgradbo Uşaka. Zbrane podatke so analizirali v geografskem informacijskem sistemu (GIS), na podlagi česar so nato novembra 2023 posodobili podatke o rabi prostora (slika 3). Proučevano območje je veliko 11.132 ha, njegove meje pa so avtorji določili na podlagi veljavnih prostorskih načrtov. Kmetijske, vodne in gozdne površine skupaj pokrivajo 44,52 % območja, stanovanjskih površin je 14,41 %. Ceste pokrivajo približno 11,64 % območja. Površina trenutne avtobusne postaje znaša 2,32 ha. Bruto gostota prebivalstva v mestu je 60 do 70 ljudi na hektar, kar se nanaša na celotno pozidano območje.

Na podlagi prejšnjih vrednotenj uprave okrožja in presoj delovne skupine je bilo opredeljenih sedem možnih lokacij avtobusne postaje, ki so blizu središča mesta (slika 4).

Slika 4: Možne lokacije: a) univerza (alternativa 1), b) univerza (alternativa 2), c) sedanja avtobusna postaja (alternativa 3), d) letališče (alternativa 4), e) Most Çanlı (alternativa 5), f) Ulubeyska cesta (alternativa 6), g) območje zahodno od križišča z Ulubeysko cesto (alternativa 7) (ilustracija: avtorji, na podlagi aplikacije Google Maps)

Prva lokacija (slika 4a) je velika 5,6 ha in je od mestnega središča oddaljena 9,3 km. Leži ob cesti, ki pelje do univerze, od katere je oddaljena 2,5 km. Površina je v javni lasti, leži na podeželskem območju, obdanem s kmetijskimi zemljišči. Ni komunalno opremljena, a vključuje dele, primerne za gradnjo. Zagotavlja zgolj povezavo z mestnim središčem, trenutno pa je ni mogoče doseči z javnim prevozom.

Druga lokacija (slika 4b) je velika 4,9 ha, od mestnega središča je oddaljena 7,0 km. Je ob cesti neposredno nasproti univerzitetnega kampusa in ima ustrezno infrastrukturo. V bližini ni stanovanjskih območij, ob lokaciji pa so zazidljiva zemljišča. Je v zasebni lasti in ima dostop do linije javnega prevoza, ki vodi do univerzitetnega kampusa.

Lokacija trenutne avtobusne postaje (slika 4c) je velika 2,3 ha. Postaja je v središču mesta, kjer je gost promet, križišča pa niso učinkovito urejena. Je zastarela in premajhna, spopada se s precejšnjimi izzivi, povezanimi z notranjo prometno ureditvijo. Čeprav bi bila obnova postaje na isti lokaciji stroškovno ugodna, bi bilo treba rešiti večje infrastrukturne težave, preurediti ključne ceste in razlastiti lastnike bližnjih manjših industrijskih obratov, da bi lahko razširili območje. Velika pomanjkljivost je, da morajo na poti do nje avtobusi peljati skozi mestno središče, kar še dodatno povečuje promet v glavnih prometnih koridorjih in obremenjuje prometni sistem. Lokacija nima neposredne povezave z železniškim omrežjem, ostaja pa pomembno prometno vozlišče z dobrimi javnimi prometnimi povezavami. Je v javni lasti.

Lokacija ob letališču (slika 4d) je velika 14,6 ha in je od središča mesta oddaljena 9,4 km. V bližini so industrijski obrati in skladišča, ob lokaciji pa so zazidljiva zemljišča. Trenutno se uporablja kot kmetijsko zemljišče. Je ob Ankarski cesti, na križišču z južno mestno obvoznico, ki je še v gradnji. Območje, ki je tik ob železnici in letališču, je v prostorskih aktih opredeljeno kot območje gospodarskih dejavnosti, ki naj bi ga spremenili v industrijsko cono (Okrožje Uşak, 2021). Je v javni lasti in ni dostopno z javnim prevozom.

Lokacija pri mostu Çanlı (slika 4e) je velika 10,8 ha in od središča mesta oddaljena 7,1 km. Je nasproti mosta Çanlı, na križišču z Ulico Sivaslı. Območje ni pozidano, ob njem pa so kmetijska zemljišča. Je strateško pomembno prometno vozlišče na glavni prometni osi Isparta–Denizli in je tik ob južni mestni obvoznici. Zaradi nagnjenega terena bi bila gradnja avtobusne postaje razmeroma draga, saj bi bila potrebna dodatna izkopavanja, izravnava in stabilizacija. Območje je večinoma v javni lasti in dostopno z javnim prevozom.

Lokacija ob Ulubeyski cesti (slika 4f) je velika 4,9 ha in je 4,7 km oddaljena od središča mesta. Je tik ob križišču Ulubeyske ceste in priključka na južno obvoznico ter je pomembno prometno vozlišče z dostopom do mesta iz vseh smeri. Trenutno so na njem poslovni in komunalni objekti ter prazna zemljišča, ki pa se na vzhodu lahko zazidajo. Območje ima dobro razvito infrastrukturo ter je v prostorskem načrtu opredeljeno kot območje kulturnih in komunalnih objektov (Uşak District, 2021). Lokacija je blizu območij načrtovane goste stanovanjske zazidave na jugu in jugovzhodu. Je v javni lasti in dobro povezana z javnim prometnim omrežjem. Zaradi bližine železnice na vzhodni strani bi avtobusna postaja lahko delovala kot prestopna točka z dodatno železniško povezavo.

Lokacija zahodno od križišča Ulubeyske ceste z južno obvoznico (slika 4g) je velika 7,8 ha in od mestnega središča oddaljena 7.0 km. Je ob južni mestni obvoznici 2,5 km zahodno od omenjenega križišča. Je pomembno prometno vozlišče, ki bo z izgradnjo južne obvoznice omogočalo dostop do mesta iz vseh smeri. Trenutno se uporablja kot kmetijsko zemljišče, ki je na treh straneh nagnjeno. Če bi tu zgradili avtobusno postajo, bi bilo treba najprej urediti infrastrukturo, poleg tega bi bilo treba za njeno učinkovito delovanje zgraditi glavno cestno povezavo med avtocesto iz Ankare v İzmir na severu in južno mestno obvoznico na jugu. Območje je v delni lasti okrožja in nima dostopa z javnim prevozom.

2.3 Določitev kriterijev

Avtorji so na podlagi podrobnega pregleda literature opredelili ustrezne kriterije za izbor lokacije avtobusne postaje. Njihovi izsledki so povzeti v nadaljevanju.

Eden ključnih kriterijev je bližina poselitvenih območij in druge prometne infrastrukture. Roquel idr. (2021) poudarjajo pomen vrednotenja razdalje med avtobusno postajo in območji z visoko stopnjo povpraševanja po prevoznih storitvah, kot so stanovanjska naselja, trgovska središča in prometni koridorji. Bližina potnikom olajša dostop in spodbuja uporabo javnega prevoza. Koblar in Mladenovič (2020) opozarjata na pristope, ki spodbujajo gradnjo strnjenih urbanih območij z mešano rabo prostora ter izboljšajo učinkovitost in uporabniško izkušnjo. Avtobusne postaje morajo zagotavljati učinkovito multimodalno povezanost z železniškim omrežjem, območji za pešce in kolesarskimi potmi (Abdullah idr., 2019), ki krepi mobilnost in dostopnost (Taghavi idr., 2021).

Lokacija avtobusne postaje pomembno vpliva na rabo prostora in okolico. Vključevanje okoljske trajnosti v načrtovanje je postalo neločljiv del sodobnega urbanizma. Študije poudarjajo potrebo po upoštevanju tako ekoloških kot ekonomskih dejavnikov pri izbiri lokacije (Tuames in Widyastuti, 2020; Memon idr., 2023). Avtobusne postaje ne vplivajo samo na prevozni sektor, ampak so tudi pomembna gospodarska in družbena središča. S povezovanjem postaj s poslovnimi območji se poveča njihova vrednost v smislu trgovskih in turističnih vozlišč, hkrati pa se okoliški javni prostori preoblikujejo v dobre kraje za druženje (Abdullah idr., 2019). Avtobusnih postaj ne bi smeli obravnavati zgolj kot prometno infrastrukturo, ki omogoča mobilnost, temveč kot živahna urbana vozlišča, ki jih stalno uporabljajo množice ljudi, tj. kot ključne prvine prepletanja urbanih funkcij in ustvarjanja dobrih krajev.

Podobno kot v prejšnjih raziskavah, v katerih so bili sistematično analizirani najrazličnejši prostorski, okoljski, gospodarski in družbeni dejavniki, so tudi v tej raziskavi avtorji želeli oblikovati obsežen nabor kriterijev. Sprva so jih opredelili šestdeset, izmed katerih je nato delovna skupina s podrobno presojo določila dvajset najpomembnejših kriterijev za odločanje. S tovrstnim participativnim pristopom so povečali kontekstualno ustreznost kriterijev in praktično uporabnost metodologije.

Dvajset končnih kriterijev je bilo razvrščenih v tri glavne kategorije: 1. raba prostora in vpliv na okolje, 2. gospodarski in družbeni dejavniki ter 3. promet in mobilnost. Taka razvrstitev izraža teoretično podlago kriterijev in njihov praktični pomen.

Uporabljeni metodološki okvir je bil zasnovan kot večstopenjski postopek izločanja, ki ga je izvedla delovna skupina, ter je združeval pregled literature in strokovno presojo. Preglednica 1 vključuje podroben seznam kriterijev in uporabljenih podatkovnih virov.

Preglednica 1: Kriteriji za izbor lokacije

Kategorija, koda in kriterij	Metoda, vir podatkov
Raba prostora in vpliv na okolje	
K1: Skladnost s prostorskimi akti	Pregled prostorskih aktov (Okrožje Uşak, 2021)
K2: Uporabna površina	Analiza rabe prostora
K3: Oddaljenost od mestnega središča	Analiza točkovne gostote v GIS
K4: Topografija	Analiza naklona površja za oceno primernosti terena
K5: Tveganje za nastanek naravnih nesreč	Analiza na podlagi podatkov AFAD (2021)
Gospodarski in družbeni dejavniki	
K6: Stroški projekta in infrastrukturne omejitve	Ocena stroškov projekta (pridobitev zemljišč, tehnični/okoljski dejavniki)
K7: Potencial za privabljanje naložb	Pregled trenutnih/potencialnih naložb; intervjuji s predstavniki lokalne uprave
Promet in mobilnost	
K8: Širina cest	Analiza na podlagi podatkov o rabi prostora
K9: Dnevni obseg prometa na cestah, ki vodijo do lokacije	Štetje vseh vozil na izbranih točkah
K10: Dnevno število avtobusov na cestah, ki vodijo do lokacije	Štetje avtobusov in pregled razpoložljivih linij med trenutno avtobusno postajo in lokacijo
K11: Varnost cest v bližini	Analiza karte žarišč prometnih nesreč
K12: Oddaljenost od najbližjega križišča	Izmerjena z GIS na podlagi podatkov o rabi prostora
K13: Oddaljenost od najbližje železniške postaje	Izračun najkrajše poti v prometnem omrežju na podlagi podatkov o rabi prostora
K14: Oddaljenost od najbližje linije hitrega vlaka	Izračun najkrajše razdalje
K15: Oddaljenost od letališča	Izračun najkrajše poti v prometnem omrežju na podlagi podatkov o rabi prostora
K16: Oddaljenost od linij javnega prevoza	Analiza gostote linij javnega prevoza v GIS na podlagi podatkov okrožnega direktorata za prevozne storitve
K17: Dostop za pešce/kolesarje	Analiza podatkov o dostopnosti iz raziskav rabe prostora in prometa
K18: Oddaljenost od univerz	Analiza lokacij univerz na podlagi točkovne gostote v GIS
K19: Oddaljenost od industrijskih con	Izračun najkrajše poti v prometnem omrežju na podlagi podatkov o rabi prostora
K20: Oddaljenost od stanovanjskih območij	Analiza točkovne gostote v GIS

3 Rezultati

3.1 Uteževanje kriterijev s postopkom analitične hierarhije

Avtorji so s postopkom analitične hierarhije parno primerjali dvajset izbranih kriterijev po pomembnosti, na podlagi česar so oblikovali matriko primerjav. Nato so matriko normalizirali in izračunali uteži posameznih kriterijev, ki izražajo splošno raven njihove pomembnosti. Za preverjanje zanesljivosti analize so nato izračunali konsistenčni količnik. Ta je bil nižji od 10 % (0,092377), s čimer so potrdili veljavnost in zanesljivost analize. V preglednici 2 so navedene uteži dvajsetih kriterijev, določene s postopkom analitične hierarhije, skupaj z vrednostmi, ki so jih avtorji nato uporabili v matrikah odločanja, ki so jih oblikovali z metodami ARAS, MOOSRA in VIKOR.

Preglednica 2: Uteži kriterijev, določene s postopkom analitične hierarhije, in matrika odločanja

Kategorija, koda in kriterij	Alternative							Utež
	1	2	3	4	5	6	7	
Raba prostora in vpliv na okolje								
K1: Skladnost s prostorskimi akti (po Likertovi lestvici)	2	3	5	2	3	3	1	0,035
K2: Uporabna površina (ha)	5,6	6,4	2,3	14,6	10,8	4,9	6,4	0,121
K3†: Oddaljenost od mestnega središča (km)	10,7	8,3	3,3	10,0	6,8	7,7	8,2	0,013
K4: Topografija (po Likertovi lestvici)	3	5	1	3	2	5	3	0,048
K5: Tveganje za nastanek naravnih nesreč (po Likertovi lestvici)	5	5	1	2	3	5	5	0,122
Gospodarski in družbeni dejavniki								
K6†: Stroški projekta in omejitve (po Likertovi lestvici)	5	3	3	5	3	2	5	0,106
K7: Potencial za privabljanje naložb (po Likertovi lestvici)	1	5	1	2	3	5	2	0,014
Promet in mobilnost								
K8: Širina cest (m)	35	35	50	30	40	30	40	0,027
K9†: Dnevni obseg prometa (št. vseh vozil)	30.568	30.568	33.176	17.667	2.052	16.146	3.250	0.041
K10: Dnevno število avtobusov	264	264	800	543	30	80	20	0,042
K11: Varnost cest (po Likertovi lestvici)	5	5	1	5	3	3	5	0,013
K12†: Oddaljenost od križišča (km)	4,6	2,3	0,1	2,8	0,5	0,2	2,0	0,031
K13†: Oddaljenost od železniške postaje (v km)	12,0	7,5	2,2	0,2	6,7	0,2	2,1	0,062
K14†: Oddaljenost od hitrega vlaka (v km)	22,0	17,4	14,0	17,0	11,0	8,0	9,5	0,044
K15†: Oddaljenost od letališča (v km)	16,0	13,6	8,4	3,6	10,0	11,0	13,3	0,015
K16†: Oddaljenost od javnega prevoza (v km)	9,5	7,1	2,9	9,4	7,1	4,7	7,7	0,080
K17: Dostop za pešce/kolesarje (po Likertovi lestvici)	1	2	5	1	2	3	1	0,053
K18†: Oddaljenost od univerz (v km)	5,1	0,5	6	17,5	18,7	10,2	8,6	0,011
K19†: Oddaljenost od industrijskih con (v km)	6,0	8,5	13,8	24,7	21,4	15,6	13,6	0,007
K20†: Oddaljenost od stanovanjskih območij (v km)	10,1	7,6	2,6	9,7	8,2	5,8	8,2	0,116

Opomba: Avtorji so za ocenjevanje uporabili petstopenjsko Likertovo lestvico (1 = zelo nizka vrednost, 5 = zelo visoka vrednost). Kriteriji, označeni z †, so bili uporabljeni v fazi analize stroškov, preostali pa v fazi analize koristi (pri določanju vrednosti Y_j).

Na podlagi določenih uteži je bila po pomembnosti na prvem mestu kategorija »promet in mobilnost« (0,542 točk), na drugem pa »raba prostora in vpliv na okolje« (0,339 točk). Kriteriji z najvišjimi vrednostmi uteži so bili tveganje za nastanek naravnih nesreč, uporabna površina, oddaljenost od stanovanjskih območij, stroški projekta in infrastrukturne omejitve ter oddaljenost od javnega prevoza. Ti so bili pri odločanju najpomembnejši.

3.2 Izbor lokacije z metodo MOOSRA

V okviru metode MOOSRA so avtorji najprej normalizirali podatke v preglednici 2, in sicer tako, da so sešteli kvadrate vrednosti v vsakem stolpcu, izračunali kvadratni koren te vsote za posamezni stolpec in nato vsako vrednost v stolpcu delili s tem kvadratnim korenom. Nato so uteži, izračunane s postopkom analitične hierarhije, pomnožili s temi normaliziranimi vrednostmi, na podlagi česar so oblikovali uteženo normalizirano matriko odločanja. Nato so ločili koristne in

Preglednica 3: Razvrstitev alternativ po metodi MOOSRA

Alternativa	Y_i	Mesto
1	0,533607	7
2	0,924436	3
3	1,079570	2
4	0,848516	5
5	0,922459	4
6	1,612323	1
7	0,810362	6

Preglednica 4: Vrednosti funkcije optimalnosti in razvrstitev alternativ

Alternativa	S_i	K_i	$\%K_i$
Optimalna vrednost	0,241804892		
1	0,080000154	0,330845888	33,08
2	0,093320829	0,385934414	38,59
3	0,133164547	0,550710725	55,07
4	0,096110390	0,397470827	39,75
5	0,100526268	0,415732980	41,57
6	0,168023970	0,694874154	69,49
7	0,08804895	0,36413221	36,41

nekoristne kriterije (nekoristni kriteriji so v preglednici 2 označeni z znakom †) ter izračunali njihove vsote. Tako so dobili rezultate, predstavljene v preglednici 3.

Na koncu so razvrstili alternative glede na njihove končne vrednosti Y_i, pri čemer so višje vrednosti pomenile večjo ustreznost lokacije. Za najprimernejšo se je izkazala alternativa 6 (Ulubeyska cesta), sledili sta alternativa 3 (trenutna avtobusna postaja, 1,07 točk) in alternativa 2 (lokacija nasproti univerzitetnega kampusa) (preglednica 3).

3.3 Izbor lokacije z metodo ARAS

V okviru analize po metodi ARAS so avtorji določili vrednosti alternativ na podlagi kriterijev. Optimalne vrednosti so izračunali tako, da so opredelili koristnost (tj. stroške in koristi) vsakega kriterija. Ob upoštevanju ugotovljenih stroškov in koristi kriterijev so nato podatke normalizirali, da bi zagotovili večjo primerljivost kriterijev in odpravili vplive merskih enot. S tem so oblikovali normalizirano matriko odločanja. Uteži, določene s postopkom analitične hierarhije, so nato pomnožili

Preglednica 5: Najvišja vrednost f_i^* in najnižja vrednost f_i^-

Koda	f_i^*	f_i^-
K1	5	1
K2	491	56
K3	10	107
K4	5	1
K5	5	1
K6	2	5
K7	5	1
K8	50	30
K9	2,052	33,176
K10	800	20
K11	5	1
K12	2	46
K13	2	75
K14	8	174
K15	10	136
K16	29	95
K17	5	1
K18	5	187
K19	6	247
K20	26	101

z normaliziranimi vrednostmi in ustvarili uteženo normalizirano matriko odločanja.

V naslednjem koraku so izračunali vrednosti funkcije optimalnosti za vsako alternativo in jih pretvorili v vrednosti S_i in K_i, ki so skupaj s končno razvrstitvijo alternativ predstavljene v preglednici 4. Rezultati analize po metodi ARAS so pokazali, da je za lokacijo nove avtobusne postaje najprimernejša alternativa 6 (Ulubeyska cesta), ki je bila najbližje optimalni vrednosti, sledili sta alternativi 3 (trenutna avtobusna postaja) in 5 (Most Çanlı).

3.4 Izbor lokacije z metodo VIKOR

Pri tej metodi so avtorji najprej normalizirali podatke v preglednici 2, da so zagotovili ustrezno primerljivost kriterijev, na podlagi česar so dobili uteženo normalizirano matriko odločanja. Za vsak kriterij so določili najvišjo vrednost f_i^* in najnižjo vrednost f_i^- (preglednica 5), nato pa so izračunali vrednosti S_i

in R_i za vsako alternativo. V tej fazi so uporabili uteži, predhodno izračunane s postopkom analitične hierarhije. Na koncu so izračunali še vrednosti Q_i. Vrednost v je znašala 0,5, tako kot v raziskavi, v kateri sta Opricović in Tzeng (2004) prvič predstavila to metodo. Pri razvrščanju alternativ po metodi VIKOR je najboljša alternativa tista, ki ima najnižjo vrednost. Končna razvrstitev na podlagi izračuna vrednosti S, R in Q je predstavljena v preglednici 6.

Potem ko so avtorji razvrstili alternative po primernosti, so preverili, ali izpolnjujejo pogoj 1 (sprejemljiva prednost) in pogoj 2 (sprejemljiva stabilnost pri odločanju), na podlagi česar so lahko določili kompromisno rešitev. Izpolnjevanje pogoja 1 so preverili z naslednjo enačbo: $Q(a'') - Q(a') \geq DQ$. Vrednost DQ je bila določena pri 0,16. Če je vrednost na levi strani enačbe večja od 0,16, to pomeni, da alternativa a'izpolnjuje pogoj 1. Pri preverjanju izpolnjevanja pogoja 2 pa je morala alternativa z najvišjo vrednostjo Q (v našem primeru alternativa 6) imeti tudi najvišji vrednosti R in S. Ker je bila alternativa 6 na prvem mestu tudi po omenjenih vrednostih, je torej izpolnjevala pogoj 2.

3.5 Primerjava rezultatov

Za bolj sistematični pregled so avtorji primerjali rezultate, dobljene z metodami MOOSRA, ARAS in VIKOR (preglednica 7).

Kot je razvidno iz preglednice 7, je bila pri vseh treh navedenih metodah alternativa 6 (Ulubeyska cesta) izbrana za najprimernejšo lokacijo. Navedeno močno ujemanje potrjuje robustnost hibridnega modela in njegovo zmožnost zagotavljanja zanesljivih in ponovljivih rezultatov. Poleg tega izid potrjujejo tudi dejanske okoliščine: alternativa 6 ima strateško pomembno lego ob južni mestni obvoznici in tik ob železniški progi, poleg tega se na njej ali v bližini stalno gradi nova infrastruktura, ki jo financira okrožje Uşak. Veljavnost izsledkov raziskave torej potrjujejo tako rezultati uporabljenega hibridnega modela kot dejanske prostorske okoliščine.

Preglednica 6: Vrednosti *S*, *R* in *Q* ter končna razvrstitev alternativ

Alternativa	S_i	R_i	Q_i
6	0,212373937	0,049493333	0,000000000
3	0,443452258	0,122000000	0,737771710
5	0,585031914	0,106535632	0,776811340
2	0,574150026	0,118774713	0,850013938
7	0,621309110	0,118774713	0,898539027
4	0,698298696	0,109813333	0,915961751
1	0,686624490	0,121000000	0,981091723

Preglednica 7: Primerjava rezultatov, dobljenih z metodami MOOSRA, ARAS in VIKOR

Alternativa	MOOSRA	ARAS	VIKOR	Splošna razvrstitev
1	7	7	7	neprimerna
2	3	5	4	srednje primerna
3	2	2	2	zelo primerna
4	5	4	6	neprimerna
5	4	3	3	srednje primerna
6	1	1	1	najbolj primerna
7	6	6	5	neprimerna

4 Razprava

Hibridni model večkriterijskega odločanja, predstavljen v tej raziskavi, zagotavlja sistematičen in analitičen okvir, ki odločevalcem pomaga pri reševanju zapletenih problemov v praksi. Z vključevanjem raznovrstnih pogledov deležnikov omogoča sprejemanje uravnoteženih in racionalnih odločitev. Njegova uporabnost je ponazorjena na primeru izbora lokacije avtobusne postaje, pri čemer je bila kot najprimernejša izbrana alternativa 6 (Ulubeyjeva cesta). Ta je v industrijski coni med železniško progo in načrtovano mestno obvoznico ter omogoča povezavo z bližnjimi glavnimi cestami in križišči. Zemljišče trenutno ni v uporabi, njegova namembnost pa bi se lahko v prostorskih načrtih spremenila v skladu s prihodnjimi odločitvami o rabi prostora. V primerjavi z drugimi analiziranimi območji je izbrana lokacija najmanj problematična s socialnega in okoljskega vidika, poleg tega bi bili stroški gradnje na njej nižji kot drugje.

Uporabljeni hibridni model se je izkazal za učinkovitega pri odločanju o zapletenih vprašanjih, saj vključuje tako kvantitativne kot kvalitativne vidike. Alternativa 6 je pri vseh treh uporabljenih metodah dosegla najvišje vrednosti, kar je mogoče pripisati zlasti dobri dostopnosti lokacije, njeni združljivosti s trenutno in načrtovano prostorsko rabo ter dobrim možnostim povezave s prihodnjimi prometnimi koridorji.

Raziskava je potekala v okviru projekta izbora lokacije nove avtobusne postaje v Uşaku, pri katerem je sodelovala tudi uprava okrožja Uşak. Ob koncu projekta je bila na podlagi presoj uprave za najprimernejšo lokacijo izbrana alternativa 6, v skladu s to odločitvijo pa so novo avtobusno postajo začeli graditi leta 2024. Navedeno kaže, da raziskava ni bila samo teoretična, ampak so njeni izsledki uporabni tudi v praksi. Poleg tega to,

da se je projekt končal z dejansko izvedbo, potrjuje veljavnost in uporabnost modela, uporabljenega za izbor lokacije.

Raziskava je torej pomembna tako s teoretičnega kot praktičnega vidika. V teoretičnem smislu dopolnjuje literaturo s področja večkriterijskega odločanja, saj je bil v njej predstavljen hibridni model, ki združuje štiri metode. Postopek analitične hierarhije ter metode MOOSRA, ARAS in VIKOR se po navadi uporabljajo posamično, zato je njihova združitev v enoten okvir za izbiro lokacije avtobusne postaje metodološka novost. Raziskava je poleg tega empirično potrdila tezo, da hibridni modeli povečujejo robustnost odločitev v primerjavi s pristopi, ki temeljijo na samo eni metodi. S praktičnega vidika raziskava ponazarja uporabnost hibridnih orodij večkriterijskega odločanja v urbanistični praksi. To, da je uprava okrožja rezultate raziskave uporabila pri izvajanju politike, dokazuje, da se s tovrstnimi modeli lahko premostijo vrzeli med akademskimi analizami in mestnim upravljanjem.

Kljub vsemu ima raziskava nekatere omejitve. Analiza je bila omejena na sedem možnih lokacij in dvajset kriterijev, kar ni malo, a vseeno ni zajela kvalitativnih vidikov, kot so zadovoljstvo potnikov, sprejetost v skupnosti in uporabniške izkušnje. Raziskava je bila izvedena na podlagi prostorskih aktov, ki veljajo na nižji oziroma višji ravni, zaradi česar je bila analiza omejena na uveljavljeni prostorski in politični okvir mesta Uşak. Posledično dolgoročne demografske spremembe, prihodnja širitev mesta in tveganja, povezana s podnebnimi spremembami, niso bili izrecno vključeni v model, so pa bili posredno razvidni iz načrtovalskega okvira.

V prihodnjih raziskavah bi bilo mogoče navedene omejitve odpraviti z večjo vključenostjo deležnikov s strukturiranimi pristopi, kot so analize Delphi, SWOT, TOWS ali SOAR (Cole idr., 2022; Ju in Kim, 2023; Lee idr., 2025). Rezultate odločanja je mogoče izboljšati tudi z uporabo dinamičnih sistemov uteževanja, ki zajamejo spreminjajoči se vpliv raznovrstnih akterjev. Poleg tega bi lahko z združitvijo hibridnega modela večkriterijskega odločanja in drugih orodij (npr. simulacijsko modeliranje, mrežne analize in GIS) izboljšali njegovo zmožnost reševanja problemov razporeditve in optimizacije, ki vključujejo več intermodalnih avtobusnih postaj hkrati. S tovrstnimi metodološkimi razširitvami je mogoče povečati uporabnost modela in okrepiti njegov pomen za reševanje sodobnih vprašanj v načrtovanju prometa in mobilnosti, vključno z oblikovanjem intermodalnih omrežij, vrednotenjem tehnologij, upravljanjem storitev in oblikovanjem prometne politike.

5 Sklep

V raziskavi je bilo za najprimernejšo lokacijo nove avtobusne postaje v Uşaku izbrano območje ob Ulubeyski cesti. Raziskava je pomembna s teoretičnega vidika, saj nadgrajuje dosedanje hibridne modele večkriterijskega odločanja, in s praktičnega vidika, saj so njeni izsledki vplivali na odločitve mestne uprave. Z združevanjem empiričnih ugotovitev ter teoretičnih spoznanj in uporabnih vidikov dokazuje, da lahko hibridna orodja za podporo odločanju spodbujajo celostno, trajnostno in v prihodnost usmerjeno načrtovanje mestnega prometa.

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Zahvala

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Mestni odprti prostori kot rekreacijska območja in zatočišča v primeru izrednih razmer: spoznanja po potresu v Malatyi

Med potresom v Turčiji leta 2023 so bili javni odprti prostori pomembna zbirna območja, po potresu pa se niso mogli več ustrezno uporabljati za rekreacijo in niti niso mogli več zadovoljevati drugih vsakdanjih potreb prebivalcev. Avtorice so v članku proučile učinkovitost šestih javnih odprtih prostorov v Malatyi in njihove spremembe po potresu ter predlagale strategije za vključitev trajnostnih načel v načrte potresne varnosti. Pri tem so uporabile metodo naknadne ocene uporabe prostora, ki je vključevala terenske analize, polstrukturirane intervjuje s šestdesetimi občinskimi strokovnjaki in anketo, v kateri je sodelovalo 240 uporabnikov proučevanih prostorov. Izsledki so pokazali, da so med potresom za javne odprte prostore nastale težave, kot so neustrezna infrastruktura, pomanjkanje prostora za postavljanje šotorov in težave, povezane z varnostjo in vzdrževanjem površin. Po potresu se večina teh ne uporablja več za rekreacijo. Nekateri so se spremenili v trgovska območja, drugi so dobili nove uporabnike, pogosto so se pojavile še druge spremembe v rabi prostora. Glavna ugotovitev raziskave je, da potresna odpornost javnih odprtih prostorov ni odvisna samo od njihove velikosti, dostopnosti in lokacije, ampak tudi od možnosti izvajanja hitrih vzdrževalnih posegov na teh površinah in večnamenskosti, ki zagotavljata, da se na teh prostorih ohrani življenje in da delujejo tudi po naravni nesreči. Med ključnimi načrtovalskimi priporočili so vključitev ukrepov za okrepitev pripravljenosti na nesreče v mestno načrtovanje in omogočanje učinkovite obnove po nesrečah.

Ključne besede: javni odprti prostori, potresna odpornost, obnova po nesrečah, Malatya, Turčija

1 Uvod

Potresi so naravni pojavi, ki jih ni mogoče preprečiti, njihove uničujoče posledice pa je mogoče pomembno zmanjšati z učinkovitim urbanističnim načrtovanjem. Z vključevanjem strategij za zmanjšanje tveganja za nastanek nesreč v prostorsko načrtovanje lahko strokovnjaki ustvarijo odpornejša mesta in tako omilijo uničujoče posledice potresov (León in March, 2016). Tak pristop se poudarja tudi v mednarodnih okvirjih, kot so Hyoški akcijski okvir, Agenda 2030 za trajnostni razvoj in Sendajski okvir za zmanjševanje tveganja nesreč (UNISDR, 2015). Tudi v Mednarodni strategiji Združenih narodov za zmanjševanje tveganja nesreč je izpostavljen pomen prostorskih in oblikovalskih rešitev pri krepitvi odpornosti mest (UNISDR, 2017). Zato morajo biti v načrtovanje odpornosti proti nesrečam vključeni vsi elementi mestnega prostora, tudi ulice, stavbe, infrastruktura in zelene površine. V tem pogledu imajo javni odprti prostori ključno vlogo, saj omogočajo povezovanje upravljanja nesreč z vsakdanjim mestnim življenjem.

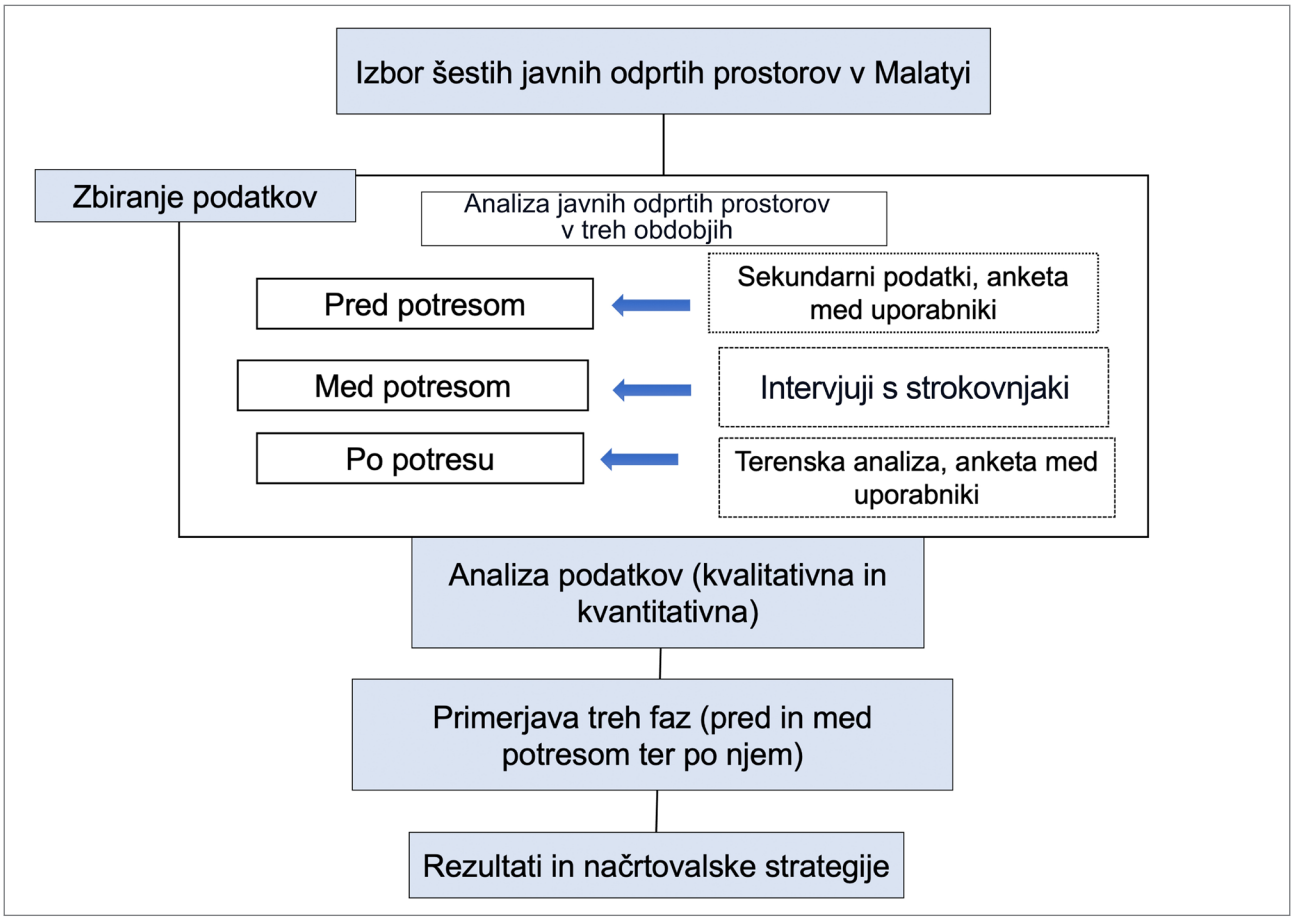
Javni odprti prostori so strukturna hrbtenica mesta in ključni za zagotavljanje odpornosti proti nesrečam (Koren in Rus, 2019). Po potresih se ljudje instinktivno zatekajo na odprta območja, ki se tako spremenijo v zbirna mesta, kjer se ljudje počutijo varne in so jim na voljo osnovne storitve (Godschalk, 2003). Ti prostori so lahko začasna bivališča, hkrati pa se na njih lahko deli pomoč, ljudje tam dobijo zdravstveno oskrbo in osnovne dobrine (Johnson, 2007; Mengi in Erdin, 2018). Poleg tega so prostor, na katerem se ljudje lahko družijo in medsebojno podpirajo, kar spodbuja kolektivno okrevanje (Allan idr., 2013). V družbah z močno potresno izkušnjo ponavljajoči se popotresni sunki pogosto krepijo nagnjenost k zadrževanju na prostem (Atalay, 2008). Navedeno vlogo potrjujejo tudi pretekli primeri potresov po svetu: po potresu v San Franciscu leta 1906 (Law, 2018) so parke uporabljali kot začasna šotorišča, v Ciudad de México so po potresu leta 1985 odprti prostori postali ključni za preživetje (Rodríguez idr., 2007), potres v Venčuanu na Kitajskem leta 2008 pa je poudaril pomen parkov kot središč za okrevanje (Xiao in Tang, 2013). Brez učinkovitega kriznega načrtovanja pa lahko nastanejo motnje pri evakuaciji in dostavi pomoči, zaradi česar so lahko izgube še večje (Allan idr., 2013). Tudi po potresu v Čilu leta 2010 so se športna igrišča in parki uporabljali kot začasna šotorišča. Navedeni primeri potrjujejo, da bi morali biti parki, otroška igrišča in športne površine strateško zasnovani tako, da imajo dvojni namen, tj. da omogočajo vsakdanjo uporabo in uporabo v izrednih razmerah.

Kljub pomembni vlogi javnih odprtih prostorov so zemljišča, ki bi bila zanje primerna, v mestih omejena, hkrati pa se ti prostori že uporabljajo v dobro okolja ali družbe ali za rekreacijo. Ne morejo biti namenjeni izključno uporabi ob nesrečah (French, 2017). Mestne zelene površine prispevajo k biotski raznovrstnosti, čistejšemu zraku in vodi, blažijo vpliv vetra in hrupa, uravnavajo mikroklimo (Jayakody idr., 2016) ter krepijo dobro počutje, družbeno kohezijo in gospodarsko vitalnost (Kozamernik idr., 2024). Ob preureditvi v zatočišča med nesrečami pa vrste njihove osnovne uporabe pogosto potisnejo v ozadje.

Izsledki iz literature kažejo, da lahko prostori, ki so zasnovani predvsem za uporabo v izrednih razmerah, izgubijo svojo privlačnost za vsakdanjo rabo, če niso ustrezno vzdrževani (Koren in Rus, 2019). Navedeno izpostavljajo tudi nedavne raziskave: Yücel in Komar (2021) sta primerjali t. i. potresne parke, pri čemer sta proučili oblikovalska merila za rekreacijsko rabo v primerjavi z uporabo ob nesrečah. Çavuş in Perçin (2021) sta proučevala, kako se lahko ustrezno opremljeni parki po nesrečah učinkovito prilagodijo, in predlagala oblikovalske izboljšave. Ünkaracalar in Aycı (2023) sta analizirali turške parke po potresih februarja 2023, pri čemer sta ugotovili razlike v njihovi prilagodljivosti. Raziskava začasne rabe prostora v Kopru je pokazala, da tovrstna raba resda aktivira premalo izkoriščene površine, a lahko hkrati ogrozi dolgoročno rekreacijsko rabo parkov (Cotič in Uršič, 2024). Baylan idr. (2025) so proučevali, kako so razseljeni prebivalci, ki so preživeli potres, uporabljali zelene površine za družbeno oporo in psihosocialno okrevanje. Navedene raziskave poudarjajo potrebo po povezovanju upravljanja nesreč in urbanističnega načrtovanja, na podlagi česar se lahko zagotovita odpornost javnih odprtih prostorov in kontinuiteta vrst rabe teh (Song idr., 2017; Akar idr., 2024).

Javni odprti prostori na splošno veljajo za varna in primerna zbirna območja in zatočišča ob potresih (Coburn in Spence, 2002). Opravljati morajo torej dvojno vlogo: z vidika upravljanja nesreč morajo ljudem zagotavljati zatočišče, z vidika urbanističnega načrtovanja pa morajo opravljati družbeno, rekreacijsko in ekološko funkcijo. V praksi številni javni odprti prostori niso ustrezno pripravljeni, da bi hkrati izpolnjevali obe vlogi (Šamić-Musemić in Zagora, 2021; Dinç in Gök, 2024; Anhorn in Khazai, 2015; Alawi idr., 2023; Şahin idr., 2022). Avtorice v članku obravnavajo tri ključna vprašanja: 1. Kako se je intenzivnost uporabe spremenila po potresu? 2. Kako so se spremenile vrste dejavnosti? 3. S katerimi težavami so se javni odprti prostori spopadali med potresom (med zagotavljanjem zatočišča) in po njem (med obnovo)?

Ker Turčija leži v alpsko-himalajskem potresnem pasu in ima kompleksno topografijo, je močno potresno ogrožena (Bayrak idr., 2015; Gerdan in Özdemir, 2017; Onay, 2024). 6. februarja 2023 sta dva močna potresa (z magnitudama M_w 7,7 oziroma 7,8) prizadela enajst turških provinc. Epicenter sta imela v pro-



Slika 1: Shematski prikaz raziskovalne metodologije (ilustracija: avtorice)

vinci Kahramanmaraş, zahtevala pa sta več kot 60.000 življenj (AFAD, 2023). Obsežno uničenje je ohromilo vsakdanje življenje in prebivalce prisililo, da so odprte površine uporabljali kot zasilna zatočišča. Navedena katastrofa je avtoricam ponudila edinstveno priložnost za proučevanje preobrazbe javnih odprtih prostorov v izrednih razmerah.

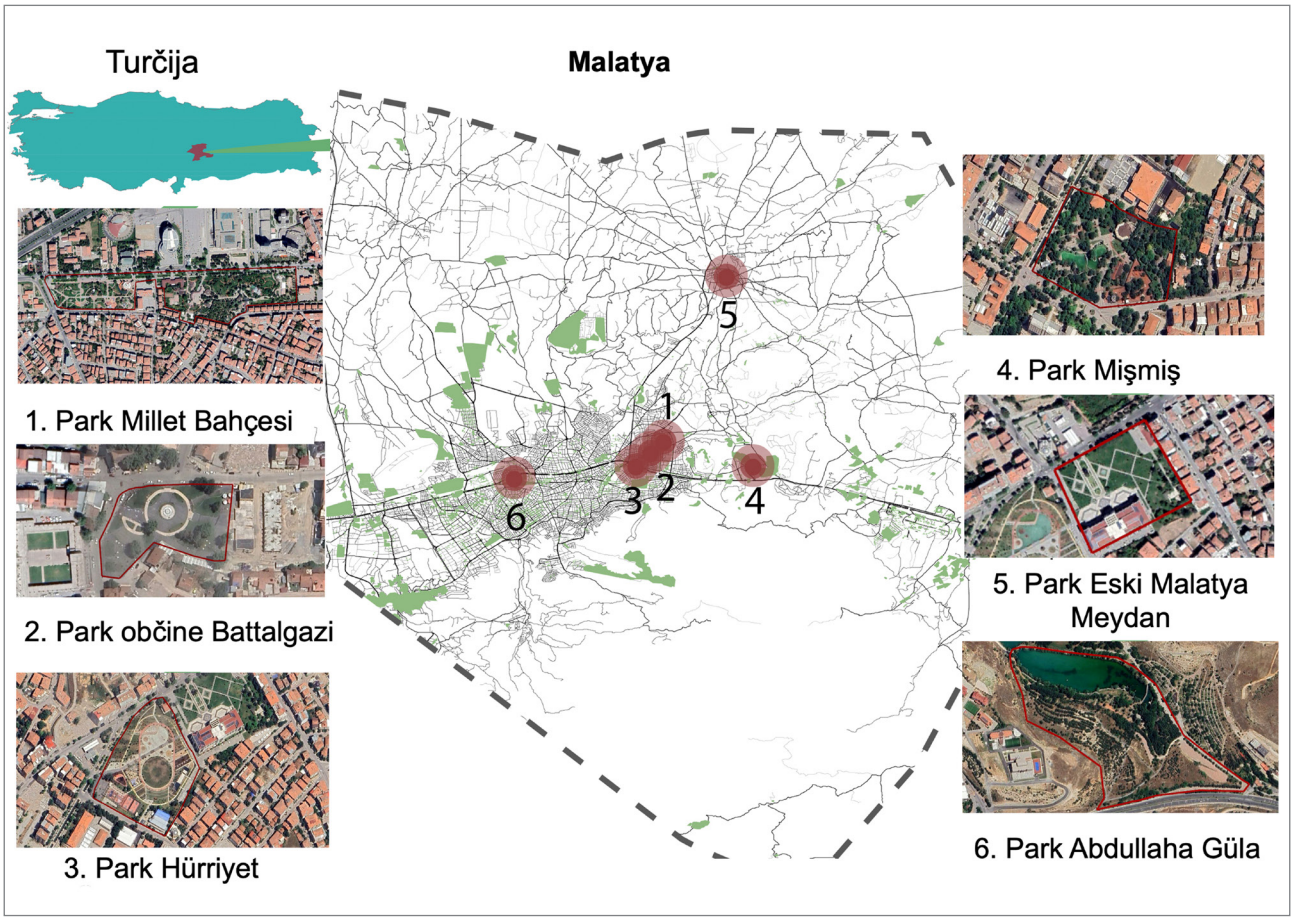
Glavni namen raziskave je bil proučiti rabo javnih odprtih prostorov v Malatyi po potresu leta 2023, s poudarkom na njihovi zmožnosti zadovoljevanja rekreacijskih in drugih potreb vsakdanjega življenja v mestu. Avtorice so analizirale šest glavnih javnih odprtih prostorov v Malatyi – enem izmed najbolj prizadetih mest, pri čemer so se osredotočile na njihove vrste rabe pred potresom, v prvih 72 urah po potresu in po naravni nesreči. Čeprav jih je turški urad za obvladovanje naravnih nesreč AFAD določil za zbirna območja v primeru potresa, večina javnih odprtih prostorov ni bila ustrezno pripravljena za zagotavljanje zasilne nastanitve. Izsledki raziskave bodo v pomoč načrtovalcem in odločevalcem pri oblikovanju potresno odpornih javnih odprtih prostorov, ki lahko ublažijo posledice naravnih nesreč in hkrati podpirajo dolgoročno obnovo mest.

2 Gradivo in metode

Avtorice so v raziskavi z metodo naknadne ocene uporabe prostora proučile funkcionalnost šestih javnih odprtih prostorov v Malatyi pred potresom leta 2023, med njim in po njem. Navedeno metodo so izbrale zato, ker omogoča celostno analizo delovanja javnih odprtih prostorov v dejanskih razmerah, zlasti kadar so izpostavljeni nepričakovanim obremenitvam, kot so naravne nesreče (Preiser in Vischer, 2005). Metodologija je vključevala terensko analizo, polstrukturirane intervjuje z uradniki in anketo med uporabniki, na podlagi katerih so avtorice proučile prostorske, upravne in družbene vidike javnih odprtih prostorov med potresom in po njem (slika 1).

2.1 Območje raziskave

Provinca Malatya leži na zahodu turške pokrajine Vzhodna Anatolija. Zanjo so značilna vroča, sušna poletja in mrzle, deževne zime. Razteza se v smeri sever–jug, pri čemer se njen teren rahlo dviga. Mesto Malatya ima 807.947 prebivalcev, od katerih jih 78 % živi v okrožjih Battalgazi in Yeşilyurt. Gostota prebivalstva v provinci znaša 66 ljudi na kvadratni



Slika 2: Lokacija šestih izbranih javnih odprtih prostorov v Malatyi (ilustracija: avtorice)

kilometer. Zaradi goratega reliefa in aktivne geološke zgradbe je območje močno izpostavljeno potresom (Şahin, 2022).

V potresih februarja 2023 je bila Malatya med najbolj prizadetimi mesti. Takoj po nesreči je v mestu vladal precejšen kaos. Mnogi prebivalci so zatočišče poiskali v zbirnih taboriščih, šotorih pred svojimi domovi ali javnih parkih. Zaradi nenehnih popotresnih sunkov niso vstopali niti v stavbe, katerih konstrukcija je ostala nedotaknjena (Türkmen idr., 2023). Med zasilno nastanitvijo so se pojavile resne težave, med drugim zamude pri razdeljevanju šotorov in pomoči ter omejen dostop do čiste vode, sanitarij in prostorov za umivanje. V članku so v skladu z raziskovalnimi cilji analizirane vloge in vrste rabe javnih odprtih prostorov med potresom v Malatyi.

Kot je razvidno s slike 2, je bilo za analizo izbranih šest javnih odprtih prostorov v mestu: park Millet Bahçesi, park občine Battalgazi, park Hürriyet, park Mişmiş, park Eski Malatya Meydan in park Abdullaha Güla. V nadaljevanju so navedene njihove splošne značilnosti in raba prostora.

Park Millet Bahçesi je velik 40.651 m². V spodnjem delu je pokrito parkirišče, nasproti glavnega vhoda je ribnik, vodno območje pa krasi sezonska parterna zasaditev. V parku je več območij z igrali, športna igrišča, otroški bazen, amfiteater, družbeni objekti, sprehajalne poti, sadovnjak in zeliščni vrtovi. Na njegovem območju je tudi urad za socialno delo občine Malatya.

Park občine Battalgazi je povezan z okoliškimi cestnimi osmi. Na površini 32.844 m² so pokrito parkirišče, fontana nasproti glavnega vhoda, obdana z dišečimi vrtnicami raznovrstnih barv, dve knjižnici, čajnica, pet pergol in sprehajalne poti. Na strehi skupnostnega objekta so nameščeni fotovoltaične plošče in sistem za zbiranje deževnice.

Park Hürriyet se razprostira na površini 39.650 m². Ima tri vhode, in sicer po enega na vzhodni, zahodni in severni strani. V sklopu parka so parkirišče, igrišča, matični urad, javna knjižnica, kavarne in restavracije, skupnostni objekti, igrala, tekaške steze, ribnik, sprehajalne poti in fitnes.

Park Mişmiş je velik 400.020 m² in je zunaj mestnega središča. Na vhodu in izhodu sta vratarnici, ki zagotavljata nadzorovan dostop do parka. Sprehajalne poti omogočajo neprekinjeno gibanje po celotnem območju, ob jezeru in v parku so prostori za

piknik. Obiskovalcem so na voljo restavracija, kavarna, tržnica, molilnica, otroško igrišče in sanitarije. Park ima tudi parkirišče, vendar z vozili ni mogoč dostop do območij za piknike.

Park Eski Malatya Meydan ima površino 19.850 m². Je v starem mestnem jedru Malatye in je bil obnovljen s sredstvi občine Battalgazi v okviru prizadevanj za ohranjanje kulturne dediščine. V parku so zasajena drevesa in najrazličnejše druge rastline, ima pa tudi obsežne betonske površine. V sredini je bazen, ob straneh pa sta pergoli s fontanama.

Park Abdullaha Güla je velik 135.756 m². Njegova lokacija blizu občinskega urada in nakupovalnega središča Malatya Park je za uporabnike zelo priročna. V njem so trgovine, sprehajalne poti, kavarne, paviljoni, klopi, otroško igrišče, restavracija, športno-rekreacijsko območje, fontane in območje za piknike za nekadilce.

Navedeni javni odprti prostori so bili izbrani, ker jih prebivalci intenzivno uporabljajo in ker jih je urad za obvladovanje naravnih nesreč (AFAD, 2022) določil za uradna zbirna območja in zatočišča v primeru potresa. Raziskava prinaša dragocena spoznanja za upravljavce in urbaniste ter omogoča bolj premišljeno odločanje. Poleg tega omogoča presojo učinkovitosti javnih odprtih prostorov med nesrečo in njihove dolgoročne primernosti kot evakuacijskih ali zaščitenih območij.

2.2 Zbiranje podatkov

2.2.1 Terenske analize

Avtorice so s terenskimi analizami objektivno proučile stanje, opremljenost in okoljsko kakovost vseh šest javnih odprtih prostorov. Da bi proučile razmere pred potresom (na podlagi občinskih arhivov in starejših fotografij) in stanje več kot leto po njem, so analize izvedle med marcem 2023 in februarjem 2024. Na podlagi geolociranih fotografij in strukturiranih opazovalnih obrazcev so analizirale vsakega izmed šestih javnih odprtih prostorov, pri čemer so se osredotočile na dostopnost, rastlinstvo, infrastrukturo in čistočo. Dokumentirale so otroška igrišča, sanitarije, sprehajalne poti in zelene površine. Z uporabo geografskega informacijskega sistema in občinskih prostorskih podatkov so zbrale in preverile več kot petsto fotografij in terenskih zapiskov. S primerjanjem stanja analiziranih javnih odprtih prostorov pred potresom in po njem so lahko določile in bolje razumele nastale funkcionalne in prostorske spremembe. V okviru primerjalne analize so torej oblikovale opisne podatke o poškodbah, izgubi funkcionalnosti in spremembah pri vzdrževanju.

2.2.2 Polstrukturirani intervjuji z lokalnimi uradniki

Od intervjuvancev so bile pridobljene strokovne informacije o rabi javnih odprtih prostorov med potresom. Med aprilom in junijem 2023, ko je ukrepanje po potresu še potekalo, so avtorice opravile polstrukturirane intervjuje s šestdesetimi lokalnimi uradniki (desetimi na vsaki lokaciji) iz občin Yeşilyurt, Battalgazi in Malatya. Med njimi so bili gradbeni inženirji, arhitekti, krajinski arhitekti, kmetijski inženirji in urbanisti. Od njih so pridobile podatke o uporabi, vzdrževanju in spremembah izbranih šestih javnih odprtih prostorov med potresom. Vsak intervju je trajal približno od 30 do 45 minut, dokumentiran pa je bil v obliki povzetkov, napisanih na računalnik, in zapiskov, napisanih ročno. Prepisi intervjujev so bili nato tematsko kodirani.

2.2.3 Anketa med uporabniki

Namen ankete je bil proučiti uporabo in vzdrževanje šestih javnih odprtih prostorov ter mnenja o njih pred potresom leta 2023 in po njem. Z metodo priročnega vzorčenja je bila med septembrom in decembrom 2023 opravljena ustna anketa mimoidočih na vsaki izmed šestih lokacij. Anketiranci so ocenjevali tri tematske sklope: pogostost njihovih obiskov pred potresom in po njem (od vsak dan do redko), na podlagi česar so avtorice določile spremembe v vedenju uporabnikov, vrste dejavnosti, s katerimi so se ukvarjali pred potresom in po njem (npr. sprehodi, počitek, druženje, rekreacija ali uporaba javnega odprtega prostora za prečenje), ter glavne težave, ki so jih opazili po potresu, vključno s potrebami po nujnih popravilih, izgubo rekreacijske funkcije, težavami s čistočo in oteženo obnovo zaradi obsežne škode. Anketa je vsebovala vprašanja zaprtega in odprtega tipa ter trditve, ki so jih anketiranci vrednotili na petstopenjski Likertovi lestvici.

V anketi je sodelovalo 240 posameznikov, po štirideset na vsakem proučevanem prostoru, vsak pogovor pa je trajal od 10 do 15 minut. Anketiranci so bili izbrani s priročnim vzorčenjem in so vključevali lokalne prebivalce, ki so uporabljali ali obiskovali proučevane odprte prostore in so bili pripravljeni odgovarjati na vprašanja na kraju samem. Za zagotavljanje zadostne raznolikosti anketirancev so bile izbrane osebe različne starosti in obeh spolov, zlasti tiste, ki so lokacije obiskovale tako pred potresom kot po njem. Anketiranci so po pojasnilu, da gre za akademsko in anonimno raziskavo, podali ustno soglasje za sodelovanje v anketi, vsi podatki pa so bili shranjeni v digitalnih datotekah, zaščitenih z geslom. Avtorice so zbrane podatke nato analizirale in primerjale, da so določile trende sprememb v vedenju uporabnikov, pogostosti obiskov in zaznanih težavah na proučenih javnih odprtih prostorih.

2.2.4 Analiza podatkov

Vsi podatki, pridobljeni s terenskimi opazovanji, anketami in intervjuji, so bili najprej ročno zapisani, nato pa digitalizirani za sistematično analizo. Kvantitativni podatki iz ankete so bili v programu Microsoft Excel urejeni v opisne preglednice in primerjalne prikaze stanja pred potresom in po njem. Kvalitativno gradivo (tj. odgovori na odprta vprašanja, prepisi intervjujev in fotografije) je bilo razvrščeno in urejeno v programu Microsoft Word.

Zbrani podatki so bili podlaga za analizo in primerjavo izbranih javnih odprtih prostorov. Ti so bili proučeni zlasti z vidika namenskosti, vzdrževanja in upravljanja, infrastrukture in opremljenosti, varnosti, velikosti, lokacije ter zadovoljstva uporabnikov pred in med potresom ter po njem. Navedeni dejavniki so bili v drugih raziskavah že izpostavljeni kot ključni za popotresno obnovo (Yücel in Komar, 2021; Gökgöz idr., 2020; Madureira idr., 2018; Kabisch idr., 2015; Chiesura, 2004; León in March, 2016; Johnson, 2007; Jayakody idr., 2016).

3 Rezultati

3.1 Terenske analize (raba in stanje javnih odprtih prostorov)

Pred potresom so park Millet Bahçesi pogosto uporabljali kot rekreacijski prostor tako podnevi kot zvečer ter kot družabno središče, saj leži blizu občine Battalgazi in mestnega središča. Terenski ogledi po potresu so pokazali, da je bil park preoblikovan v trgovsko območje, na katerem prevladujejo kontejnerske enote. Zelene površine in otroška igrišča so izginili, nadomestile pa so jih manjše prodajalne. Infrastruktura in sanitarije so poškodovane, na območju ni ustrezne razsvetljave, higienske razmere so slabe. Prostor ne deluje več kot družabni park, temveč kot začasno trgovsko središče.

Park občine Battalgazi je bil pred potresom privlačen zaradi bogatega rastlinja, cvetličnih zasaditev in senčnih predelov. Po potresu so na krajinsko oblikovane površine postavili restavracijo in pekarno. S temi novimi posegi so zmanjšali obseg zelenih površin in spremenili prvotno naravo parka. Nekatere tlakovane površine so popravili, rastline pa se slabo vzdržujejo. Ljudje zato park zdaj obiskujejo samo za kratek čas ali iz praktičnih razlogov, ne uporabljajo pa ga več za prostočasne dejavnosti.

Park Hürriyet je bil pred potresom priljubljen kraj za druženje, sprehajanje in preživljanje časa z družino, zlasti ob koncih tedna. Po obdobju neuporabe po potresu je park postopno ponovno oživel. Kavarne in restavracije so se ponovno odprle, vendar se prostor zdaj večinoma uporablja kot prehodna pot. Del rastlinja se je ohranil, otroška igrišča in druga infrastruktura pa vidno propadajo.

Park Mişmiş, nekoč večnamenski zeleni prostor, se večinoma ne uporablja več za rekreacijo. Po potresu so bila otroška igrišča in travnate površine poškodovani, ljudje pa so se v parku prenehali družiti. Dele parka zasedajo začasni objekti in čeprav se je ohranil del naravne vegetacije, je območje postalo tiho in slabo izkoriščeno – večinoma ga obiskujejo posamezni domačini in prostovoljci.

Park Eski Malatya Meydan je bil pred potresom zaradi bližine avtobusne postaje in starega mestnega jedra Malatye pomembno zbirališče in prehodna točka. Po potresu je bil preoblikovan v kontejnersko tržnico in začasno stanovanjsko območje. Tlakovane površine so poškodovane, prostor pa je prenatrpan in neurejen. Izgubil je prvotno identiteto in se danes večinoma uporablja kot prehodna pot za pešce.

Park Abdullaha Güla je bil nekoč pomembno družabno in športno središče, zlasti v večernih urah. Po potresu se je spremenil v območje, natrpano s kontejnerskimi prodajalnami in začasnimi stojnicami. Otroška igrišča in zelene površine so poškodovani, infrastruktura je oslabljena. Park se ne uporablja več tako pogosto za rekreacijo, ljudje ga zdaj večinoma obiskujejo samo za kratek čas.

Terenska raziskava je pokazala, da se je vseh šest javnih odprtih prostorov v Malatyi po potresu leta 2023 močno spremenilo. Mnogi so postopno izgubili svojo rekreacijsko funkcijo in so bili spremenjeni v začasne trgovske prostore, kot so kontejnerske prodajalne in kioski. Na sliki 3 so prikazane nekatere prostorske in funkcionalne spremembe, zaradi katerih se je zmanjšal rekreacijski pomen proučenih prostorov, ki so se po potresu začeli uporabljati za reševanje izrednih razmer in v neformalne namene.

3.2 Intervjuji

Park Millet Bahçesi je bil izbran za zbirno mesto v primeru potresa zaradi središčne lege in dobre dostopnosti. Humanitarna pomoč in prehrana sta bili dostavljeni neposredno na območje, po celotnem parku pa so bili postavljeni šotori in kontejnerji. Prostor vseeno ni bil dovolj velik za vse ljudi, ki so vanj prihajali, kar je povzročilo prenatrpanost in slabo organizacijo.

Park občine Battalgazi se je takoj po potresu uporabljal kot evakuacijsko in distribucijsko središče, saj je bil blizu mestnega središča. Večina parka je bila zapolnjena s šotori, ljudem so delili hrano in oblačila ter jim zagotovili začasno bivališče. Kljub temu je bilo območje premajhno, da bi sprejelo vse eva-

Slika 3: Izbrani javni odprti prostori v Malatyi po potresu leta 2023: a) kontejnersko naselje v parku Eski Malatya Meydan, b) šotorsko naselje v parku občine Battalgazi, c) kontejnerski objekti v parku Millet Bahçesi, d) kioski in neformalne stojnice v Parku Abdullaha Güla, e) poškodovano otroško igrišče v parku Mişmiş, f) neformalna tržnica v parku Eski Malatya Meydan (foto: avtorice)

kuirance. Lokalni uradniki so opozorili na slabo pripravljenost ter nezadostno vzdrževanje in sanacijo med krizo in po njej.

Čeprav je park Hürriyet majhen, je zaradi dobre dostopnosti iz mestnega središča med potresom postal začasno zatočišče. Zagotovil je začetno bivališče, prek občinskega urada, ki deluje v parku, pa tudi socialne storitve. V času potresa ni imel dovolj klopi, senčnih površin, sanitarij in komunalne infrastrukture.

Park Mişmiş, največji odprti prostor na varni razdalji od stavb, se je med potresom uporabljal kot pomembno kontejnersko in skladiščno središče. Velik del je bil preurejen v začasna zatočišča, kjer je bilo poskrbljeno za osnovne potrebe ljudi, vključno z razdeljevanjem hrane, otroškimi dejavnostmi in razdeljevanjem paketov pomoči. Niso pa bile zagotovljene ustrezne sanitarije, razsvetljava in druga infrastruktura, poleg tega je v parku kljub njegovi velikosti primanjkovalo prostora za šotore in kontejnerje.

V parku Eski Malatya Meydan so postavili šotore in delili osnovno pomoč, vendar je bila zaradi poškodovane infrastrukture in prometne gneče njegova uporabnost omejena. Šotori in kontejnerji so bili majhni in neustrezni. Park je bil pomembna točka za razdeljevanje pomoči, higienske razmere v njem pa so bile slabe.

Zaradi središčne lege in odprte zasnove parka Abdullaha Güla so tudi v njem postavili šotore in razdeljevali pomoč. Lokalni uradniki so poročali o varnostnem preverjanju in pregledih infrastrukture v tem času. Kljub velikosti se je park namreč spopadal s težavami, povezanimi s poškodovano infrastrukturo in varnostjo.

Čeprav so se ta območja sprva uporabljala kot zatočišča, točke za razdeljevanje pomoči ali kontejnerska naselja, so težave s sanitarnimi razmerami, varnostjo in poškodovano infrastrukturo omejevale njihovo splošno učinkovitost. Poleg tega sta bili veliki težavi pomanjkanje osebja in slaba pripravljenost na nesreče.

3.3 Anketa med uporabniki

Med 240 anketiranci je bilo 35 % žensk in 65 % moških. 70 % jih je bilo poročenih, večina je imela univerzitetno izobrazbo. Šestdeset sodelujočih je med potresom februarja 2023 osebno uporabljalo parke kot zatočišča ali zbirna mesta.

3.3.1 Intenzivnost in pogostost uporabe

Anketiranci so bili vprašani, kako pogosto so obiskovali posamezni park pred potresom in po njem. Rezultati so prikazani na sliki 4; s slike je razvidno, da je potres vplival na uporabo proučevanih javnih odprtih prostorov.

Vsi javni odprti prostori so se pred potresom pogosteje uporabljali. Mnogi anketiranci so na primer obiskali parke Millet Bahçesi, Hürriyet in Eski Malatya Meydan enkrat ali dvakrat tedensko, kar kaže, da so se ta območja aktivno uporabljala za druženje in rekreacijo. Podobno je tudi park občine Battalgazi veliko anketirancev obiskalo dvakrat tedensko, kar kaže, da so se ljudje v njem redno zbirali. Tudi v park Abdullaha Güla so ljudje redno zahajali vsak teden, za park Mişmiş pa je razvidna uravnotežena porazdelitev dnevne, tedenske in občasne rabe.

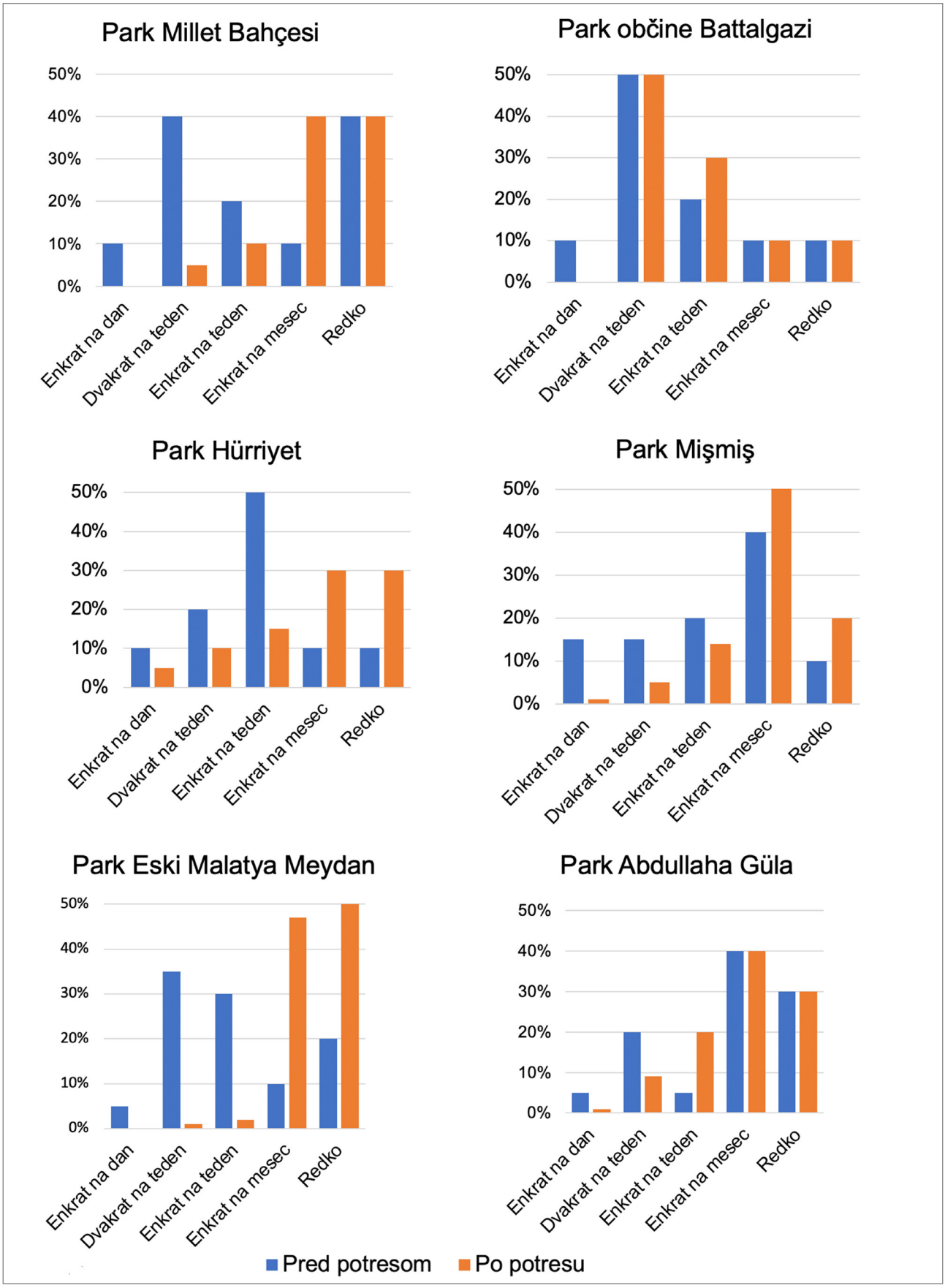
Po potresu se je dinamika obiskov opazno spremenila. V parkih Millet Bahçesi, Hürriyet in Eski Malatya Meydan so redni obiski močno upadli, uporabniki pa so poročali o obiskih enkrat na mesec ali redkeje, kar kaže na manjšo dostopnost, varnost ali privlačnost teh območij. Za park občine Battalgazi je bil ugotovljen manjši upad, saj je stopnja obiskov dvakrat tedensko ostala visoka, kar kaže, da je za ljudi še vedno pomemben. Park Abdullaha Güla ljudje obiskujejo malo redkeje kot pred potresom (enkrat mesečno), vendar njegova uporaba ni drastično upadla. Nasprotno pa se je mesečna uporaba parka Mişmiş povečala, kar pomeni, da je postal pomembnejši kot pred potresom. Navedena dinamika kaže, da je večina parkov izgubila vlogo vsakodnevnih družabnih prostorov, park Mişmiş in deloma park Abdullaha Güla pa sta ohranila ali okrepila svoj pomen, kar odraža razlike v dojemanju javnih odprtih prostorov po potresu.

3.3.2 Vrste dejavnosti

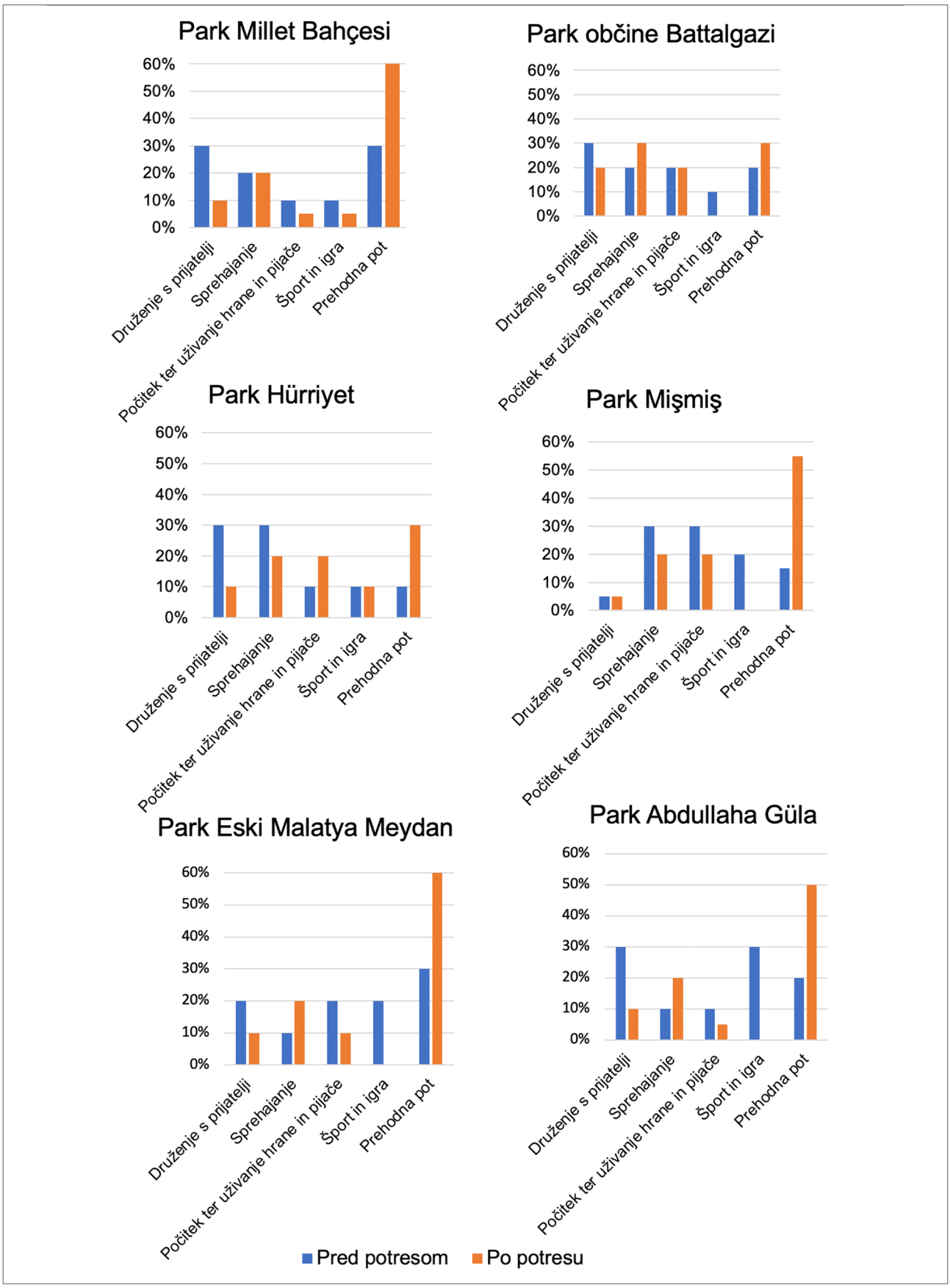
Naslednji tematski sklop, obravnavan v anketi, se je nanašal na spremembe funkcij proučevanih parkov po potresu, s čimer so avtorice želele ugotoviti, kako je naravna nesreča vplivala na njihovo rabo. Upoštevanih je bilo pet glavnih dejavnosti: sprehajanje, druženje s prijatelji, počitek ter uživanje hrane in pijače, športne aktivnosti in igre ter uporaba prostora kot prehodne poti. S slike 5 so razvidne jasne razlike v rabi pred potresom in po njem. Primerjalna analiza je pokazala precejšnje spremembe v rabi po potresu, pri čemer prevladujeta dva trenda: močan porast uporabe javnih odprtih prostorov kot prehodnih poti in opazen upad družabnih dejavnosti.

Na vseh šestih javnih odprtih prostorih so bile dejavnosti pred potresom raznovrstne in uravnotežene, kar pomeni, da so jih ljudje uporabljali v najrazličnejše prostočasne namene. Park Millet Bahçesi so v glavnem uporabljali kot prehodno pot (približno 45 % anketirancev), manj pa tudi za sprehode, druženje in počitek, k čemur sta pripomogli njegovi središčna lega in dobra dostopnost. Za park občine Battalgazi je bil značilen lepo zaokrožen nabor rab, pri čemer so prednjačili druženje s prijatelji, sprehodi in počitek, zaradi česar je bil pomembno družabno središče. Park Hürriyet se je v glavnem uporabljal za sprehode in druženje, park Mişmiş, ki je od vseh največji, pa je imel večnamensko vlogo, z dokaj enakomerno porazdelitvijo dejavnosti, kot so sprehajanje, uživanje hrane in pijače, športne aktivnosti in druženje. Park Eski Malatya Meydan se je v glavnem uporabljal kot prehodna pot, nekoliko manj pa tudi za sprehode in druženje. Park Abdullaha Güla je imel med vsemi najbolj raznovrstne uporabnike, saj je bilo v njem vseh pet dejavnosti zastopanih dokaj enakomerno. Na splošno so bili pred potresom vsi parki živahni rekreacijski in družabni prostori, ki so jih ljudje uporabljali zlasti za sprehode, počitek, igro in druženje. Uporabljali so se tudi kot prehodi, vendar razen v parkih Millet Bahçesi in Eski Malatya Meydan to ni bila prevladujoča raba.

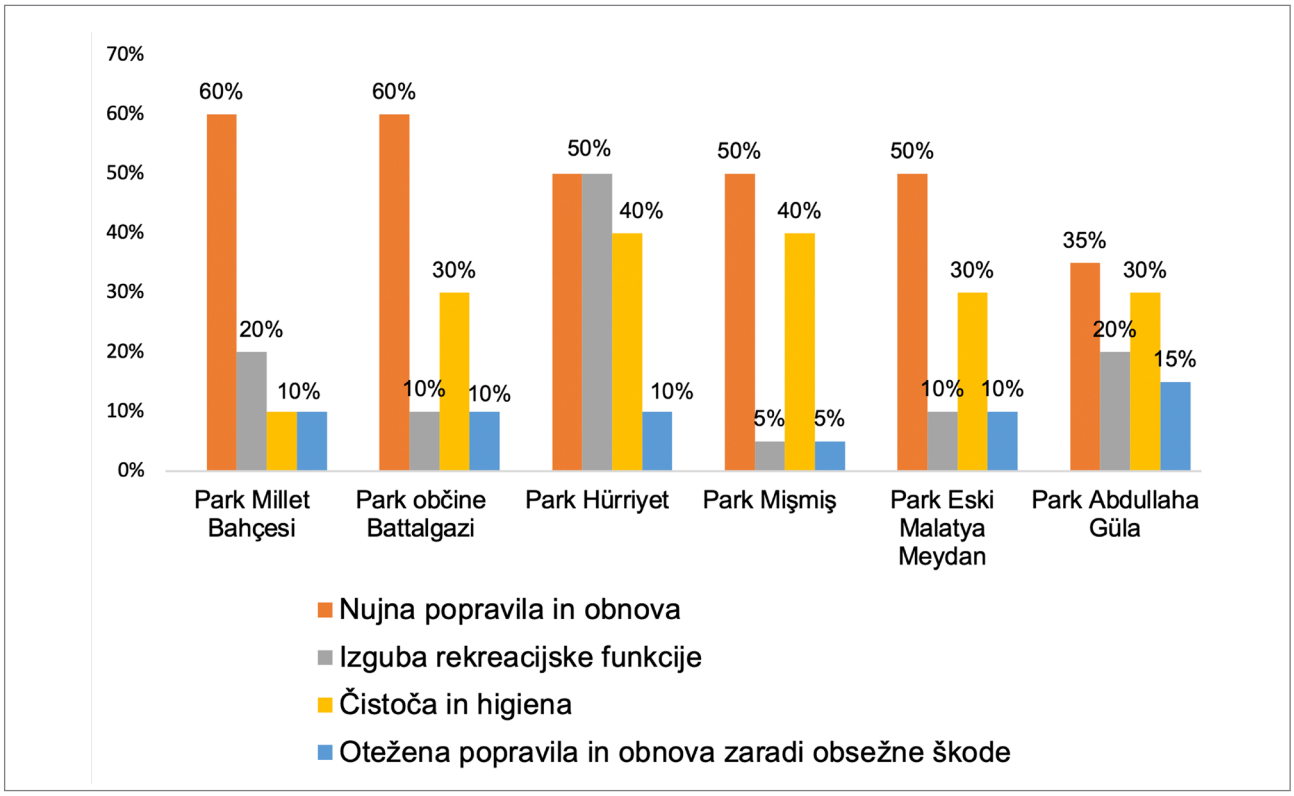
Po potresu se je funkcionalna raba vseh javnih odprtih prostorov preusmerila zlasti v gibanje po območju, družabne in rekreacijske dejavnosti pa so močno upadle. Park Millet Bahçesi se je uporabljal predvsem kot prehodna pot (ta vrsta rabe se je povečala na približno 60 %), občutno manj pa za druženje in počitek, saj je bilo območje spremenjeno v kontejnerski trgovski center. Park občine Battalgazi je v primerjavi z drugimi javnimi odprtimi prostori ohranil razmeroma več družabnih funkcij (npr. druženje in počitek), najverjetneje zaradi bližine ustanov, ki so pomagale ohranjati skupnostno rabo prostora. Park Hürriyet se je v glavnem začel uporabljati kot prehodna pot (po navedbah približno 40 % anketirancev) in je izgubil večino rekreacijskih funkcij, kar je posledica zlasti njegove majhnosti in vloge kot osrednje povezovalne poti. Največja sprememba je opazna za park Mişmiş: njegova uporaba kot prehodne poti se je povečala na približno 55 %, športne in rekreacijske aktivnosti v njem pa so skoraj izginile, saj se je spremenil v kontejnersko območje, na katerem so delili humanitarno pomoč. Tudi park Eski Malatya Meydan se je začel v glavnem uporabljati kot prehodna pot (po navedbah približno 60 % anketirancev), pri čemer je izgubil svojo nekdanjo kulturno in družabno funkcijo. Podobno se je zgodilo v parku Abdullaha Güla (kot prehodno območje ga je začelo uporabljati približno 55 % anketirancev), in to kljub njegovi velikosti, čeprav so se v njem nekatere dejavnosti ohranile, kar kaže na delno odpornost prostora.



Slika 4: Primerjava intenzivnosti in pogostosti rabe šestih javnih odprtih prostorov na podlagi ankete (ilustracija: avtorice)



Slika 5: Analiza vrst dejavnosti na šestih javnih odprtih prostorih pred potresom leta 2023 in po njem (ilustracija: avtorice)



Slika 6: Mnenja uporabnikov glede trenutnih težav na šestih javnih odprtih prostorih na podlagi ankete (ilustracija: avtorice)

3.3.3 Trenutne težave (po potresu)

Anketiranci so z odgovarjanjem na vprašanje zaprtega tipa poročali o težavah, ki so jih na odprtih javnih prostorih opazili po potresu. Lahko so izbrali eno ali več težav med štirimi vnaprej določenimi možnostmi, ki so bile oblikovane deduktivno na podlagi terenskih opazovanj in proučevanja literature s področja vrednotenja javnih prostorov po nesrečah (npr. Jayakody idr., 2016; León in March, 2016; Johnson, 2007). Izbirali so lahko med naslednjimi možnostmi: 1. nujna popravila, vključno z vidnimi konstrukcijskimi ali površinskimi poškodbami, ki jih je treba nujno sanirati, 2. izguba rekreacijske funkcije ali nezmožnost uporabe prostora za prostočasne ali družabne dejavnosti zaradi poškodovane ali premaknjene opreme in infrastrukture, 3. čistoča in higiena, v smislu neustreznih sanitarnih razmer, kopičenja odpadkov, nezadostnega vzdrževanja in pomanjkanja osnovne opreme, kot so smetnjaki, stranišča in prostori za umivanje in pranje, po potresu ter 4. otežena obnova zaradi obsežne škode, kar se nanaša na večje, dolgoročne težave pri obnovi, ki so posledica hudih poškodb stavb in infrastrukture ter zahtevajo obsežnejše posege od rednega vzdrževanja. Kot je razvidno s slike 6, so bili vsi veljavni odgovori številčno kodirani in nato kvantitativno analizirani v programu Microsoft Excel, pri čemer so bili izračunani deleži izbir posameznih možnosti. Na podlagi teh deležev so nato avtorice primerjale vseh šest analiziranih parkov.

Najpogosteje omenjena težava v vseh parkih je bila potreba po nujnem popravilu infrastrukture, kot so klopi, poti, ograje in javna razsvetljava. Ta problem je bil najizrazitejši v parkih Millet Bahçesi, Battalgazi, Hürriyet, Mişmiş in Eski Malatya Meydan, za te parke ga je navedlo od 50 do 60 % uporabnikov. Čeprav je za park Abdullaha Güla ta delež manjši, so bila nujna popravila tudi v tem parku najpogosteje omenjena težava.

Mnogi anketiranci so za vse parke menili, da so ti izgubili svojo rekreacijsko funkcijo. Ta težava je bila najbolj opazna v parkih Hürriyet in Mişmiş, za ta parka jo je omenilo 40 % uporabnikov. Navedeni rezultati se ujemajo s podatki na sliki 5, iz katerih je razviden upad dejavnosti, kot sta igra in počitek.

Čeprav je bila zaskrbljenost zaradi čistoče in higiene izražena za vseh šest javnih odprtih prostorov, ta težava ni bila tako pereča kot nujna popravila ali izguba rekreacijske funkcije. Največji delež uporabnikov je težave s čistočo izrazil za park Abdullaha Güla, sledila sta parka Millet Bahçesi in Battalgazi.

Kot je razvidno s slike 6, je bila otežena obnova zaradi obsežne škode najmanj pogosto omenjena težava, a pa je bila vseeno opažena na vseh lokacijah. Največji delež (15 %) uporabnikov je menil, da je obnova območja otežena, v parku Abdullaha Güla. V parkih Millet Bahçesi, Battalgazi in Hürriyet je to težavo izpostavilo 10 % uporabnikov.

Čeprav je vseh šest javnih odprtih prostorov potrebovalo nujna popravila, so imeli različne sekundarne težave. Nekateri so se spopadali z večjimi izzivi glede čistoče, pri drugih pa je bila glavna težava to, da niso bili več primerni za rekreacijske namene.

Po potresu se je vsak javni odprti prostor spopadal z drugačnimi izzivi in vsak je bil spremenjen, na kar so vplivale njihove prostorske značilnosti in upravljavski pristopi ter vedenje njihovih uporabnikov. Park Millet Bahçesi je bil iz rekreacijskega prostora preurejen v trgovsko območje, park občine Battalgazi je bil iz krajinsko urejenega javnega prostora preoblikovan v storitveno usmerjeno območje, park Hürriyet pa je zaradi svojega simbolnega pomena in osrednje lege hitro obnovil svojo predpotresno funkcijo. Park Mişmiş je bil sprva pomembno zbirališče, po potresu pa je izgubil svojo kulturno in rekreacijsko funkcijo. Park Eski Malatya Meydan se je spremenil v nekakšen prehod, ki ga večinoma obiskujejo začasni uporabniki od drugod, med njimi ulični prodajalci in stanovalci bližnjih začasnih bivališč. Park Abdullaha Güla Park pa je utrpel precejšnjo škodo, zaradi česar se je spremenila demografska sestava njegovih uporabnikov.

4 Razprava

Analiza izsledkov terenskih opazovanj, intervjujev in anketnih rezultatov je pokazala, da so kakovost infrastrukture, dostopnost lokacije in njeno upravljanje pred nesrečo najpomembnejši dejavniki, ki so vplivali na stanje proučenih prostorov po potresu. Združeni rezultati vseh treh metod potrjujejo hipotezo, da javni odprti prostori z dobro urejenim vzdrževanjem, središčno lego in simbolnim pomenom po nesrečah hitreje okrevajo in ohranijo svojo družbeno vrednost.

Po potresu se je vseh šest obravnavanih javnih odprtih prostorov z območij prostočasnih dejavnosti spremenilo predvsem v prehodna območja. Gibanje čez te prostore je postal prevladujoči namen, ne uporabljajo pa se več za družabne, kulturne in rekreativne namene. Hkrati so rezultati raziskave pokazali razlike med proučenimi javnimi prostori, ki so posledica njihove lege, velikosti in infrastrukture. Središčni prostori, kot je park Hürriyet, so ohranili vlogo skupnostnih središč, na večjih območjih, kot je park Mişmiş, pa je kljub njihovi velikosti rekreacijska in kulturna raba upadla, ljudje pa so jih začeli večinoma uporabljati kot prehodne poti. V parku Mişmiş so bila zaradi obsežne uporabe območja za skladiščenje in postavitev kontejnerjev, povečanega prometa in začasnih objektov močno poškodovana tla, otroška igrišča in zelene površine. Zaradi neustrezne sanacije in slabega vzdrževanja park ni mogel obnoviti svoje predpotresne rekreacijske vloge.

Druge raziskave so pokazale, da na odpornost javnih odprtih prostorov bolj kot velikost vplivata dostopnost in vzdrževanje (Foški idr., 2024; Onay idr., 2024). Tudi empirična terenska analiza je potrdila, da raba proučenih javnih prostorov po potresu ni bila odvisna zgolj od njihove velikosti. Čeprav sta parka Mişmiş in Abdullaha Güla obsežna, se je njuna uporabnost zmanjšala zaradi poškodovane infrastrukture, uničenih površin in nezadostnega vzdrževanja. Nasprotno pa se je park Hürriyet – manjši park s središčno lego v mestu – zaradi boljše dostopnosti in hitrejše občinske sanacije še naprej uporabljal kot skupnostno zbirališče. Navedeni izsledki kažejo, da so javni odprti prostori zelo prilagodljivi, a hkrati ranljivi elementi odpornosti mestne infrastrukture.

Najpogostejše težave po potresu, opredeljene s terenskimi analizami in anketami med uporabniki, so bile povezane s higieno, varnostjo in poškodovano infrastrukturo. V zvezi s higieno so bili izpostavljeni poškodovani kanalizacijski sistemi, nezadostno čiščenje in pomanjkanje začasne sanitarne opreme, kot so stranišča in prhe. Varnostni izzivi so bili povezani z neustrezno razsvetljavo, pomanjkanjem osebja in nenadzorovanim dostopom, infrastrukturne pomanjkljivosti pa so vključevale poškodovane klopi, uničene poti in premalo smetnjakov. Zaradi navedenih razmer se je zmanjšalo zadovoljstvo z javnimi odprtimi prostori, posledično se ne uporabljajo več za rekreacijske namene, kar so potrdile tudi ankete med uporabniki.

Na podlagi izsledkov opravljene raziskave so avtorice oblikovale več priporočil za urejanje javnih odprtih prostorov, zlasti v potresno ranljivih mestih. Prvič, ta območja bi morala imeti prilagodljivo zasnovo, z večnamenskimi prostori, ki jih je mogoče hitro preurediti za potrebe v primeru nesreč. Modularni tlakovci, odprte travnate površine in široke pešpoti lahko v izrednih razmerah olajšajo začasno postavitev šotorov in kontejnerjev. Tudi s premično ulično opremo in razsvetljavo je mogoče v izrednih razmerah izboljšati prostorsko prilagodljivost in zmanjšati dolgoročno škodo. Park Mişmiş je bil na primer zaradi velikih odprtih površin in ravnega terena med potresom učinkovit krizni center, saj je bilo mogoče na njem preprosto postaviti šotore in kontejnerje. Modularna infrastruktura in premična ulična oprema, ki jo je mogoče odstraniti, lahko preprečita poškodbe tal, zaradi česar so pri urejanju parkov potrebne prožne in prilagodljive oblikovalske strategije.

Drugič, na otroških igriščih in območjih za sedenje je treba uporabljati potresno odporne materiale. Podzemne napeljave za vodovod, elektriko in odvodnjavanje morajo biti zasnovane z dostopnimi servisnimi točkami, ki omogočajo hitra popravila po potresu. Zelo pomembna je tudi stabilizacija tal, ki preprečuje površinske deformacije zaradi intenzivne hoje ali uporabe vozil med izrednimi razmerami. Navedeno dobro ponazarja

park Abdullaha Güla, v katerem so bili zaradi uporabe krhkih, neodpornih materialov otroška igrišča in klopi močno poškodovani, tlakovane površine pa so razpokale pod težo vozil, ki so na območje vozila pomoč.

Tretjič, pomembno je ohranjati raznovrstno mešanico avtohtonih rastlin, ki so odporne proti suši in drugim obremenitvam in ki lahko preživijo daljša obdobja nepozornosti. Za izboljšanje ekološke stabilnosti so potrebni načrti ponovne zasaditve in obnove tal, ki poteka v fazah. Ohranitev odraslih dreves je posebej pomembna, saj ta zagotavljajo naravno senco, koristno tako za dejavnosti, povezane z nudenjem pomoči v izrednih razmerah, kot za rekreacijo. Primer parka občine Battalgazi kaže, da je območje izgubilo velik del zelenja, ko so na zasajenih površinah postavili začasno restavracijo. Ker park ni imel pripravljenega načrta ponovne zasaditve in v njem ni bilo rastlinskih vrst, odpornih proti suši, se je zmanjšala tudi njegova ekološka odpornost.

Četrtič, zaradi neustreznega prostorskega načrtovanja je možno nenadzorovano komercialno poseganje v prostor. Ker so bile odprte površine v parkih Millet Bahçesi in Abdullaha Güla brez označenih intervencijskih con, so jih zasedle neformalne kontejnerske prodajalne. Nasprotno pa je park Hürriyet zaradi strnjene zasnove, jasno urejenih pešpoti in dobrega dostopa iz mestnega središča ohranil vlogo družabnega središča. Navedeno se ujema z izsledki Tatlić idr. (2024), ki poudarjajo, da je dostopnost eden ključnih vidikov odpornosti mest. Intervencijske poti je treba načrtovati tako, da ne motijo rekreacijskih poti ob običajni uporabi. Poleg tega se lahko z uporabo univerzalnega dostopa (npr. širokih vhodov, klančin in ustrezne razsvetljave) izboljšata tako varnost med evakuacijo kot udobje med vsakdanjo rabo. Pomembno je ohranjati tudi preglednost prostora, ki pripomore k večjemu občutku varnosti po naravnih nesrečah.

Nazadnje je treba posebno pozornost nameniti tudi vzdrževanju prostora in angažiranju skupnosti. Po potresu se je park Eski Malatya Meydan čedalje bolj zanemarjal, dokler se ni spremenil v ulico, ki jo večinoma uporabljajo začasni prebivalci. Njegova ponovna oživitev je bila otežena, ker zanj ni bilo usklajenega vzdrževalnega načrta in programov vključevanja skupnosti. Nasprotno pa so lokalne pobude v parku Hürriyet, kot so ponovno odprtje kavarn in manjše čistilne akcije, pripomogle k ponovni angažiranosti uporabnikov, kar poudarja pomen sodelovanja lokalne skupnosti v obnovi po naravnih nesrečah. Poglavitna je priprava celovitega vzdrževalnega načrta, ki vključuje tako rutinske posege kot ukrepe v izrednih razmerah. Poleg tega je za učinkovito obvladovanje prehodnega obdobja po naravni nesreči ključno ustrezno usposabljanje lokalne skupnosti in občinske uprave.

5 Sklep

Izsledki raziskave potrjujejo, da morajo imeti javni odprti prostori na potresno ogroženih mestnih območjih dvojno vlogo: ustrezni morajo biti za vsakdanje rekreacijske in ekološke funkcije ter hkrati delovati kot kritična infrastruktura za ukrepanje ob nesrečah. Ti vlogi se pogosto medsebojno izključujeta. Kadar se upravljanje nesreč in urbanistično načrtovanje izvajata ločeno, javnim odprtim prostorom po nesrečah grozi propadanje ali komercializacija, kot se je to zgodilo v parkih Millet Bahçesi in Abdullaha Güla v Malatyi. S celovitim pristopom, ki kot načrtovalska izhodišča vključuje prilagodljivost, trpežnost in večnamenskost, lahko odprti prostori ostanejo dinamične in odporne prvine mestne krajine.

Analizirani javni odprti prostori so takoj po potresu zagotovili zavetje in pomoč, a so se hkrati spopadali s številnimi izzivi, vključno z neustrezno infrastrukturo, slabimi higienskimi razmerami in upravljavskimi težavami. Večina se šest mesecev po potresu še ni v celoti začela uporabljati za rekreacijo. Nekateri so se preusmerili v trgovsko dejavnost, varnost in zadovoljstvo uporabnikov pa sta se na vseh poslabšala. Navedene ugotovitve kažejo, da je odpornost odvisna od več dejavnikov, kot so pravočasno vzdrževanje, robustna infrastruktura in dobra dostopnost. Raziskava daje nov vpogled v oblikovanje in upravljanje javnih odprtih prostorov, ki omogočajo vsakdanjo uporabo in uporabo v izrednih razmerah, s čimer premošča vrzel med upravljanjem nesreč in urbanističnim načrtovanjem.

Izsledki raziskave poleg tega poudarjajo potrebo po sistematičnih načrtovalskih pristopih, ki zagotavljajo ravnovesje med dostopnostjo in varnostjo, omogočajo učinkovito sanacijo po nesrečah ter vključujejo ukrepe za boljšo pripravljenost na nesreče v načrtovanje parkov. Ena izmed omejitev raziskave je njena osredotočenost na šest javnih odprtih prostorov v samo enem mestu, kar lahko omejuje posplošljivost rezultatov. Kljub temu so v njej navedena dragocena priporočila za načrtovalce in odločevalce na potresno ogroženih mestnih območjih, hkrati pa zagotavlja dobro podlago za prihodnje primerjalne raziskave.

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Modernistična arhitektura kot del sodobne identitete mest: Plečnik in Ravnikar v Ljubljani ter Grabrijan in Neidhardt v Sarajevu

V članku je proučen vpliv modernistične arhitekture na oblikovanje identitete dveh mest nekdanje Jugoslavije, Ljubljane in Sarajeva. Primerjani so prispevki ključnih arhitektov k oblikovanju urbanih tkiv in identitet obeh mest v 20. stoletju, pri čemer sta upoštevana njuna skupna socialistična preteklost in njun različni družbenokulturni razvoj po koncu devetdesetih let 20. stoletja. Modernistična dediščina analiziranih mest je obravnavana z vidika trajnostnosti, odpornosti in spreminjajočega se pojmovanja kulturne identitete. Poseben poudarek je na delih Jožeta Plečnika in Edvarda Ravnikarja v Ljubljani ter Dušana Grabrijana in Juraja Neidhardta v Sarajevu.

Ključne besede: identiteta mesta, kontekst, dediščina, zapuščina, urbanizem po meri človeka, Jože Plečnik, Edvard Ravnikar, Dušan Grabrijan, Juraj Neidhardt

1 Uvod

O identiteti mest, po kateri se ta razlikujejo drug od drugega, se zlasti v zadnjih desetletjih, zaznamovanih z globalizacijo in homogenizacijo kulture in grajenega okolja, mnenja precej krešejo. Čeprav sta v prvi polovici 20. stoletja mednarodni slog in modernistična arhitektura pooseblja la močne silnice univerzalizacije in standardizacije, so se uveljavile tudi druge prakse, s katerimi so arhitekti poskušali upoštevati lokalne značilnosti. Danes je modernistična dediščina pogosto predmet polemik, zlasti z vidika trajnostnosti, pri tem pa je še vedno pomembno proučevati njeno vlogo pri oblikovanju sodobne identitete mest, zlasti na podlagi del pomembnih predstavnikov arhitekturne avantgarde. Navedeno je še posebej zanimivo na Zahodnem Balkanu, zlasti v glavnih mestih nekdanjih jugoslovanskih republik, na katera je vplivala burna zgodovina na stičišču kultur, dodatno pa sta jih preoblikovali skupna socialistična preteklost in tranzicija po razpadu socializma. Članek se osredotoča na Sarajevo in Ljubljano – obe mesti sta bili do leta 1941 del Kraljevine Jugoslavije, po koncu druge svetovne vojne pa sta bili del socialistične Jugoslavije.

Poudarek je na ključnih modernističnih arhitektih 20. stoletja, ki so s pristopi, ki upoštevajo lokalno okolje in njegove značilnosti, in razvojem prepoznavnih arhitekturnih izrazov pomembno prispevali k edinstvenima identitetama Sarajeva in Ljubljane. Primerjalna analiza del Jožeta Plečnika, Edvarda Ravnikarja, Juraja Neidhardta in Dušana Grabrijana je pokazala različne izraze urbanega modernizma, ki pa jim je skupno to, da upoštevajo značilnosti lokalnega okolja. Avtorji v članku najprej analizirajo, kako se lokalne značilnosti kažejo v delu posameznega arhitekta v njegovem mestnem, kulturnem in političnem okolju. Primerjajo njihove prispevke v obdobju oblikovanja identitet Sarajeva in Ljubljane, ki je sovpadalo z vzponom modernizma. Poleg tega proučujejo, kako se modernistična arhitekturna dediščina kaže v sodobnih urbanih zgodbah obeh mest. Članek poleg uvoda in sklepa vsebuje še tri glavne dele. Uvodu sledi analiza teoretičnega ozadja in ključnih pojmov, kot so podoba mesta, identiteta mesta, duh kraja, kritični regionalizem in kontekstualna arhitektura. V naslednjem poglavju so predstavljene raziskovalna metodologija in študiji primera Ljubljane in Sarajeva, s poudarkom na njunih identitetah v 20. stoletju, ki sta se razvijali z upoštevanjem lokalnih značilnosti. Na koncu so v rezultatih primerjalno predstavljeni prispevki omenjenih ključnih arhitektov in njihov današnji pomen.

2 Teoretično ozadje in ključni pojmi

V članku je identiteta mest obravnavana v povezavi s pojmom podobe mesta, ki ga je razvil Kevin Lynch. Podobo mesta po njegovem sestavljajo tri prvine: identiteta, struktura in pomen. »Da bo podoba učinkovala, je najprej potrebna identifikacija nekega objekta, ki omogoči, da ga razlikujemo od drugih in prepoznamo kot ločljivo entiteto /.../ Poleg tega mora podoba vključevati prostorski ali strukturni odnos objekta do opazovalca in do drugih objektov. Nazadnje pa mora objekt za opazovalca imeti tudi nek pomen, bodisi praktičen ali čustveno pogojen.« (Lynch, 2010: 28) Z drugimi besedami, arhitektura in predmeti imajo ključno vlogo pri oblikovanju narave mesta – ne izolirano, temveč v odnosu s širšim urbanim okoljem. Ne nazadnje na identiteto mest ne vplivajo samo materialne prvine, ampak tudi nesnovni dejavniki, kot so družbenokulturni in simbolni vidiki ter to, kako ljudje mesto dojemajo in doživljajo. Značilna narava mesta se oblikuje na presečišču njegove materialne oblike (okoljskega, urbanističnega in arhitekturnega okvira) ter njegovih družbenih, kulturnih in simbolnih pomenov. Identitet Sarajeva in Ljubljane ni mogoče proučevati ločeno od njunega celovitega zgodovinskega ozadja. Z osredotočanjem na modernistično dediščino so avtorji proučili samo eno izmed številnih plasti identitete mest. Dragoceno analitično orodje je tudi teorija fenomenologije prostora in kraja Christiana Norberga-Schulza in zlasti pojem duha kraja (*genius loci*), ki ga je uvedel. Trdil je, da je kraj prostor posebne narave, pripadati kraju pa pomeni imeti identiteto (Norberg-Schulz, 1980).

Kljub raznovrstnim izraznim oblikam se regionalizem večinoma razume kot teoretični okvir, ki nasprotuje vplivom globalizacije, univerzalizacije in standardizacije, ki pogosto krnijo lokalno identiteto in kulturno različnost. Mumford (1947) ga je opredelil bolj kot aktivni spopad z globalnim, ne kot obliko neposrednega upora. Štiri desetletja pozneje sta Tzonis in Lefaivre (1981) predstavila teorijo kritičnega regionalizma kot konceptualni pristop, ki spodbuja refleksivno ukvarjanje s tradicijo, identiteto in kontekstom ter poziva h kritičnemu samopremisleku v globalnem arhitekturnem diskurzu. Njuno teorijo je leta 1983 nadgradil Frampton (2007), ki navaja, da je namen kritičnega regionalizma oblikovati kulturno strategijo posredovanja med univerzalno civilizacijo in lokalno kulturo. Kritični regionalizem poleg tega spodbuja dialog med moderno tehnologijo in naravnim okoljem ter poudarja izkustvene in taktilne lastnosti arhitekture. Pomen značilnosti lokalnega okolja v arhitekturi in urbanizmu je bil zares prepoznan šele v zadnjih desetletjih 20. stoletja. V skladu s slavno izjavo Jacquesa Derridaja (1967), da zunaj besedila ni ničesar, pomena ni mogoče ločiti od konteksta. Navedeno stališče je postalo zlasti izrazito v postmodernističnem obdobju, ko so ga zagovarjali

arhitekti in teoretiki, kot so Aldo Rossi, Thomas L. Schumacher in Colin Rowe. Ti so trdili, da je treba arhitekturni predmet razumeti kot drobec večje urbane celote (Nesbitt, 1996).

Značilnosti lokalnega okolja je mogoče analizirati z materialnega (naravnega in grajenega) in nematerialnega (družbenega in kulturnega) vidika. V arhitekturi in urbanizmu se lahko kažejo neposredno ali implicitno (Zagora, 2012). Prispevek modernističnih arhitektov k identiteti mest ponazarjajo dela Antonija Gaudíja v Barceloni, Oscarja Niemeyerja v Brasílii, Otta Wagnerja na Dunaju in Alvara Aalta v Helsinkih. Njihova dela so nastala pred pojavom fenomena zvezdniških arhitektov, strategij znamčenja mest in komodifikacijo arhitekturnih znamenitosti (Zhukin, 1995). Pri proučevanju modernizma in oblikovanja identitete evropskih mest v prvi polovici 20. stoletja je ključno analizirati delo začetnikov mednarodnega sloga v arhitekturi, ki so v svojih stvaritvah pokazali prefinjeno razumevanje značilnosti lokalnega okolja. Le Corbusier (1930) je izpostavil temeljno povezavo med arhitekturo in urbanizmom: »Architecture en tout, urbanisme en tout /.../ Une cellule = un homme; des cellules = la ville« (Arhitektura v vsem, urbanizem v vsem /.../ Ena celica = en človek, več celic = mesto). Načrtovanje stavb in urejanje mest sta torej neločljivo povezana in ju lahko primerjamo s posamičnimi bivalnimi enotami, ki skupaj tvorijo skladno celoto. Čeprav se je Le Corbusier strinjal, da so tehnike, izzivi in rešitve postajali čedalje bolj globalizirani, je poudaril, da imajo lokalni dejavniki, kot so podnebje, geografske značilnosti, topografija in kulturna različnost, še vedno ključno vlogo pri oblikovalskih pristopih, ki upoštevajo značilnosti lokalnega okolja. Avtorji tako v članku proučujejo, kako sta pojma značilnosti lokalnega okolja in duha kraja, skupaj s pristopi kritičnega regionalizma – še preden so se ti formalno uveljavili – in filozofijo modernistične arhitekturne avantgarde, vplivala na delo izbranih balkanskih arhitektov v 20. stoletju.

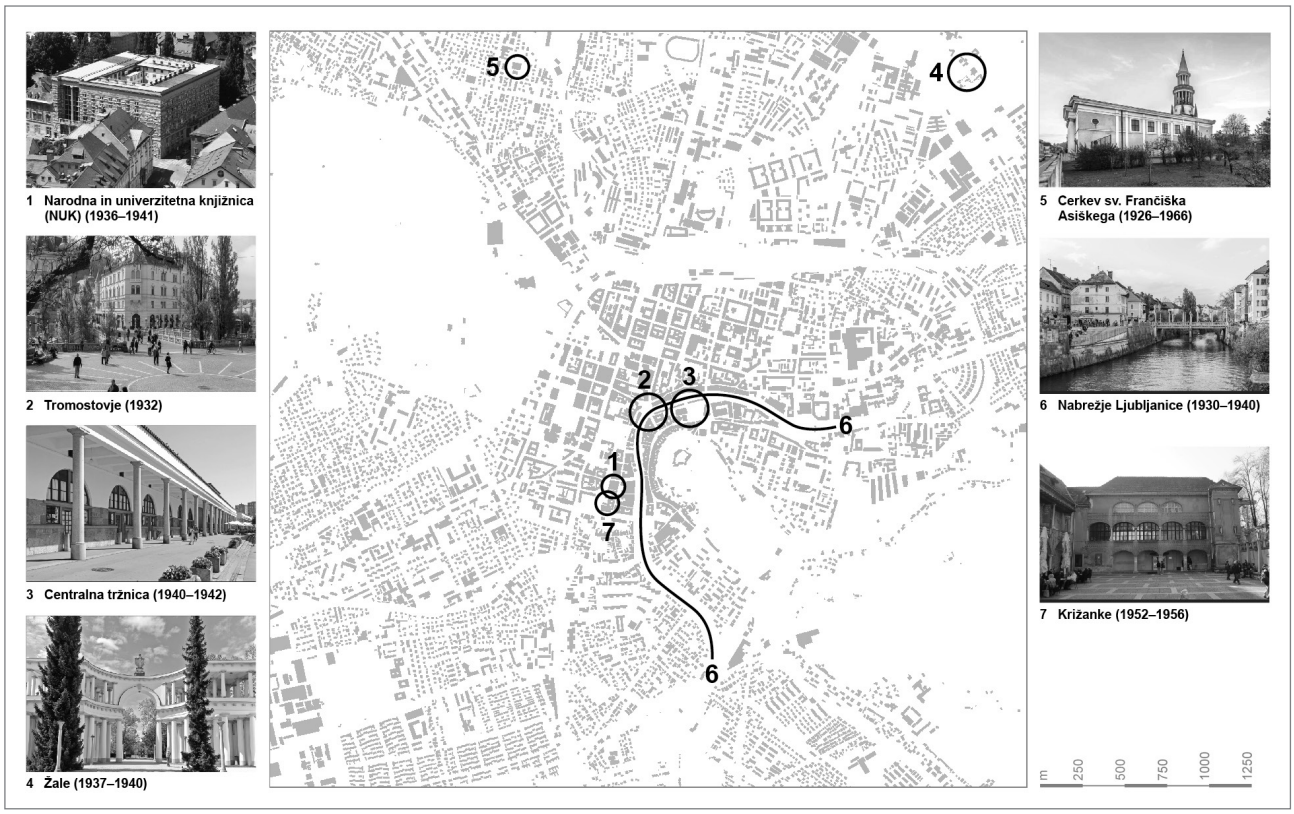
3 Gradivo in metode

Raziskovalna metodologija, uporabljena v tem prispevku, združuje historiografski pristop z vidikom značilnosti lokalnega okolja in interdisciplinarnim vidikom. Pregledu literature sledi zgodovinska analiza obeh mest. Ta je dopolnjena s študijami primera izbranih del ključnih arhitekturnih ustvarjalcev, tipološko analizo in kartiranjem, ki jih avtorji sklenejo s prekrivanjem podatkov in primerjalno analizo. Identiteti obeh mest obsegata vse zgodovinske plasti, razvidne iz njunih ulic, stavb in rečnih bregov, od rimskega do srednjeveškega obdobja, v Sarajevu pa so močne tudi sledi Osmanskega cesarstva. Obe mesti sta spadali pod Avstro-Ogrsko, nato h Kraljevini Jugoslaviji in nazadnje k Socialistični federativni republiki Jugoslaviji. Ljubljana se je razvijala kot srednjeevropska deželna prestolnica, Sarajevo pa pooseblja sobivanje orientalske in zahodne kulture. Mesti sta imeli in še vedno imata primerljivo velikost in število prebivalcev. Avtorji se v članku osredotočajo na to, kako je bil modernizem uveden v obeh mestih, kako se je razvijal v 20. stoletju ter katere intelektualne in strokovne izmenjave so vplivale na značilne pristope njunih ključnih modernističnih arhitektov, zlasti v kombinaciji z lokalnimi značilnostmi. Ti pristopi so imeli v vsakem mestu drugačne, a značilne izrazne oblike. Avtorji proučujejo, kako so se navedeni modernistični pristopi, ki so upoštevali značilnosti lokalnega okolja, pojavili in razvijali v Sarajevu in Ljubljani ter kateri so bili mednarodni modernistični arhitekti, ki so odločilno vplivali na arhitekturni razvoj izbranih mest.

Poleg drugih pomembnih avantgardnih predstavnikov mednarodnega arhitekturnega sloga je imel Le Corbusier, utemeljitelj evropskega modernizma v arhitekturi, osrednjo vlogo pri prenosu modernističnih arhitekturnih vplivov na Balkan, tudi v Sarajevo in Ljubljano. Razlog za to ni bil samo njegov mednarodni ugled, temveč tudi njegove posredne in neposredne povezave s takratnimi jugoslovanskimi arhitekti. Z vidika značilnosti lokalnega okolja in identitete kraja je ključno proučiti temelje, na katerih se je oblikovala identiteta obeh mest. V Ljubljani se je identiteta kraja oblikovala z navezovanjem na klasicizem, kar je razvidno zlasti iz del Jožeta Plečnika (Long, 2000), v Sarajevu pa je temeljila na tradiciji in regionalizmu, kar ponazarjajo dela Juraja Neidhardta (Idrizbegović-Zgonić in Džumhur, 2024). Za modernistični slog Ljubljane in Sarajeva so poskrbeli zlasti v tujini izobraženi arhitekti, ki so bili aktivno vključeni v mednarodne mreže izmenjave znanja, hkrati pa so navdih iskali v svojem lokalnem okolju. Navedena dvojnost kaže na ključno vlogo mednarodnih mrež pri širjenju modernističnih idej, hkrati pa poudarja trajni pomen arhitekturnega načrtovanja, ki upošteva lokalne značilnosti, pri oblikovanju identitete mest.

3.1 Ljubljana

Na arhitekturni in urbanistični razvoj Ljubljane v 20. stoletju sta močno vplivala Jože Plečnik (1872–1957) in Edvard Ravnikar (1907–1993), katerih oblikovalski in načrtovalski pristopi so izražali vizijo, osredotočeno na človeka, ki je izhajala iz kulturnih posebnosti, zgodovinske kontinuitete in prostorskega simbolizma. Plečnik je Ljubljano temeljito preoblikoval s pristopom, ki ga je UNESCO prepoznal kot edinstveni primer urbanističnega oblikovanja po meri človeka. Pri tem je identiteto mesta preoblikoval tako, da je svoja dela tankočutno vpel v njegov zgodovinski okvir (slika 1, preglednica 1). Imel je ključno vlogo pri oblikovanju kulturne in prostorske identitete Ljubljane, saj je s svojimi posegi mesto spremenil v simbolno prestolnico slovenskega naroda (Vodopivec in Žnidaršič, 2010). Njegov arhitekturni slog je temeljil na reinterpretaciji



Slika 1: Plečnikova najpomembnejša dela v središču Ljubljane, prikazana na zemljevidu (vir: avtorji; fotografije: Wikimedia Commons, Flickr Creative Commons in B. Zupančič)

klasičnih oblik, uporabi lokalnih materialov ter vključevanju simbolnih in duhovnih motivov, na podlagi česar je ustvaril edinstveno urbano identiteto v evropskem arhitekturnem okviru (Mihelič, 2012; Prelovšek, 1992). S preureditvijo ključnih javnih prostorov, kot so Tromostovje, Kongresni trg, Čevljarski most in nabrežja Ljubljanice, je oblikoval posebno urbano morfologijo, ki je presegala golo funkcionalnost ter v mestno tkivo vnesla simbolne in estetske razsežnosti. Njegova najpomembnejša dela, kot so Narodna in univerzitetna knjižnica, Žale, centralna tržnica in Križanke, so postala ikonične znamenitosti ter hkrati kraji narodne identitete in kolektivnega spomina, v katerih se kaže Plečnikovo dojemanje arhitekture kot kulturne pripovedi na eni strani in občanske zavesti na drugi. Njegova vizija Ljubljanice kot osrednje mestne osi se ohranja s sodobnimi prenovitvenimi projekti, ki dosegajo mednarodna priznanja, kot je evropska nagrada za javni prostor leta 2011. Kot predavatelj na nekdanji Tehniški fakulteti Univerze v Ljubljani je razvil pedagoški model, ki je odločilno vplival na več generacij slovenskih arhitektov ter v arhitekturno izobraževanje vpeljal umetniški in etični vidik ter vidik upoštevanja značilnosti lokalnega okolja (Mihelič, 2012; Vodopivec in Žnidaršič, 2010). S povezovanjem klasičnega arhitekturnega izrazoslovja s sodobnimi funkcionalnimi zahtevami ter njihovo utemeljitvijo v lokalnih kulturnih in simbolnih virih je Plečnikov arhitekturni jezik sinteza klasičnih in modernih prvin, ki Ljubljano umešča v evropski arhitekturni kanon (Zupančič, 2019).

Edvard Ravnikar, Plečnikov študent in ena osrednjih osebnosti povojne slovenske arhitekture, je od svojega mentorja prevzel občutljiv odnos do prostora, značilnosti lokalnega okolja in simbolizma, kar je pozneje na novo interpretiral z upoštevanjem arhitekturnega modernizma. Pod močnim vplivom Plečnikovega obrtniškega in na lokalne značilnosti vezanega pristopa je prevzel načela Le Corbusierjevega modernizma, racionalistična in funkcionalistična načela Bauhausa (zlasti Visoke šole za oblikovanje v Ulmu), regionalne arhitekturne tradicije ter nazadnje strukturalizma in metabolizma. Svoj arhitekturni izrazni slog je razvijal in preoblikoval celotno kariero. S celostnim in sistematičnim pristopom k urbanističnemu načrtovanju je postavil konceptualne temelje povojnega prostorskega razvoja Ljubljane in uvedel prostorski pristop, s katerim je mednarodna modernistična načela prepletel z lokalnimi kulturnimi in zgodovinskimi značilnostmi (Mihelič in Kerbler, 2024). Ravnikarjeva urbanistična vizija je temeljila na odprtem, policentričnem modelu mesta, ki je spodbujal ravnovesje med zgodovinskimi objekti in sodobnimi posegi, s čimer je na novo opredelil upravno in simbolno središče Ljubljane (slika 2, preglednica 2). Primer navedenega pristopa je njegova ureditev Trga republike, monumentalnega javnega prostora,

Preglednica 1: Ključni Plečnikovi projekti in njihov vpliv na identiteto Ljubljane

Leto	Projekt	Glavne arhitekturne značilnosti	Vpliv
1936–1941	Narodna in univerzitetna knjižnica (NUK): monumentalna knjižnica s fasado iz opeke in kamna, objekt s simbolno vrednostjo	Ikonični simbol slovenske kulture, šolstva in narodne identitete	Kot kulturni spomenik državnega pomena od leta 2009 je NUK dobro ohranjen in še vedno v aktivni javni in akademski rabi, še naprej sooblikuje podobo mesta in je referenčni model vključevanja dediščine v sodobno mestno življenje.
1932	Tromostovje: edinstveni kompleks treh med seboj povezanih mostov za pešce, ki poteka čez Ljubljanico in povezuje srednjeveško mestno jedro s sodobnim mestom	Ikonična mestna znamenitost, ki povezuje staro in novo	Tromostovje je v celoti ohranjeno in zaščiteno kot kulturni spomenik državnega pomena. Ostaja živahno središče za pešce, njegova edinstvena zasnova pa še naprej določa identiteto in mednarodno podobo mesta.
1940–1942	Centralna tržnica: pokrita tržnica s kolonadama ob reki	Povezava med mestnim življenjem in arhitekturo	Centralna tržnica je v celoti ohranjena in zaščitena kot kulturni spomenik državnega pomena. Ostaja glavna mestna tržnica in živahno družabno središče ter še naprej določa identiteto Ljubljane kot odprtega, živahnega mesta po meri človeka.
1937–1940	Žale: pokopališki kompleks, zasnovan kot mesto mrtvih, z monumentalnim vhodom, kapelami in simbolno krajinsko ureditvijo	Humanizacija smrti in spoštovanje tradicije, prostor kolektivnega spomina	Žale so v celoti ohranjene in zaščitene kot kulturni spomenik državnega pomena. Še naprej določajo identiteto mesta kot prostora spoštovanja, vključevanja in arhitekturne odličnosti.
1926–1966	Cerkev sv. Frančiška Asiškega: modernistična cerkev z opečnatimi stebri in značilnim zvonikom	Prepoznavni prostorski poudarek, referenčni primer sodobne sakralne arhitekture	Cerkev je v celoti ohranjena in zaščitena kot kulturni spomenik državnega pomena. Ostaja aktivno župnijsko središče in prepoznavna znamenitost v Šiški, ki krepi lokalno identiteto in je referenčni primer sodobne sakralne arhitekture v Ljubljani.
1930–1940	Nabrežja Ljubljanice: urbanistična ureditev bregov, sprehajališč, teras in drevoredov	Preureditev rečnih bregov v osrednjo mestno os ter živahen in zelen javni prostor	Nabrežja so dobro ohranjena in zaščitena kot kulturni spomenik državnega pomena. Tvorijo osrednji del ljubljanskega javnega prostora ter ostajajo ključni del mesta za družabno življenje, prireditve in turizem.
1952–1956	Križanke: preureditev nekdanjega samostana v poletno gledališče	Pomembno prizorišče za kulturne prireditve, ki krepi identiteto Ljubljane kot festivalskega mesta.	Križanke so v celoti ohranjene in zaščitene kot kulturni spomenik državnega pomena in glavno ljubljansko prizorišče za kulturne prireditve na prostem. Plečnik je s preureditvijo nekdanjega samostana v poletno gledališče ustvaril edinstveni javni prostor za festivale in druge javne prireditve.

Vir: avtorji

namenjenega demokratičnim in državotvornim funkcijam, s katerim je preoblikoval mestno središče (Mihelič in Kerbler, 2024). Prostorsko kompozicijo trga, ki temelji na dveh stolpnicah in osrednji ploščadi, si je zamislil kot sodobno agoro, ki združuje simbolno, funkcionalno in estetsko razsežnost. Z arhitekturnimi deli, kot so Cankarjev dom, Moderna galerija in Trg republike, je združil funkcionalistična oblikovalska načela in simbolno prostorskost, pri čemer je posebno pozornost namenil vlogi javnega prostora pri oblikovanju urbane izkušnje. Da bi se izognil prevladi arhitekture nad prostorom, je nove objekte v mestno tkivo vključil prefinjeno in natančno, kar dokazuje njegovo tankočutno razumevanje zgodovinskih plasti in topografije. Kot pedagog in eden izmed utemeljiteljev ljubljanske šole arhitekture je institucionaliziral diskurz sodobne arhitekture v Sloveniji, ki je poudarjal intelektualno odgovornost, interdisciplinarnost in neprekinjeno povezavo s tradicijo (Vodopivec in Žnidaršič, 2010).

3.2 Sarajevo

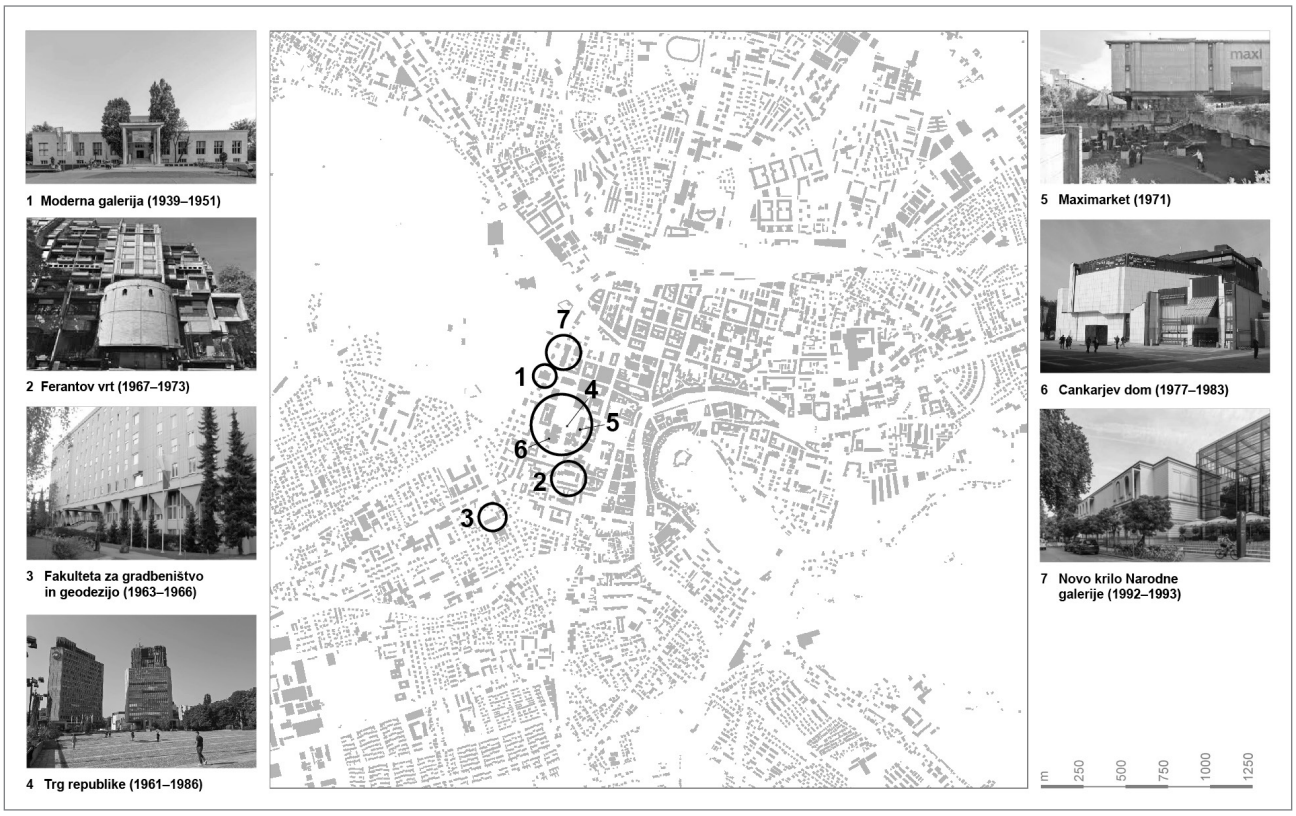
Za mestno tkivo Sarajeva je značilna dinamična (in ponekod dvoumna) povezava med tradicionalno in zgodovinsko arhitekturo na eni strani ter modernistično in sodobno arhitekturo na drugi. Arhitekturna dediščina mesta, ki sega od osmanskega prek avstro-ogrskega obdobja, obdobja Kraljevine Jugoslavije in socialistične Jugoslavije do danes, je podobna večplastni strukturi, ki se je razvila v zanimivo in edinstveno urbano okolje. S tega vidika je zlasti zanimivo raziskati začetke arhitekturnega modernizma v Sarajevu v dvajsetih letih 20. stoletja, ko so se prve generacije arhitektov, izšolanih v evropskih akademskih središčih, vračale v mesto. Med prvimi predstavniki arhitekturne avantgarde so bili diplomanti praške Fakultete za arhitekturo, med njimi Dušan Smiljanić, Helen Baldasar, brata Reuf, Muhamed Kadić, Emanuel Šamanek, Leon Kabiljo in Jahiel Finci, pozneje pa tudi diplomanti dunajske Fakultete

Preglednica 2: Ključni Ravnikarjevi projekti in njihov vpliv na identiteto Ljubljane

Leto	Projekt	Glavne arhitekturne značilnosti	Vpliv
1939–1951	Moderna galerija: prva namensko zgrajena galerija moderne umetnosti v Sloveniji z modernistično fasado iz kamna in inovativno razsvetljavo	Postavila je nacionalni standard za galerijsko in muzejsko arhitekturo, okrepila je kulturno vlogo Ljubljane.	Galerija je od leta 1993 zaščitena kot arhitekturni spomenik in je po celoviti prenovi v letih 2008 in 2009, pri kateri je bila upoštevana Ravnikarjeva izvirna zasnova, dobro ohranjena. Danes je referenčni primer muzejske arhitekture in njene vključenosti v mestno tkivo.
1960–1986	Vizija urbanistične ureditve ljubljanskega mestnega središča: povojna vizija ureditve novega mestnega središča, ki jo je udejanjil z ureditvijo Trga republike, monumentalnega javnega prostora	Sodobno mestno središče, simbol državnosti, osrednji prostor javnega življenja.	Območje je zaščiteno kot kulturni spomenik državnega pomena. Ostaja osrednji prostor javnega življenja, prireditev in zborovanj ter še naprej oblikuje sodobno podobo Ljubljane. Je referenčni model trajnostne urbane prenove.
1967–1973	Ferantov vrt: stanovanjsko-poslovni kompleks, izrazit primer modernistične arhitekture	Model stanovanjske gradnje, ki podpira sodobni mestni življenjski slog, odprtost in metropolitanskost.	Kompleks je dobro ohranjen in še vedno namenjen stanovanjski rabi. Z mešano rabo in prepoznavno arhitekturo prispeva k metropolitanskosti ljubljanskega mestnega središča. Še naprej določa identiteto mesta kot odprtega, raznovrstnega in odpornega urbanega okolja.
1963–1966	Fakulteta za gradbeništvo in geodezijo: univerzitetna stavba z inovativno konstrukcijo in jasno, funkcionalno ureditvijo prostorov	Krepi identiteto univerzitetnega območja, vključuje modernistična arhitekturna in urbanistična načela.	Fakulteta ostaja v aktivni akademski rabi, njena prisotnost krepi identiteto univerzitetnega območja in je primer vključitve modernističnih arhitekturnih in urbanističnih načel v mestno tkivo Ljubljane.
1961–1986	Trg republike: glavni javni trg z monumentalnima stolpnicama, blagovnico Maximarket in Cankarjevim domom	Simbol samostojnosti in sodobne identitete, prizorišče javnega življenja.	Trg republike je zaščiten kot kulturni spomenik državnega pomena in ostaja osrednji javni prostor Ljubljane. Njegova prostorska in simbolna vloga še naprej oblikuje sodobno podobo in kolektivni spomin mesta.
1971	Maximarket: sodobna blagovnica, ki se odpira na ploščad, z živahno trgovsko dejavnostjo	Podpira večnamenskost in dostopnost mestnega središča ter vsakdanje življenje v mestu.	Blagovnica (danes znana pod imenom Maxi) ostaja aktivno nakupovalno in družabno središče na Trgu republike in je del zaščitenega spomeniškega območja. Njena zasnova krepi večnamensko naravo. Trga republike in njegovo vlogo živahnega mestnega jedra po meri človeka.
1977–1983	Cankarjev dom: glavni slovenski kulturni in kongresni center	Zasnovan je kot večnamenski kompleks z velikimi podzemnimi dvoranami, monumentalnim vhodom in modernistično fasado iz kamna.	Cankarjev dom je zaščiten kot del spomeniškega območja Trga republike in ostaja osrednje prizorišče kulturnih prireditev, kongresov in državnih slovesnosti. Stavba je dobro vzdrževana in krepi status Ljubljane kot kulturne prestolnice. Je simbol nacionalne kulture in javnega življenja.
1992–1993	Novo krilo Narodne galerije: sodobno razstavno krilo, povezano s staro stavbo galerije	Krepi vlogo Narodne galerije, povezuje tradicijo in sodobno umetnost.	Novo krilo, dokončano leta 1993, je funkcionalno in vizualno povezano s staro galerijo ter zaščiteno kot del državne kulturne dediščine. Krepi vlogo Narodne galerije kot osrednje kulturne ustanove in prispeva k identiteti Ljubljane kot mesta, ki ceni tako dediščino kot sodobno umetnost.

Vir: avtorji

za arhitekturo, kot sta Mate Baylon in Juraj Neidhardt (Čelić, 1988). Velik del arhitekturnih stvaritev v Sarajevu v dvajsetih in tridesetih letih prejšnjega stoletja so sestavljali predvsem posamezni posegi, kot so dopolnilne zazidave v avstro-ogrskih zaprtih urbanih blokih ali rekonstrukcije objektov. Med stavbnimi tipi so prevladovali šole, vile, banke, hranilnice in javne ustanove ter stanovanjsko-poslovni objekti in najemniški stanovanjski bloki. Prihod številnih arhitektov, ki so zagovarjali čiste in izčiščene volumne, je v Sarajevo postopno vpeljal mednarodne vplive modernistične arhitekture. Sčasoma sta se iz del prve generacije modernistov v Sarajevu oblikovali dve smeri: prva je bila strogo funkcionalistična, dosledno zavezana modernističnim načelom in večinoma neobčutljiva za lokalne značilnosti, druga pa je upoštevala lokalne značilnosti, pri



Slika 2: Ravnikarjeva najpomembnejša dela v središču Ljubljane (vir: avtorji; fotografije: Wikimedia Commons, Flickr Creative Commons in B. Zupančič)

čemer se je arhitekt odzival na lokalno urbano, kulturno in politično okolje (Kahrović Handžić, 2023).

Predstavnika druge smeri sta bila arhitekta Dušan Grabrijan in Juraj Neidhardt, ki sta prepoznala združljivost tradicionalne bosanske hiše in lokalnih značilnosti z univerzalnimi načeli modernistične arhitekture. Navedeno sta utemeljila tako teoretično kot v praksi. Oba sta v Sarajevo prišla iz drugih delov Jugoslavije ter v stroki prispevala mednarodno znanje in profesionalne izkušnje. Grabrijan je bil znan po izobrazbi s področja teorije in zgodovine arhitekture, ki jo je pridobil v Ljubljani in Parizu, Neidhardt pa je modernistični vidik obogatil z izkušnjami iz Zagreba, Berlina in Pariza ter z upoštevanjem lokalne, predvsem ljudske stavbne tradicije. Njuno delo je eden najzgodnejših primerov kritičnega regionalizma – približno štiri desetletja, preden so ga teoretično utemeljili Tzonis in Lefaivre (1981) ter Frampton (1983). Iz obsežne korespondence med arhitektoma se je razvilo tesno prijateljstvo, hkrati pa sta z njo postavila teoretične temelje arhitekturnega pristopa, ki upošteva lokalne značilnosti.

Slovenski arhitekt, urbanist in arhitekturni teoretik Dušan Grabrijan (1899–1952) je močno vplival na razvoj arhitekturne misli v Bosni in Hercegovini v prvi polovici 20. stoletja. Študiral je v Ljubljani in Parizu, kjer se je seznanil z modernističnimi idejami in Le Corbusierjevim delom (Čelić, 1970). Čeprav je izhajal iz srednjeevropskega kulturnega okolja, je večji del svoje poklicne kariere in teoretičnih razmislekov posvetil Sarajevu, kjer je poučeval na srednji tehnični šoli (Abadžić-Hodžić, 2021). Prepoznaven je bil zlasti kot zagovornik zamisli, da arhitektura uteleša duh kraja – njegove kulturne, zgodovinske in funkcionalne značilnosti. Grabrijanovo metodološko izhodišče je bila analiza živete izkušnje in otipljive stvarnosti mestnega okolja. S tem pristopom je oblikoval formalne in prostorske strategije, ki temeljijo na arhitekturnih posegih, prilagojenih zadevnemu kraju, s čimer vzpostavljajo ravnovesje med preteklostjo in sedanjostjo pri oblikovanju mest. Njegovi teoretični razmisleki o pomenu lokalne tradicije pri oblikovanju sodobnega arhitekturnega izraza so se udejanjili v sodelovanju z Neidhardtom, s katerim je delil vizijo o arhitekturi, ki presega golo funkcionalnost in postane nosilka kulturne identitete. Grabrijan in Neidhardt sta verjela, da je orientalska hiša osnova za tip modernistične arhitekture, kakršno je razvijal Le Corbusier, s čimer sta povezala ljudsko tradicijo z avantgardnimi oblikovalskimi načeli.

Grabrijan in Neidhardt sta se spoznala v Mariboru med služenjem vojaškega roka. Medtem ko je Grabrijan bival v Sarajevu, kjer je leta 1930 začel poučevati na srednji tehnični šoli, Neidhardt pa je delal v Le Corbusierjevem ateljeju v Parizu, sta si redno dopisovala (Zupančič, 2024). Njuna skupna idejna izhodišča so dosegla vrhunec v knjigi *Arhitektura Bosne i put*

Preglednica 3: Ključna Grabrijanova dela in njihov vpliv na identiteto Sarajeva

Leto	Delo	Glavne značilnosti	Vpliv
1942	*Sarajevo i njegovi trabanti: Arhitektonsko-urbanistička razmatranja uoči nacrta za regulacije grada Sarajeva* (Sarajevo in njegova predmestja: arhitekturni in urbanistični premisleki pred pripravo regulacijskega načrta Sarajeva): urbanistična študija, ki jo je napisal skupaj z Neidhardtom ter se osredotoča na povezavo med Sarajevom in manjšimi okoliškimi naselji.	Publikacija združuje teorijo z urbanističnimi idejnimi rešitvami, je pomembna podlaga za razumevanje sarajevske kulturne dediščine, pri čemer zagovarja modernistični pristop k urbanizaciji.	Čeprav so bila nekatera Grabrijanova teoretična dela objavljena šele po njegovi smrti, so njegovi teoretični razmisleki vplivali na sodobne raziskave arhitekturnih šol po nekdanji Jugoslaviji prek publikacij in razstav. Knjiga *Arhitektura Bosne i put u suvremeno* je postala mednarodno prepoznavna v okviru razstave *Toward a Concrete Utopia: Architecture in Yugoslavia 1948–1980*, ki je bila v letih 2018 in 2019 na ogled v Muzeju moderne umetnosti (MoMA) v New Yorku.
1957	*Arhitektura Bosne i put u suvremeno*: teoretično delo, ki ga je napisal skupaj z Neidhardtom in v katerem zagovarja dialog med tradicionalno in modernistično arhitekturo.	Temeljno delo, ki združuje znanstveno raziskavo z vizionarskim manifestom urbanističnega razvoja Sarajeva.	
1984	*Bosanska orijentalna arhitektura u Sarajevu* (Bosanska orientalska arhitektura v Sarajevu): urbanistična študija bosanske muslimanske ljudske kulture in načina življenja, ki je bila v štiridesetih letih 20. stoletja sprva objavljena v obliki člankov, nato pa je bila posthumno izdana še v knjigi.	Pionirsko znanstveno delo, ki se osredotoča na povezavo med družbenokulturnimi vzorci orientalskega življenjskega sloga ter prostorskimi in estetskimi značilnostmi tradicionalne stanovanjske arhitekture v Sarajevu.	

Vir: avtorji

u suvremeno (Arhitektura Bosne in pot v sodobnost) (Neidhardt in Grabrijan, 1957), v kateri sta predstavila oblikovalska načela, ki so temeljila na upoštevanju lokalnih značilnosti. Z reinterpretacijo tradicionalne arhitekture sta v lokalnem okolju oblikovala modernistični arhitekturni slog, ki je temeljil na kritični sintezi zgodovinskih vzorcev. Grabrijan je poskušal premišljeno slediti načelom modernistične arhitekture, zametke česar je prepoznaval že v osmanski arhitekturi, pri čemer jih je prilagodil posebnostim Bosne (Korolija, 2024). Obsežno gradivo, sestavljeno iz več kot 15.000 enot, ki ga je ustvaril v več kot tridesetletni karieri, hrani Muzej za arhitekturo in oblikovanje v Ljubljani (Zupančič, 2024), iz tega gradiva pa sta razvidni izjemna globina in metodološka strogost njegovega znanstvenega dela. Njegova dela dajejo pomemben vpogled v njegovo poglobljeno proučevanje bosanske ljudske arhitekture (preglednica 3).

Juraj Neidhart (1901–1979) je bil začetnik arhitekturnega modernizma v Bosni in Hercegovini, znan po dosmrtnem zagovarjanju globoke povezanosti z lokalno kulturno in arhitekturno dediščino. Njegova vizija modernistične arhitekture je temeljila na prostorski, materialni in simbolni logiki tradicionalne lokalne arhitekture, katere vrednote je prepoznal, analiziral in reinterpretiral z načeli modernizma. Njegov najpomembnejši prispevek je v prenosu modernističnih načel v kulturno okolje Sarajeva. Med letoma 1933 in 1935 je delal v Le Corbusierjevem ateljeju skupaj s sedemnajstimi drugimi jugoslovanskimi arhitekti (Zupančič, 2017). Med njimi jih je bilo deset iz Slovenije, vključno z Ravnikarjem, ki se je Plečnikovemu ateljeju pridružil leta 1939. Neidhardt in Ravnikar se v ateljeju nikoli nista srečala, oba pa sta bila sprejeta v Jugoslovansko akademijo znanosti in umetnosti v Zagrebu. Še en Plečnikov študent, ki je nekaj časa preživel v Parizu, čeprav ni delal v Le Corbusierjevem ateljeju, je bil Grabrijan. Med bivanjem v Sarajevu si je dopisoval z Neidhardtom, pri čemer sta se osredotočala na bosansko orientalsko arhitekturo in izzive, povezane z njenim vključevanjem v modernistični slog (Grabrijan, 1984). Leta 1936 se je Neidhardt obrnil na Grabrijana s prošnjo, naj pripravi njegovo prvo samostojno razstavo v Jugoslaviji. Ta je bila istega leta postavljena v sarajevski mestni hiši (Karlić Kapetanović, 1990). Leta 1938 se je Neidhardt na Grabrijanovo prigovarjanje preselil v Sarajevo, kjer je sprejel nov poklicni izziv (Karlić Kapetanović, 1990). Grabrijan se je leta 1939 o tekočih projektih dopisoval tudi z Ravnikarjem, ko je ta delal v Le Corbusierjevem ateljeju v Parizu (Zupančič, 2017).

Med Neidhardtovimi projekti izstopajo zlasti urbanistične idejne rešitve, s katerimi je zmagoval na natečajih in v katerih je predstavil svojo vizijo razvoja povojnega Sarajeva kot glavnega mesta Bosne in Hercegovine. Najbolj znan je po natečajni rešitvi za sosesko Marijin dvor iz leta 1955, s katero je nadaljeval vizijo, ki jo je prvič predstavil leta 1936 v natečajnem projektu za novo železniško postajo, ki naj bi zapolnila vrzel v sarajevskem mestnem tkivu. Z vidika razvojne osi mesta v smeri vzhod–zahod (Žuljić idr., 2015) je Marijin dvor (tudi *Marindvor*) prepoznal kot povezavo med starim mestnim jedrom na vzhodu in načrtovanimi novimi soseskami na zahodu. Pri

Slika 3: Neidhardtova najpomembnejša dela v središču Sarajeva (vir: avtorji; fotografije: Wikimedia Commons, Flickr Creative Commons in museuminexile.com/index.php/neidhardt)

tem jo je na novo opredelil kot protiutež kulturnemu žarišču republike, utelešenemu v sarajevskem starem mestnem jedru (Baščaršiji), ki bo postala upravno, politično, družbeno in kulturno središče mesta ter prizorišče vseh družbenih dogodkov (Neidhardt in Čelić, 1956: 95–96). Leta 1976 so razpisali nov natečaj, tokrat samo za stavbo narodne skupščine, Neidhardt je na njem zmagal (to je bil njegov zadnji natečaj pred smrtjo leta 1979), gradnja poslopja pa je bila dokončana leta 1982. Del idejnega projekta za Marijin dvor iz leta 1955 je bila tudi zasnova nove Filozofske fakultete, zgrajene leta 1959, v bližini je bila leta 1970 po njegovih načrtih zgrajena tudi Fakulteta za naravoslovje in matematiko (slika 3).

K urbanistični kontinuiteti območja med Marijinim dvorom in Baščaršijo prispevajo tudi druga pomembna Neidhardtova dela. Med njimi je stanovanjski kompleks na Alipašini ulici – urbanistični prototip širšega predloga prenove, katerega cilj je bila širitev mesta vzdolž ulice proti severu. Drug tak projekt je bil skavtski dom v soseski Mejtaš, ki se dviga nad središčem Sarajeva, na prehodnem območju med stanovanjskimi bloki iz avstro-ogrskega časa in osmanskimi soseskami (mahalami). Neidhardt ga je zasnoval kot sodobno interpretacijo prepleta volumnov in kompozicije, za kar je našel navdih v tradicionalnih orientalskih bosanskih hišah (preglednica 4).

Čeprav sta Grabrijan in Neidhardt prihajala iz tujih kulturnih okolij, je njun prispevek k oblikovanju podobe Sarajeva razviden v tem, da sta univerzalne vrednote materialnih in nematerialnih plasti sarajevskih lokalnih značilnosti na novo premislila in jih prevedla v sodoben arhitekturni izraz. Svoje skupno teoretično delo sta prenašala naprej v pedagoški dejavnosti, saj sta oba poučevala v Sarajevu, Neidhardt pa ga je dodatno nadgrajeval s številnimi izvedenimi in neizvedenimi projekti.

Knjiga *Arhitektura Bosne i put u suvremeno* (Neidhardt in Grabrijan, 1957) je pomemben teoretični dosežek. V njej je predstavljena pot k sodobni arhitekturi, ki ne zavrača tradicije, temveč jo sprejema kot temelj nove, avtentične sodobnosti. Univerzalno sporočilo, ki ga delo prenaša, dodatno utrjujejo naslednje Neidhardtove besede:

Skrbi me, da smo večinoma izgubili svojo arhitekturno individualnost, ki je bila nekoč tako močno izrazita na Balkanskem polotoku. To še zlasti opazijo tujci. Odtujenost in monotonija postopno nadomeščata prave arhitekturne vrednote. Fiziognomija, ki je izhajala iz enotne prostorske ideje, igrivost lokalne arhitekture, dualizem kocke in vogala itd., se ne smejo izgubiti niti v sodobnem času. Zato ne smemo vleči tako ostrih mej med preteklostjo in sedanjostjo v duhovnem prostoru arhitekture,

Preglednica 4: Ključni Neidhartovi projekti in njihov vpliv na identiteto Sarajeva

Leto	Projekt	Glavne arhitekturne značilnosti	Vpliv
1947–1958	Stanovanjski kompleks na Alipašini ulici: stanovanjske stavbe, umeščene poševno na teren in povezane z zelenimi površinami.	Nov modela bivanja v mestnem središču, skupaj z uvedbo modernističnega mestnega tkiva	Od leta 2022 razglašen za državni spomenik, a potreben celovite prenove. Čeprav so bile s posamičnimi obnovitvenimi deli spremenjene fasade, se vpliv kompleksa na lokalno okolje ni spremenil, saj ostaja prepoznaven prostorski poudarek.
1952	Skavtski dom v soseski Mejtaš: večnamenski tridelni objekt (kino, upravni del in restavracija), prepoznaven po betonski strehi v obliki hiperboličnega paraboloida.	Interpretacija tradicionalne arhitekture v modernističnem arhitekturnem slogu, ki ustvarja izviren arhitekturni izraz.	Stavba se od približno leta 2000 uporablja kot osnovna šola, izvedena so bila samo posamična delna obnovitvena dela. Zaradi neurejenega pravnega statusa ostaja prihodnost stavbe negotova.
1955–1959	Filozofska fakulteta: javna izobraževalna ustanova z modernistično zasnovo, prilagojeno lokalnemu okolju.	Primer modernistične arhitekture, ki vključuje elemente tradicionalne arhitekture in je tesno povezana z zelenimi površinami.	Stavba je bila po vojni obnovljena in še naprej opravlja prvotno izobraževalno funkcijo. Njena zunanjost in notranjost sta dobro ohranjeni, objekt pa ostaja lep primer modernistične arhitekture.
1970	Fakulteta za naravoslovje in matematiko: javna izobraževalna ustanova z modernistično zasnovo, prepoznavni prostorski poudarek v zahodnem delu Sarajeva.	Modernistična stavba v Sarajevu, ki vključuje tradicionalne elemente, odlikuje jo edinstvena oblika in je prepoznavna orientacijska točka.	Po povojni obnovi je stavba ohranila prvotno funkcijo, z namestitvijo reklamnega napisa na njen stolp pa se je spremenila njena prvotna podoba. Poleg tega pred kratkim predlagani novi regulacijski načrt predvideva zazidavo odprtih javnih površin v sklopu fakultete.
1979–1982	Narodna skupščina: ključna javna ustanova in modernistična znamenitost v upravnem središču Sarajeva.	Ikonična mestna znamenitost, izrazit primer modernistične arhitekture.	Stavba ohranja prvotno funkcijo in je bila do leta 2009 celovito obnovljena, čeprav ne povsem avtentično. Danes je skupaj s trgom ključna mestna znamenitost in prepoznavni element sodobne podobe Sarajeva. Leta 2022 je bil vložen predlog za razglasitev objekta za državni spomenik.

Vir: avtorji

da ne bi končali kot popotnik, ki med prečkanjem Atlantika išče ekvator. (Karlić Kapetanović, 1990)

Grabrijanovo in Neidhardtovo teoretično delo ostaja izjemno vplivno in aktualno, ne samo v Bosni in Hercegovini ter širši regiji, temveč tudi mednarodno, kar potrjuje tudi dejstvo, da mu velik pomen priznavajo ustanove in organizacije, kot sta newyorški Muzej moderne umetnosti in Docomomo. Neidhardtova grajena dela v Sarajevu so v glavnem povezana z območjem Marijinega dvora. Njegovi izvirni urbanistični načrti niso bili nikoli v celoti izvedeni, zaradi vojne in povojne obnove pa je bila razprava o prihodnosti območja še dodatno odložena. Prostorski razvoj soseske še danes občasno ogrožajo novogradnje in predlogi regulacijskih načrtov, ki so pogosto predmet sporov in na koncu niso sprejeti. Univerzitetni stavbi in narodna skupščina v Marijinem dvoru večinoma ohranjajo prvotno zasnovo ter kljub političnim in družbenim spremembam ostajajo pomembne mestne znamenitosti. Zlasti ranljiv je modernistični stanovanjski kompleks na Alipašini ulici, čeprav je bil razglašen za državni spomenik, saj sta njegova prenova in vzdrževanje v celoti prepuščena stanovalcem. Navedeno poudarja pomen strateškega pristopa k aktivnemu varovanju modernistične dediščine, ki bi morala biti referenčna točka za razvoj mestnega tkiva.

4 Rezultati

Avtorji so na podlagi primerjave Ljubljane in Sarajeva analizirali prispevke ključnih arhitektov k oblikovanju identitete obeh mest med njunim razvojem in modernizacijo v 20. stoletju. Primerjava je umeščena v okvir Lynchevega koncepta podobe mesta, s poudarkom na identiteti, strukturi in pomenu. Analiza je potekala v treh fazah: avtorji so najprej proučili delo vsakega arhitekta posebej, nato so primerjali po dva izbrana arhitekta iz vsakega mesta, na koncu pa so analizirali vse štiri skupaj z vidika njihovega vpliva na mestno okolje, v katerem so delovali (preglednica 5, slika 4). Vsi štirje obravnavani arhitekti so se šolali in delovali v tujini. Plečnik je študiral in se izpopolnjeval na Dunaju in v Pragi, Ravnikar v Parizu in Helsinkih, Grabrijan v Ljubljani in Parizu, Neidhardt pa v Berlinu, Parizu in Zagrebu. Namesto da bi prevzeli pristop tabule rase,

Preglednica 5: Primerjava arhitekture in identitete Ljubljane in Sarajeva

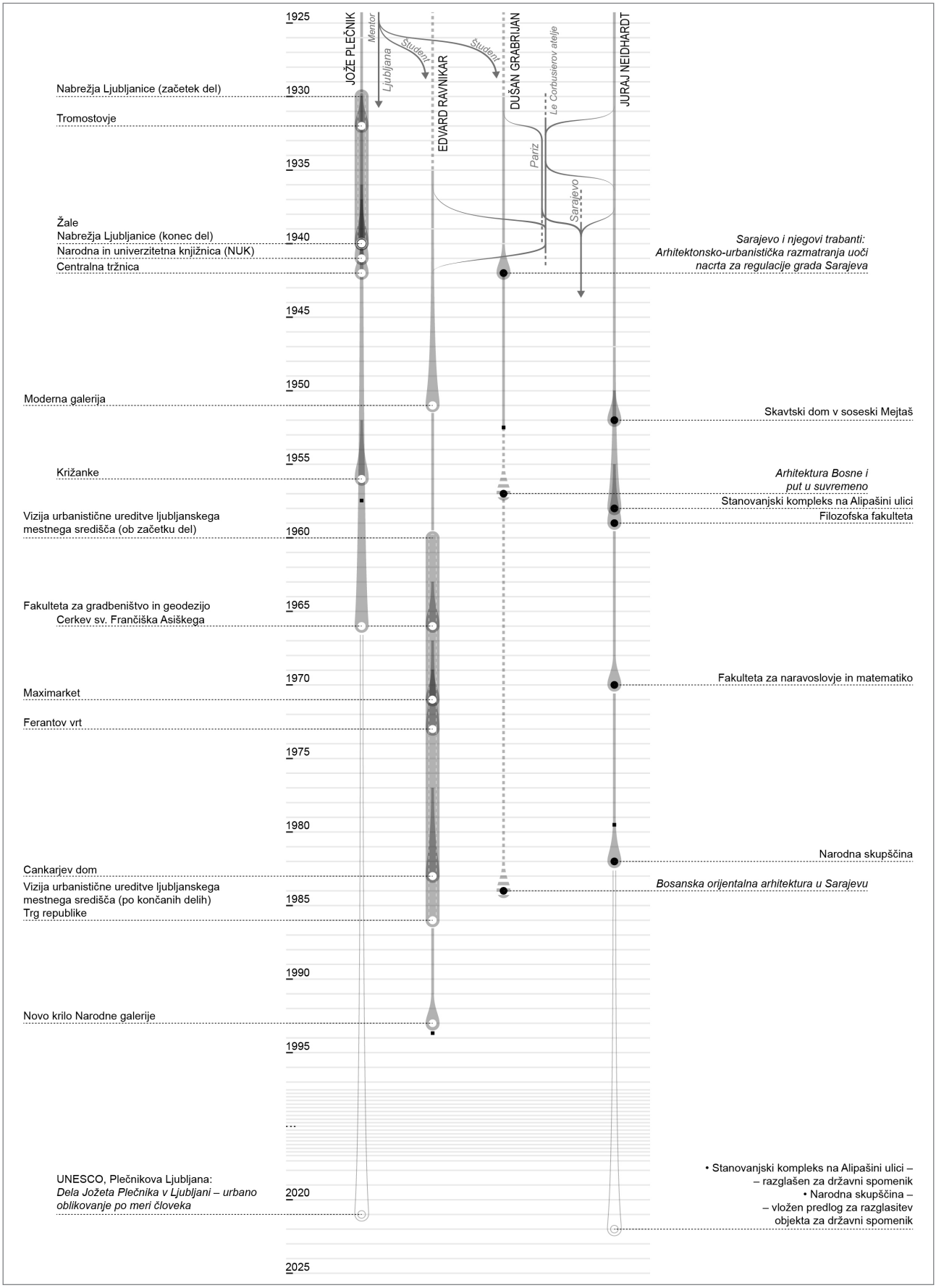
Arhitekt	Vpliv na obliko mesta	Prispevek k identiteti mesta	Pomen
Jože Plečnik, arhitekt in predavatelj v Pragi in Ljubljani, med študijem na Dunaju sta nanj vplivala teorija Gottfrieda Semperja in Otto Wagner.	Ljubljansko mestno središče je preuredil v simbolni slovesni prostor, poudarek je na aksialnosti, monumentalnosti in simbolizmu.	Ustvaril je poseben arhitekturni slog, ki je postal sinonim za identiteto Ljubljane.	Plečnikova dela so referenčni model vključevanja dediščine v sodobno mestno življenje, navdihujejo trajnostno prenovo mest po meri človeka.
Edvard Ravnikar, arhitekt in predavatelj v Ljubljani, Plečnikov študent, ključna osebnost povojnega slovenskega modernizma.	Uvedel je modernistično členitev prostora in prostorsko odprtost, poudarek je na pomenu javnih trgov in vključevanju javnih funkcij.	Opredelil je socialistično identiteto Ljubljane kot sodobne, napredne prestolnice, ob hkratnem upoštevanju njenih zgodovinskih plasti.	Ravnikarjevi javni prostori ostajajo živi, njegov pristop k oblikovanju javnih prostorov in načrtovanju mešane rabe prostora postaja v sodobnem urbanizmu čedalje pomembnejši.
Dušan Grabrijan, učitelj v Sarajevu in Ljubljani, arhitekt, Plečnikov študent, leta 1930 se je preselil v Sarajevo in se leta 1945 vrnil v Ljubljano.	Zagovarjal je urbanistično oblikovanje po meri človeka, ki se osredotoča na notranja dvorišča, poudarjal je prostorsko intimnost in kulturno kontinuiteto.	Utrdil je identiteto Sarajeva kot mesta z večplastno tradicijo in intimnimi domačimi prostori.	Grabrijanove zamisli se skladajo z današnjim zanimanjem za kulturno občutljivo in skupnosti prijazno urbanistično oblikovanje manjšega obsega.
Juraj Neidhardt, predavatelj v Sarajevu, arhitekt, sodeloval je z Le Corbusierjem, obsežno je deloval v Sarajevu.	Podpiral je funkcionalistično urbanistično načrtovanje, uvedel je modernistične stanovanjske bloke in kulturne domove ob upoštevanju tradicionalne prostorske logike.	Vplival je na identiteto Sarajeva kot sodobnega mesta, ki temelji na tradiciji in tesni povezavi z naravnim okoljem.	Neidhardtova vizija kontekstualnega modernizma postaja čedalje bolj aktualna za mesta, ki okrevajo po vojnah ali doživljajo pomembne družbene in gospodarske spremembe ter želijo oblikovati svojo identiteto z arhitekturnim načrtovanjem in urbanističnim oblikovanjem.

Vir: avtorji

značilen za modernizem, so na podlagi mednarodnih izkušenj, medsebojnega srečevanja, dopisovanja, prijateljstva in sodelovanja ter odnosi s svojimi študenti razvili prav posebno metodologijo. To jim je omogočilo, da so univerzalna modernistična oblikovalska načela z upoštevanjem značilnosti lokalnega okolja vključevali v prostorske posege v razvijajočih se mestih.

Opravljene analize so pokazale, da se ključne razlike med obravnavami arhitekti kažejo v arhitekturnem slogu in estetiki. Plečnikovo delo v Ljubljani se običajno povezuje z značilnostmi, kot so eklektičnost, navezava na klasično arhitekturo in simbolizem, s poudarkom na spominu, človeškem merilu in človeških vrednotah tako v urbanističnih kot arhitekturnih projektih. V nasprotju z njim je njegov učenec Ravnikar prevzel popolnoma modernistični, mednarodni slog, osredotočen na javni in kulturni izraz z arhitekturo in javnim prostorom, razvidnim na ravni urbanega merila iz prvin državne reprezentacije in uporabe strukturalističnih načel. V Sarajevu se je Grabrijan posvetil teoriji, pri čemer je proučeval tradicijo in ljudske oblike ter zagovarjal intimne, domače prostore, zasnovane po meri človeka. Njegov kolega Neidhardt je na podlagi njunega skupnega raziskovalnega dela tradicijo združil s progresivnim, funkcionalističnim in intuitivnim oblikovanjem, pri čemer se je ukvarjal s projekti tako v človeškem kot urbanem merilu, v svoje delo pa je vključeval tudi prvine državne reprezentacije ob upoštevanju lokalne tradicije.

Ključna ugotovitev raziskave je torej, da so ti arhitekti združili avantgardne, mednarodne modernistične ideale z izrazitim občutkom za lokalno kulturo, zgodovino in mestne prostorske razmere, kljub razlikam v njihovem estetskem izrazu in različnim arhitekturnim orodjem, ki so jih uporabljali (preglednica 5). Osnovna skupna točka vseh štirih je kontekstualna, lokaciji prilagojena metodologija, s katero so aktivno prepoznavali, preoblikovali in utrjevali identiteto mesta. V njihovem delu se kaže kontinuiteta v času in prostoru, s katero so povezali preteklost, sedanjost in prihodnost, z izvedenimi projekti pa tudi svojo pedagoško vlogo, pri čemer so ustvarili trajno dediščino, ki je vplivala na naslednje generacije arhitektov. Dejansko so bili zvezdniški arhitekti, še preden je bil ta izraz sploh skovan, vsekakor pa, preden se je začel uporabljati na področju znamčenja mest. Njihov prispevek k oblikovanju identitete mest, v katerih so delovali, temelji na upoštevanju lokalnih značilnosti in premišljeni vključitvi arhitekture v mestno okolje, ne na umetno zasnovanem znamčenju mest.



Slika 4: Kronološki pregled nastanka modernističnih arhitekturnih del v Ljubljani in Sarajevu; bele pike: Plečnikova in Ravnikarjeva dela v Ljubljani, črne pike: Grabrijanova in Neidhardtova dela v Sarajevu, črni kvadratki: leto arhitektove smrti, prazna črta: neprekinjen vpliv Plečnikovih in Neidhardtovih del na sodobno arhitekturo in urbanizem (vir: avtorji)

5 Sklep

Avtorji so v primerjalni raziskavi proučevali, kako je modernistična arhitektura, tj. Plečnikova in Ravnikarjeva dela v Ljubljani ter Grabrijanova in Neidhardtova v Sarajevu, vplivala na oblikovanje identitete Ljubljane in Sarajeva, pri čemer je analitični okvir temeljil na Lynchevi teoriji podobe mesta. Analiza je pokazala, da je Plečnik v svojih delih v Ljubljani poudarjal eklekticizem, prvine klasične arhitekture, simbolizem in človeško merilo, njegov učenec Ravnikar pa se je usmeril v povsem modernistični, mednarodni slog, s katerim je izražal javne in kulturne vrednote v urbanem merilu. Grabrijan se je v Sarajevu pri svojem teoretičnem delu osredotočal na ljudske in tradicionalne oblike ter zagovarjal intimne prostore, oblikovane po meri človeka. Neidhardt je to izhodišče nadgradil s sintezo funkcionalističnega in progresivnega oblikovanja, pri čemer se je ukvarjal tako s projekti po meri človeka kot s projekti v urbanem merilu, hkrati pa je združeval prvine socialistično-modernistične državne reprezentacije in lokalne kulturne tradicije. Vsem štirim arhitektom je skupen pristop, ki upošteva lokalno okolje in temelji na arhitekturnih izraznih slogih, hkrati pa so vsi štirje pomembno prispevali k razvoju modernizma v ključnih desetletjih urbanizacije v 20. stoletju. Njihovo delo poudarja posege, zasnovane po meri človeka, v dveh mestih ob rekah ter združuje tradicionalna in modernistična oblikovalska načela, pri čemer so njihove prepoznavne avtorske poteze postale del identitete obeh mest. Raziskava je hkrati izpostavila pomen povezav med temi arhitekti – z mentorstvom, študijem in usposabljanjem v Parizu ter sodelovanjem, s čimer je razkrila, kako so ideje prehajale med mestoma in vplivale na njuno podobo.

Kljub zgodovinskim in družbenopolitičnim okoliščinam obe mesti dokazujeta, da je lahko modernistična dediščina pomemben dejavnik identitete mest. V Ljubljani je ta dediščina institucionalizirana in široko prepoznana, kar potrjuje tudi vpis Plečnikovih del na Unescov seznam svetovne kulturne dediščine pod oznako Plečnikova Ljubljana, kar poudarja trajen vpliv modernističnih načel na identiteto mesta. Sarajevo pa ima še vedno velik, neizkoriščen potencial, da svojo identiteto okrepi z ustreznim vrednotenjem in promocijo modernistične dediščine, kar je bilo oteženo zaradi političnih in družbeno-gospodarskih sprememb, zlasti vojne v Bosni in nekritičnega povojnega prostorskega razvoja.

Kljub razlikam v estetskih in arhitekturnih izrazih je vsem štirim arhitektom skupen pristop, ki upošteva lokalne značilnosti in je nekakšna zgodnja oblika regionalizma, s katerim so krepili identiteto mesta v obliki posegov, prilagojenih zadevnemu mestu. Prepoznavanje pomena in ohranjanje njihovih prispevkov omogoča varovanje arhitekturne dediščine, hkrati pa zagotavlja pomembna spoznanja za trajnosten in odporen prihodnji razvoj mest, ki upošteva njihove kulturne značilnosti.

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Zaldy F. CORPUZ

Oblikovanje in začetna validacija lestvice obnovitvene zmožnosti urbanih okolij: izsledki s Filipinov

Urbana okolja vplivajo na psihično počutje ljudi, večina lestvic za merjenje tega vpliva pa je bila do zdaj oblikovana samo za naravna okolja. V članku sta predstavljena oblikovanje in začetna validacija lestvice za merjenje obnovitvene zmožnosti urbanih okolij – oblikovalsko usmerjenega merskega orodja, namenjenega urbanim prostorom, ki jih ljudje vsak dan uporabljajo. Nabor 25 postavk, izbranih na podlagi teorij obnove pozornosti in zmanjšanja stresa, je bil preizkušen s 1.001 prebivalcem filipinskega mesta Urdaneta. S potrditveno faktorsko analizo je bila izbrana končna struktura lestvice z visoko stopnjo prileganja in zanesljivosti, ki je vključevala 17 postavk in štiri faktorje (kakovost, funkcionalnost, privlačnost in sprostitev), združenih v faktor drugega reda, imenovanega obnovitvena zmožnost urbanih okolij. Konvergentna veljavnost je bila dosežena, korelacije med faktorji so bile močne in hkrati skladne s konstruktom višjega reda. Faktor drugega reda se je izkazal za močnega napovednika splošnega zadovoljstva z urbanim prostorom, ki ga je posamezni udeleženec v raziskavi ocenjeval na podlagi fotografije. Večskupinski modeli so pokazali odvisnost faktorjev od tipa urbanega prostora: kakovost je bila najpomembnejši faktor na območjih, namenjenih rekreaciji, privlačnost na stanovanjskih območjih, območjih javnih ustanov, ulicah in trgovskih območjih, funkcionalnost na potniških terminalih, sprostitev pa je bila pomemben, a ne najbolj vpliven faktor na vseh urbanih prostorih. Izsledki raziskave so prečne narave, zato med njimi ni mogoče opredeliti zanesljivih vzročnih povezav. Lestvica je praktično diagnostično orodje za pripravo oblikovalskih hipotez, hkrati pa kaže, da se to, kar deluje obnovitveno ali blagodejno za počutje ljudi, razlikuje glede na tip urbanega prostora.

Ključne besede: obnovitvena okolja, tipi urbanih prostorov, psihometrična validacija, merska invariantnost, okoljska psihologija

1 Uvod

Urbana okolja pogosto povečujejo stres, tesnobo in mentalno izčrpanost zaradi hrupa, gneče in omejenega dostopa do prostorov, ki podpirajo duševno dobrobit (Bowler idr., 2010; McDonald idr., 2018). Kljub temu je večina orodij za merjenje obnovitvene zmožnosti okolja vsaj prvotno nastala za parke in gozdove, ne pa za ulice, stanovanjske kareje ali avtobusna in železniška postajališča (Hartig idr., 1997). Navedena vrzel kaže potrebo po vsakdanjih okoljih, ki podpirajo duševno dobrobit, ne zgolj po zeleni infrastrukturi. S tem v zvezi se pojavlja ključno načrtovalsko vprašanje: ali lahko običajni urbani prostori, kot so trgi, ulice, stanovanjski kareji, okolica javnih ustanov, poslovne četrti in potniški terminali, ljudi psihično razbremenijo?

Klasične raziskave tovrstnih podpornih okolij so poudarjale pomen območij, ki ljudem omogočajo, da se odpočijejo in okrevajo od stresa (Kaplan, 1995; Ulrich idr., 1991). V skladu s teorijo obnove pozornosti je tovrstno okrevanje mogoče, če okolja zagotavljajo štiri ključne dejavnike: odmik (psihični odmik od vsakdanjih, rutinskih nalog), fascinacijo (zlasti mehko fascinacijo, pri kateri dražljaji nežno, spontano pritegnejo posameznikovo pozornost, brez mentalnega naprezanja), obseg (okolje mora biti dovolj veliko in koherentno povezano, da se lahko posameznik vanj popolnoma vživi) in združljivost (okolje se mora ujemati s posameznikovimi željami in načrtovanimi aktivnostmi) (Kaplan in Kaplan, 1989; Kaplan, 1995). Teorija zmanjšanja stresa pa poudarja pomen psihičnega okrevanja v okoljih, ki se zdijo varna, pregledna in estetsko privlačna (Ulrich, 1984; Ulrich idr., 1991).

Obe teoriji sta se oblikovali v povezavi z naravnimi okolji, poznejše raziskave pa so pokazale, da lahko tudi nekatera urbana okolja spodbujajo duševno okrevanje (San Juan idr., 2017; Lindal in Hartig, 2013; Bornioli in Subiza-Pérez, 2023). Prvine, kot so vizualna zanimivost in berljivost prostora, zaznana varnost ter možnosti za odmor ali umik, lahko pripomorejo k psihični razbremenitvi in zmanjševanju stresa v vsakdanjih urbanih okoljih (Peschardt in Stigsdotter, 2013; Lindal in Hartig, 2015; Joye in van den Berg, 2011). Skratka, obnovitvena zmožnost okolja ni vezana zgolj na gozdove ali divjino, lahko se pojavi tudi v povsem vsakdanjih urbanih prostorih (npr. v senčnem kotičku potniškega terminala), če se ti ljudem zdijo urejeni, razumljivi in prijetni.

Naravna in urbana okolja, ki se v raziskavah obnovitvene zmožnosti strogo ločujejo, se čedalje bolj dojemajo v smislu mehkega prehajanja, ne več strogega ločevanja med njimi. Čeprav metaanalize še vedno kažejo, da imajo naravna okolja v povprečju večjo obnovitveno zmožnost, je, glede na to, da so okolja zelo raznovrstna, potrebna previdnost pri oblikovanju poenostavljenih klasifikacij (Menardo idr., 2021). Lestvica zaznane obnovitvene zmožnosti, ki temelji na zgoraj omenjenih štirih komponentah teorije obnove pozornosti, je od svojega nastanka in validacije v naravnih okoljih prevladujoče mersko orodje (Hartig idr., 1997; Pasini idr., 2014), a je nastala predvsem za vrednotenje izkušenj potopitve v naravo ali odmika od vsakdanjih nalog. V vsakdanjih urbanih okoljih številne postavke te lestvice predpostavljajo izkušnjo umika (npr. odmika kot dejanskega pobega), velik del obnovitvene zmožnosti urbanih okolij pa se v praksi pojavlja v obliki mikroobnovitve, tj. kratkih trenutkov olajšanja, ki se zgodijo na kraju samem med vsakodnevnimi aktivnostmi (Joye in Dewitte, 2018).

Še pomembnejše pa je, da omenjena lestvica premalo upošteva oblikovalske značilnosti urbanih okolij, ki vplivajo na njihovo obnovitveno zmožnost. Čeprav se fascinacija in odmik v okviru teorije obnove pozornosti nanašata na pomembne psihološke mehanizme, ne obravnavata neposredno fizičnih lastnosti okolja, ki jih uporabniki stalno navajajo kot ključne za psihološko udobje. Raziskave o preferencah glede urbanih okolij kažejo, da ljudje cenijo konkretne značilnosti, kot sta čistoča in dobra vzdrževanost (vizualna urejenost), funkcionalne prvine, kot so površine za sedenje in senca (fizično udobje), varnost in preglednost (zmožnost premikanja po prostoru) ter estetsko privlačnost (vizualno zanimivost), ki odločilno vplivajo na to, ali prostor deluje razbremenilno ali obremenjujoče (Nordh idr., 2009; Peschardt in Stigsdotter, 2013; Ríos-Rodríguez idr., 2021; Jennings in Bamkole, 2019). Navedene značilnosti se konceptualno ujemajo z obsegom in združljivostjo v okviru teorije obnove pozornosti, vendar jih je treba v smislu urbanističnega oblikovanja jasneje operacionalizirati. Podobno poudarek na varnosti in pozitivnem čustvenem odzivu pri teoriji zmanjšanja stresa kaže na velik pomen zaznane urejenosti in kakovosti okolja – vidikov, ki sta pri lestvicah, ki temeljijo na naravnih okoljih, večinoma implicitna. To, da ni postavk, ki bi se neposredno nanašale na te značilnosti grajenega okolja, je pomembna metodološka vrzel: oblikovalci težko prevedejo abstraktne pojme, kot sta odmik in fascinacija, v konkretne posege, lahko pa spremenijo sisteme vzdrževanja, dodajo površine za sedenje, izboljšajo orientacijo v prostoru ali izboljšajo njegovo vizualno zanimivost. Zato morajo lestvice obnovitvene zmožnosti urbanih okolij zapolniti vrzel med psihološko teorijo in značilnostmi, ki jih je mogoče opaziti in urbanistično oblikovati.

Iz navedenega sta razvidni dve glavni vrzeli. Prvič, očitno ni validirane lestvice, ki bi obnovitveno zmožnost operacionalizirala izrecno z izrazjem s področja urbanističnega oblikovanja, razumljivim raziskovalcem. Drugič, le malo raziskav se je osredotočalo na to, ali obnovitveni procesi delujejo enako v različnih urbanih okoljih, zato ostaja odprto vprašanje, ali je

obnova univerzalni pojav ali pa je odvisna od zadevnega okolja. Za odpravo navedenih vrzeli ni dovolj, da se preprosto prilagodijo merska orodja, zasnovana za naravna okolja, ampak je treba oblikovati namenska orodja, ki urbana okolja obravnavajo kot tehtne predmete raziskav njihove obnovitvene zmožnosti.

Obnovitvena zmožnost urbanih okolij je najverjetneje odvisna od posameznega prostora. Različni tipi urbanih prostorov, kot so stanovanjska območja, območja javnih ustanov, poslovne četrti, ulice, potniški terminali in parki, omogočajo različno rabo in v njih se pojavljajo različni stresorji, ki lahko vplivajo na njihovo obnovitveno zmožnost (Karmanov in Hamel, 2008; Wilkie in Clements, 2018). Raziskave kažejo, da zelenje na stanovanjskih območjih (Lindal in Hartig, 2013, 2015; Zhao idr., 2020), v atrijih (Cooper Marcus in Sachs, 2014), na območjih za pešce (Subiza-Pérez idr., 2020) in v parkih (Korpela idr., 2010) podpira psihično okrevanje, potniški terminali pa pogosto povečujejo stres, če niso izvedeni konkretni omilitveni oblikovalski ukrepi (npr. jasne usmerjevalne table, dovolj površin za sedenje in prostorov, ki zagotavljajo zavetje) (Evans in Wener, 2007). Zelo malo raziskav se je osredotočilo na preverjanje merske invariantnosti različnih tipov prostorov, zato še vedno ni jasno, ali okrevanje poteka po podobnih mehanizmih v vseh okoljih ali pa se relativna pomembnost različnih obnovitvenih razsežnosti spreminja glede na okolje (Chen, 2007; Milfont in Fischer, 2010; Bornioli in Subiza-Pérez, 2023).

Za odpravo navedenih vrzeli je avtor oblikoval lestvico obnovitvene zmožnosti urbanih okolij, ki operacionalizira teoriji obnove pozornosti in zmanjšanja stresa na podlagi štirih oblikovalsko usmerjenih dejavnikov: kakovosti, funkcionalnosti, privlačnosti in sprostitve. Kakovost vključuje skrb za okolje, red in varnost (kar se nanaša na neogrožujoča okolja v okviru teorije zmanjšanja stresa in na vidik obsega pri teoriji obnove pozornosti), funkcionalnost izraža prvine uporabnosti prostora (površine za sedenje, senca in usmerjevalne table), ki podpirajo načrtovane aktivnosti (kar se ujema z združljivostjo v okviru teorije obnove pozornosti). Privlačnost se nanaša na mehko fascinacijo, ki temelji na vizualni zanimivosti in arhitekturni privlačnosti (vidik fascinacije v okviru teorije obnove pozornosti), z dejavnikom sprostitve pa je odmik na novo opredeljen kot psihološki umik, dosegljiv na kraju samem, ki vključuje občutek umirjenosti v urbanem okolju (odmik po teoriji obnove pozornosti in ublažitev stresa po teoriji zmanjšanja stresa). Lestvica tako ohranja mehanizme pozornosti, opredeljene s teorijo obnove pozornosti, hkrati pa operacionalizira lastnosti grajenega okolja, ki so pri lestvicah, ki temeljijo na naravnih okoljih, premalo upoštevane. Na podlagi izsledkov prejšnjih raziskav, da se prvine obnovitvene zmožnosti razlikujejo glede na okolje (npr. orientacija je ključna na potniških terminalih, vizualna razgibanost pri ulični krajini, urejenost pa v parkih) (Evans in Wener, 2007; Peschardt in Stigsdotter, 2013; Purcell idr., 2001), je bila lestvica preizkušena s fotografijami šestih tipov urbanih prostorov.

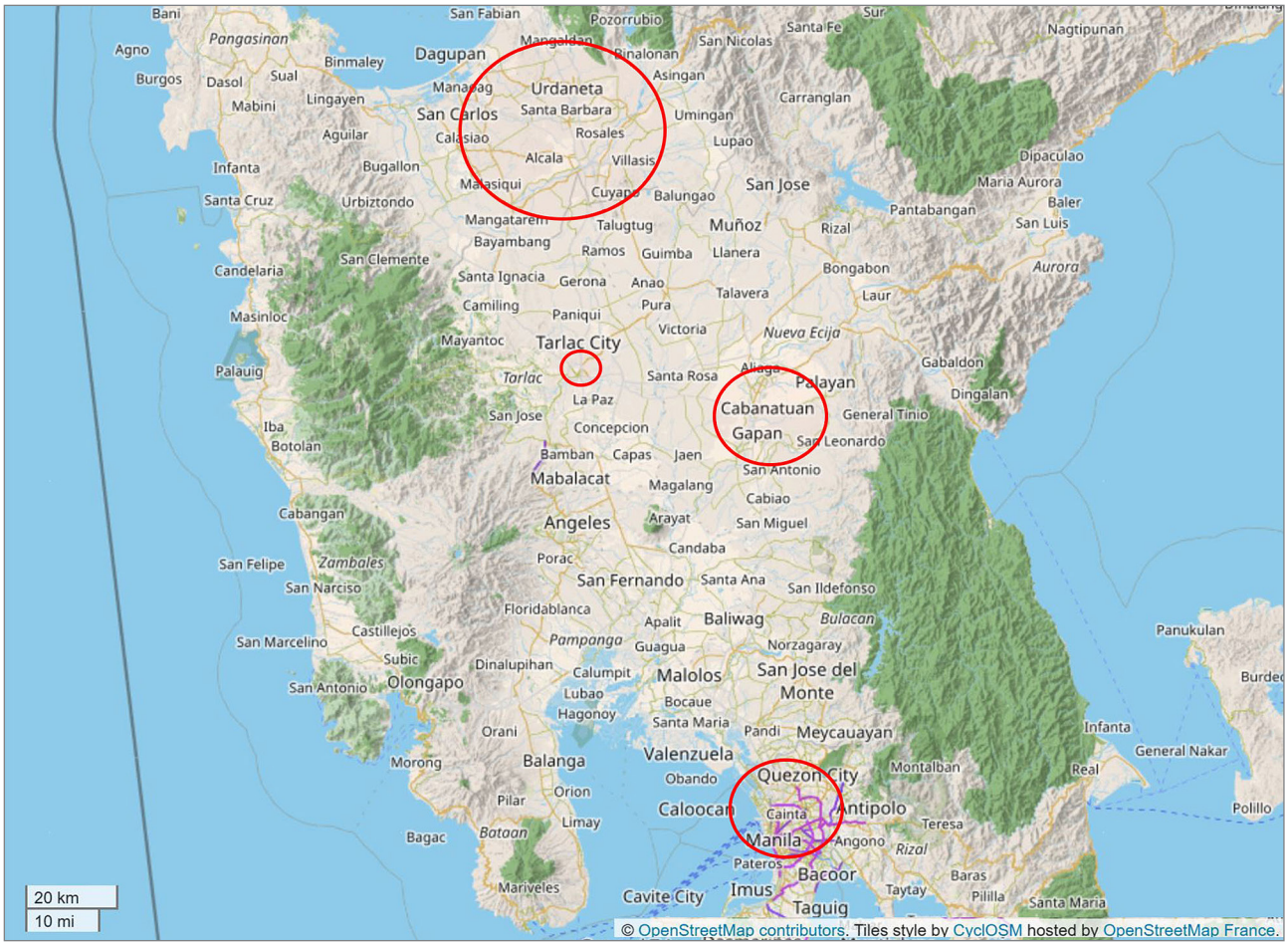
Članek ima tri cilje: 1. preveriti faktorsko strukturo lestvice obnovitvene zmožnosti urbanih okolij, prileganje in zanesljivost modela ter njegovo konvergentno, diskriminacijsko in kriterijsko veljavnost, 2. proučiti mersko invariantnost različnih tipov analiziranih urbanih prostorov z večskupinsko potrditveno faktorsko analizo ter ugotoviti, ali se obnovitvena zmožnost razlikuje glede na okolje, in 3. analizirati kriterijsko veljavnost lestvice s preverjanjem, ali njeni rezultati napovedujejo splošno zadovoljstvo z okoljem.

2 Metodologija

2.1 Zasnova raziskave in udeleženci

Junija 2025 je bila v Urdaneti na Filipinih izvedena prečna raziskava, v kateri so udeleženci ocenjevali urbane prostore na izbranih fotografijah. Vsak udeleženec si je ogledal samo eno, naključno dodeljeno fotografijo urbanega prostora. Tovrstna zasnova raziskave preprečuje učinke prenosa in različnosti, značilne za raziskave, v okviru katerih posamezni udeleženec ocenjuje elemente na vseh fotografijah (Poulton, 1982; Aguinis in Bradley, 2014). Poleg tega omogoča, da vsak udeleženec poda osredotočeno in nepristransko oceno samo enega prostora. Presojanje na podlagi fotografij je primerno za oblikovanje merskih lestvic, saj omogoča sistematični pregled vizualnih značilnosti, ob tem fotografije zadovoljivo simulirajo zadevno okolje (Stamps, 2010).

V raziskavi je sodelovalo 1.070 prebivalcev mesta, izbranih na terenu s priložnostnim vzorčenjem in kvotami po starostnih skupinah, da se je zagotovila dovolj raznovrstna demografska sestava. Merili za vključitev sta bili stalno prebivališče v Urdaneti in zmožnost podajanja informiranega soglasja. Izključeni so bili posamezniki z nepopravljeno okvaro vida, osebe, ki niso mogle slediti navodilom, in vidno opite osebe. Po preverjanju kakovosti podatkov je končni analitični vzorec vključeval 1.001 udeleženca. Med njimi je bilo 58,3 % žensk in 40,9 % moških (0,8 % jih spola ni navedlo). Po starosti so bili razdeljeni v štiri skupine: mladostniki (16–19 let; 29,6 %), mladi odrasli (20–34; 31,7 %), osebe srednjih let (35–54; 29,1 %) in starejši (55+; 9,6 %). Navedene starostne skupine odražajo razvojne faze, pomembne za zaznavanje okolja (Pan American Health Organization, 2020), in zagotavljajo uravnoteženo zastopanost v celotnem življenjskem obdobju. Izobrazbena struktura je obsegala osebe brez formalne šolske izobrazbe (1 %), osebe z osnovnošolsko izobrazbo (10,1 %), osebe s srednješolsko izobrazbo (39.5 %), osebe z visokošolsko izobrazbo (40,6 %) in osebe z magisterijem ali doktoratom (8,8 %). Prihajali so



Slika 1: Lokacije, na katerih so bile posnete fotografije, ki so bile nato uporabljene v raziskavi (kartografska podlaga: OpenStreetMap)

s podeželskih območij (41,1 %) ter iz manjših mest (19,7 %), primestnih okolij (20,6 %) in urbanih središč (18,6 %). Vsakemu je bila naključno dodeljena ena fotografija, ki je prikazovala eno izmed šestih proučevanih kategorij urbanih prostorov, pri čemer so bili deleži udeležencev razmeroma enakomerno porazdeljeni po kategorijah (od 14,9 % do 18,2 % udeleženca na kategorijo).

2.2 Dražljaji in postopek

Fotografije (tj. vizualni dražljaji) so bile izbrane iz obsežne zbirke, pripravljene posebej za ta projekt. Raziskovalna skupina je med več terenskimi obiski posnela več tisoč fotografij urbanih prostorov. Za čim večjo posplošljivost rezultatov so bile fotografije posnete tako na podeželskih kot primestnih in mestnih območjih. Na sliki 1 so prikazane lokacije, na katerih so bile posnete. Približno dve tretjini (66,1 %) fotografij je bilo narejenih v provinci Pangasinan, 17,9 % na metropolitanskem območju Metro Manile, 14,2 % v provinci Nueva Ecija, preostalih 1,8 % pa v provinci Tarlac. Vse so bile posnete ob primerljivi svetlobi in vremenskih razmerah, s standardnimi goriščnimi razdaljami (24–50 mm v polnem formatu) in minimalno obdelavo (poravnava horizonta in normalizacija osvetlitve), da bi se ohranil čim bolj naraven videz prostora. Nastavitve zaslona so bile v vseh primerih enake (izključena samodejna bliskavica, svetlost zaslona ≥ 50 %).

Iz navedene zbirke je bil izbran uravnotežen nabor fotografij, ki so prikazovale šest izbranih tipov urbanih prostorov: rekreacijske zelene površine, stanovanjska območja, območja javnih ustanov, ulični prostor, poslovno-trgovske četrti in potniške terminale. Za vsak tip urbanega prostora je bilo s sistematičnim vrednotenjem izbranih 19 reprezentativnih fotografij (skupaj 114). Šest ustrezno usposobljenih študentov urbanističnega oblikovanja je na predlaganih fotografijah neodvisno presojalo vidne kazalnike obnovitvene zmožnosti (npr. čistočo, zelenje, površine za sedenje, urejenost) in moteče elemente (npr. smeti, natrpanost in odsotnost površin, ki zagotavljajo zavetje). Z navedenim postopkom je bila zagotovljena raznovrstnost, značilna za posamezni tip urbanega prostora, saj so posnetki vključevali primere tako bolj kot manj obnovitvenih območij, ne samo ideale primere. Pred izvedbo glavne raziskave je bilo preverjeno, ali bodo udeleženci elemente na fotografijah zaznali skladno z opredeljenim namenom raziskave. Trideset ne-

Slika 2: Primeri fotografij za posamezni proučevani tip urbanega prostora: a) rekreacijsko območje, b) stanovanjsko območje, c) območje javne ustanove, d) ulični prostor, e) trgovsko območje in f) potniški terminal (foto: avtor)

odvisnih ocenjevalcev (študentov urbanističnega oblikovanja) je izbrane fotografije razvrstilo po šestih kategorijah urbanih prostorov brez informacij o njihovi lokaciji. Stopnja zanesljivosti med ocenjevalci je bila visoka (Fleissova kapa = 0,72, 95-odstotni IZ (0,68, 0,76)), kar potrjuje, da je bilo mogoče posamezne tipe urbanih prostorov jasno prepoznati. Na sliki 2 so prikazani primeri fotografij za vsako kategorijo.

Podatki so se zbirali v domovih krajanov po Urdaneti. Da bi vsi udeleženci imeli enake pogoje, so raziskovalci pred začetkom vsakega ocenjevanja elementov na fotografijah s preverjanjem na kontrolnem seznamu zagotovili, da je bilo okolje dovolj tiho (raven hrupa iz okolice je morala biti enaka ali nižja od 30 dBA), da se zasloni niso bleščali, da so udeleženci fotografije opazovali na ustrezni razdalji (50–70 cm) in da se je upošteval standardizirani protokol ocenjevanja.

Ob prihodu na lokacijo, kjer je potekalo ocenjevanje, so udeleženci prejeli informacije o raziskavi in podali pisno soglasje k sodelovanju v njej. Nato je bila vsakemu naključno dodeljena fotografija enega izmed šestih urbanih prostorov iz nabora 114 posnetkov, pri čemer so bili udeleženci razmeroma enakomerno porazdeljeni po tipih urbanega prostora. Udeleženci so svojo fotografijo opazovali 60 sekund na zaslonu prenosnega računalnika, raziskovalna ekipa pa je skrbela, da je bila njihova pozornost usmerjena na posnetek. Takoj po ogledu so udeleženci odgovorili na demografska vprašanja (o starosti, spolu, najvišji doseženi izobrazbi in trenutnem kraju bivanja) ter ocenili postavke na lestvici obnovitvene zmožnosti urbanih okolij in postavko o splošnem zadovoljstvu. To so opravili na tablici ali papirju, odvisno od preferenc in ravni pismenosti. Vsako ocenjevanje so nadzorovali usposobljeni člani raziskovalne ekipe, ki so poskrbeli, da so udeleženci razumeli, kaj se od njih zahteva, in da se je dosledno spoštoval protokol ocenjevanja.

Protokol je pregledala in odobrila univerzitetna komisija za raziskovalno etiko v skladu z nacionalnimi smernicami za zdravstvene in družbene raziskave (Philippine Health Research Ethics Board, 2022). Od vseh udeležencev je bilo pridobljeno pisno informirano soglasje za sodelovanje v raziskavi. Pri udeležencih, mlajših od 18 let, je bilo poleg tega skladno z etičnimi smernicami za raziskave z mladoletniki pridobljeno še soglasje njihovega skrbnika. Odgovori so bili anonimizirani in obdelani v skladu z zakonom iz leta 2012 o varstvu podatkov (RA 10173).

2.3 Merska orodja

Lestvica obnovitvene zmožnosti urbanih okolij je bila oblikovana kot samoocenjevalni instrument za merjenje zaznane obnovitvene zmožnosti urbanih okolij. Pri oblikovanju postavk je bil uporabljen teoretični pristop, ki neposredno izhaja iz načel teorij obnove pozornosti in zmanjšanja stresa, s čimer je bila zagotovljena vsebinska veljavnost. Namesto da bi prilagodili postavke lestvic, ki temeljijo na naravnih okoljih, je bilo oblikovanih 25 izvirnih postavk, ki so prilagojene prvinam urbanističnega oblikovanja in vključujejo osnovna obnovitvena načela. Vsaka postavka je bila trditev, ki se je nanašala na prvine obnovitvene zmožnosti prikazanega prostora in so jo udeleženci ocenili na petstopenjski Likertovi lestvici (1 = močno se ne strinjam, 5 = močno se strinjam).

Omenjenih 25 postavk je bilo vnaprej razvrščenih v štiri konceptualne dejavnike. Kakovost je vključevala estetsko urejenost in skladnost okolja, ki prispevata k občutku varnosti in reda (primer postavke: Okolje je videti čisto in dobro vzdrževano.). Funkcionalnost se je nanašala na opremo, udobje in prostorske prvine, ki podpirajo dejavnosti uporabnikov (primer: To okolje ima primerna mesta za sedenje in počitek.). Privlačnost se je nanašala na zmožnost prostora, da zlahka pritegne in zadrži pozornost, kar je povezano s konceptoma fascinacije in vizualne kompleksnosti (primer: Vizualni detajli v tem okolju so opazni in privlačni.). Sprostitev je obsegala občutke miru, varnega zavetja in psihološke odmaknjenosti, kar se ujema z vidikom odmika v okviru obnovitvene izkušnje (primer: To okolje deluje mirno in spokojno.).

Pred glavno raziskavo je bil opravljen pilotni preizkus s 50 študenti in zaposlenimi na univerzi, v sklopu tega preizkusa sta bili preverjeni jasnost in razumljivost vseh 25 postavk. Udeleženci so v osnutku vprašalnika ocenili elemente na 18 poskusnih fotografijah in podali povratne informacije na končnem obrazcu, na katerem so ocenili jasnost posnetkov (na petstopenjski lestvici) in podali proste komentarje. Na podlagi povratnih informacij so bili strokovnim ali manj pogostim izrazom v oklepajih dodani prevodi v lokalni jezik, da se je omogočila njihova boljša razumljivost, zlasti za udeležence z nižjo izobrazbo ali šibkejšim znanjem angleščine. Po teh jezikovnih prilagoditvah je bilo obdržanih vseh 25 postavk, oblikovani pa sta bili tudi končni različici protokola ocenjevanja in vprašalnika za glavno raziskavo. Nobena postavka ni bila obratno kodirana.

Splošno zadovoljstvo z okoljem se je merilo s samo eno postavko: Na splošno sem zadovoljen/-ljna s kakovostjo tega okolja. Udeleženci so to postavko ocenili na isti petstopenjski Likertovi lestvici. Postavka je bila uporabljena kot zunanja mera za preverjanje, ali rezultati lestvice obnovitvene zmožnosti urbanih okolij napovedujejo splošno oceno okolja.

2.4 Zbiranje in izbor podatkov

Odgovori so bili zbrani z uporabo aplikacije Google Obrazci. Kadar so udeleženci izrazili željo po papirnati različici vprašalnika, so bili zaradi večje natančnosti njihovi odgovori vneseni dvakrat. V aplikaciji Google Obrazci so bili kot taki označeni obvezni odgovori, omogočeno je bilo tudi samodejno preverjanje vnosa (postavke, ocenjene na Likertovi lestvici, so bile omejene na vrednosti od 1 do 5). Papirnati obrazci so bili pregledani že na mestu zbiranja podatkov, nato pa vneseni dvakrat, pri čemer je drugi vnos izvedla druga oseba, morebitna odstopanja med vnosoma pa so bila odpravljena. Podatki so bili izvoženi v program MS Excel in pregledani z vidika kakovosti. Zaradi kombinacije obveznih polj v digitalnih obrazcih in dvojnega preverjanja vnosa pri papirnatih obrazcih ni bilo težave, da bi podatki morebiti manjkali. Preverjanje kakovosti podatkov je bilo osredotočeno na prepoznavanje vzorcev nepozornega odgovarjanja. Določeni so bili z izračunom variabilnosti odgovorov na vse postavke pri posameznem udeležencu. Udeleženci, katerih odgovori so pokazali izjemno nizko stopnjo variabilnosti (standardni odklon ≤ 0,40 na petstopenjski lestvici), so bili izključeni kot verjetno nepozorni. Ta prag se ujema s priporočenimi metodami za nadzor kakovosti podatkov (Huang idr., 2012) in pomeni, da so odgovori udeležencev v povprečju odstopali za manj kot polovico točke na lestvici, kar kaže na skoraj enotno odgovarjanje (npr. skoraj vsem postavkam so dodelili oceno 3). Zaradi tega je bilo izločenih približno 6,5 % udeležencev iz začetnega nabora, tako da je končni analitični vzorec vključeval 1.001 udeleženca.

2.5 Statistična analiza

Analize so bile izvedene v dveh fazah v programu IBM SPSS Amos (različica 21.0.0). Kot mera za preverjanje hipotez je bila uporabljena stopnja značilnosti $\alpha = 0{,}05$.

V prvi fazi je bil določen teoretično zasnovan štirifaktorski model (s 25 postavkami), ovrednoten s potrditveno faktorsko analizo. Uporabljena je bila metoda največje verjetnosti, pri čemer so bile postavke na petstopenjski Likertovi lestvici

obravnavane kot približno zvezne, skladno s simulacijskimi izsledki (Rhemtulla idr., 2012; glej tudi Li, 2016; Norman, 2010). Glede na velikost vzorca in porazdelitev odgovorov se je navedena metoda izkazala za zanesljivo. Prileganje modela je bilo ovrednoteno s standardnimi merami (χ^2/df ≤ 3, CFI ≥ 0,95, SRMR ≤ 0,08, RMSEA ≤ 0,06–0,08) (Gaskin in Lim, 2016; Hu in Bentler, 1999). Indeksi modifikacij so bili pregledani, na podlagi česar so bile opredeljene postavke s šibkimi faktorskimi utežmi (< 0,50) (Hair idr., 2010; Kline, 2016; Byrne, 2016) in odvečne postavke; odstranjene so bile samo, če je bilo to teoretično utemeljeno. Sledila je primerjava alternativnih modelov na podlagi indeksov splošnega prileganja modela podatkom (CFI, SRMR in RMSEA) ter informacijskih kriterijev, usmerjenih v parsimoničnost (BIC in velikosti vzorca prilagojeni BIC ali SABIC). Primerjane so bile štiri možne strukture: enofaktorski model, model s štirimi med seboj povezanimi faktorji (kakovost, funkcionalnost, privlačnost in sprostitev), model drugega reda, pri katerem štirje faktorji zasičujejo faktor višjega reda, in bifaktorski model z enim splošnim faktorjem in štirimi specifičnimi faktorji. Modeli so bili ovrednoteni na podlagi informacijskih kriterijev BIC in SABIC, pri čemer so nižje vrednosti pomenile boljše ravnovesje med prileganjem in enostavnostjo (Burnham in Anderson, 2002). Preverjen je bil tudi Aikakejev informacijski kriterij (AIC), ki je pokazal enako razvrstitev modelov. Za izbrani končni model so bili preverjeni zanesljivost (koeficient α in sestavljena zanesljivost CR ≥ 0,70), konvergentna veljavnost (delež povprečne variance AVE ≥ 0,50) (Fornell in Larcker, 1981) in diskriminacijska veljavnost (HTMT < 0,85) (Henseler idr., 2015), pri čemer so bili z metodo bootstrap pridobljeni 95-odstotni intervali zaupanja za razmerja HTMT.

V drugi fazi je bila z zaporedno večskupinsko potrditveno faktorsko analizo proučena merska invariantnost šestih tipov urbanih prostorov. Preverjene so bile konfiguracijska invariantnost (enaka faktorska struktura v vseh skupinah), metrična invariantnost (enake faktorske uteži) in stroga invariantnost (enake korelacije/variance faktorjev). Skalarna invariantnost ni bila preverjena, ker je bil cilj ugotoviti, ali se struktura merskega modela ponovi v različnih okoljih, ne pa primerjati latentnih srednjih vrednosti. Ker so testi razlike hi-kvadrat občutljivi na velike vzorce (Yuan in Bentler, 2004), so bile poudarjene praktične spremembe v prileganju modela: vrednosti ΔCFI < 0,01 in ΔRMSEA < 0,015 sta pomenili sprejemljivo invariantnost (Chen, 2007; Cheung in Rensvold, 2002). Kadar je bilo mogoče enako omejiti samo podnabor parametrov ob ohranjanju sprejemljivega prileganja, je bila dokumentirana delna invariantnost, interpretacija pa je bila ustrezno prilagojena (Byrne, 2016; Putnick in Bornstein, 2016). Za prepoznavanje vzorcev, značilnih za posamezno okolje, so bile uteži faktorjev prvega in drugega reda analizirane ločeno za vsak tip urbanega prostora. Na tej podlagi je bilo mogoče ugotoviti, kateri faktorji in postavke so močneje ali šibkeje povezani s splošno obnovitveno zmožnostjo posameznih urbanih prostorov.

3 Rezultati

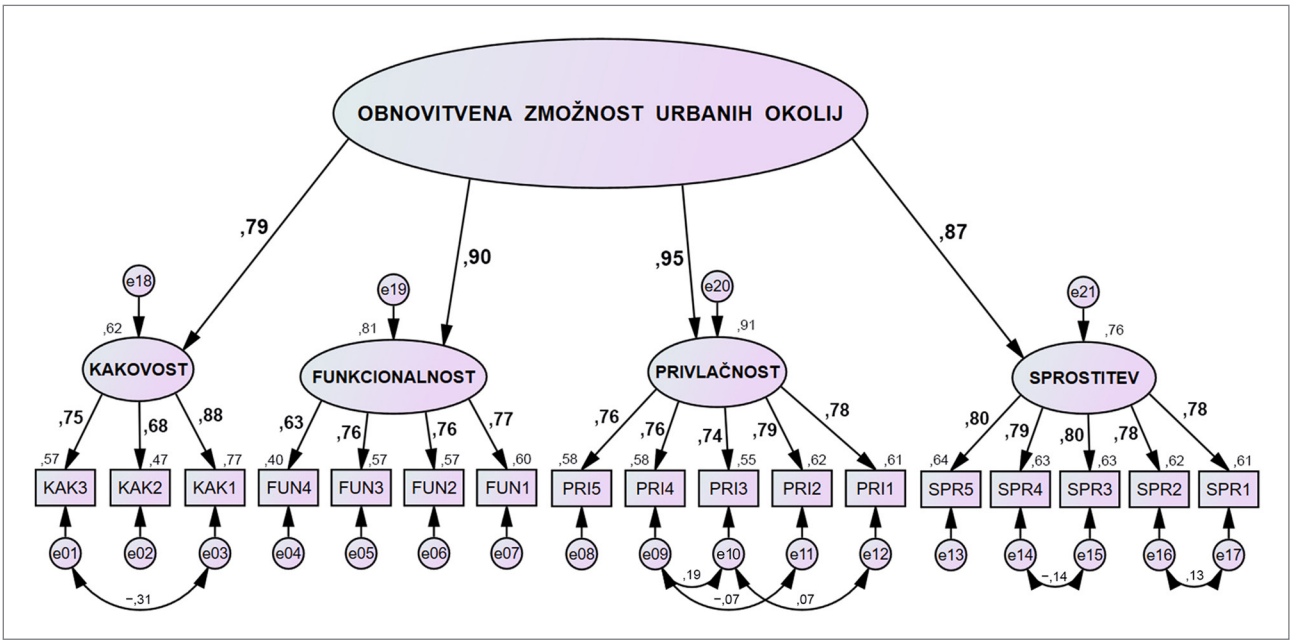
3.1 Izpopolnitev modela in njegovo prileganje

Začetna potrditvena faktorska analiza s 25 postavkami je pokazala sprejemljivo prileganje modela (χ^2 = 1014,114, df = 241, χ^2/df = 4,208, CFI = 0,951, SRMR = 0,034, RMSEA = 0,057). Na podlagi indeksov modifikacij in teoretičnih utemeljitev je bilo zaradi šibkih faktorskih uteži (< 0,50), izrazite navzkrižne uteženosti ali vsebinske odvečnosti izločenih osem postavk. Več postavk, ki so se nanašale na vizualno raznovrstnost, je bilo na primer združenih, da bi se izognili podvajanju, postavke, ki so se nanašale na dve temi, pa so bile odstranjene zaradi večje jasnosti. Končna rešitev s 17 postavkami je vključevala tri postavke, povezane s kakovostjo, štiri postavke, povezane s funkcionalnostjo, ter po pet s privlačnostjo in sprostitvijo. Vse ohranjene postavke so pokazale visoko nasičenost s svojimi predvidenimi latentnimi faktorji (0,630–0,878, vsi p < 0,001). Štirje faktorji prvega reda so bili med seboj močno povezani, kar utemeljuje uporabo konstrukta višjega reda, imenovanega obnovitvena zmožnost urbanih okolij (slika 3). Rezultat testa prileganja z indeksom RMSEA ni bil statistično značilen (PClose = 0,984), kar kaže na tesno prileganje modela (RMSEA ≤ 0,05).

V raziskavi so bili primerjani štirje merski modeli (preglednica 1). Enodimenzionalni model je pokazal slabo prileganje, kar potrjuje, da obnovitvene zmožnosti urbanih okolij ni mogoče obravnavati kot en sam, nediferenciran konstrukt. Vsi trije večdimenzionalni modeli (model s štirimi faktorji, bifaktorski model in hierarhični model drugega reda) so pokazali dobro prileganje. Informacijski kriteriji so dajali prednost različnim modelom: AIC je bil najnižji pri bifaktorskem modelu, vrednosti BIC in SABIC pa sta bili najnižji pri modelu drugega reda. Model drugega reda je bil izbran zaradi treh razlogov: a) nekoliko boljših absolutnih vrednosti indeksov prileganja (CFI, SRMR in RMSEA), b) boljšega rezultata pri kriterijih, prilagojenih parsimoničnosti (BIC in SABIC), in c) ker je model mogoče teoretično interpretirati kot splošni konstrukt obnovitvene zmožnosti urbanih okolij, izražen s štirimi konceptualno različnimi faktorji.

3.2 Zanesljivost in veljavnost

Vsi štirje faktorji lestvice obnovitvene zmožnosti urbanih okolij so pokazali visoko stopnjo notranje konsistentnosti (preglednica 2), pri čemer so bile vrednosti koeficienta alfa in sestavljene zanesljivosti med 0,793 in 0,893. Konvergentna



Slika 3: Izbrani, najbolj optimalni model drugega reda za merjenje obnovitvene zmožnosti urbanih okolij s standardiziranimi vrednostmi (diagram je izdelan v programu IBM SPSS Amos)

Preglednica 1: Indeksi prileganja štirih merskih modelov

Model	df	χ^2	χ^2/df	CFI	SRMR	RMSEA	BIC	SABIC
Štirifaktorski	113	356,90	3158	0,975	0,030	0,046	633,25	506,21
Drugega reda	109	307,73	2,823	0,980	0,027	0,043	611,714	471,97
Bifaktorski	115	358,60	3,119	0,975	0,030	0,046	631,68	500,44
Enodimenzionalni	119	1.309,26	11.002	0,878	0,058	0,100	1.544,16	1.436,17

Opomba: df = prostostne stopnje, χ^2 = hi-kvadrat, χ^2/df = razmerje med hi-kvadratom in prostostnimi stopnjami, CFI = primerjalni indeks prileganja, SRMR = standard root mean square residual, RMSEA = root mean square error of approximation, BIC = Bayesov informacijski kriterij, SABIC = Schwarzev prilagojeni Bayesov informacijski kriterij.

Preglednica 2: Zanesljivost in konvergentna veljavnost faktorjev lestvice obnovitvene zmožnosti urbanih okolij

Faktor	α	CR	AVE	MSV	MaxR(H)
Kakovost	0,793	0,792	0,561	0,575	0,810
Funkcionalnost	0,818	0,821	0,535	0,722	0,879
Privlačnost	0,878	0,878	0,590	0,722	0,829
Sprostitev	0,893	0,893	0,626	0,653	0,894

Opomba: α = koeficient alfa, CR = sestavljena zanesljivost, AVE = povprečje izločenih varianc, MSV = maksimalna skupna kvadratna varianca, MaxR(H) = maksimalna zanesljivost (H). Zadostna zanesljivost: α in CR ≥ 0.70, konvergentna veljavnost: AVE ≥ 0.50, diskriminacijska veljavnost: AVE > MSV.

Preglednica 3: Diskriminacijska veljavnost: vrednosti kriterija HTMT

	Kakovost	Funkcionalnost	Privlačnost	Sprostitev
Kakovost	–			
Funkcionalnost	0,730	–		
Privlačnost	0,738	0,836	–	
Sprostitev	0,687	0,771	0,807	–

Opomba: Vrednosti HTMT, nižje od 0,85, pomenijo zadostno diskriminacijsko veljavnost. Vse vrednosti ta kriterij izpolnjujejo, kar pomeni, da so štirje faktorji empirično razločljivi, čeprav so teoretično medsebojno povezani v okviru nadrejenega konstrukta obnovitvene zmožnosti urbanih okolij.

Preglednica 4: Končna lestvica obnovitvene zmožnosti urbanih okolij, sestavljena iz 17 postavk, s faktorji in postavkami

Faktor	Koda	Kratek opis	Postavka v vprašalniku
Kakovost	KAK1	Čisto in dobro vzdrževano	Okolje je videti čisto in dobro vzdrževano.
	KAK2	Logična razporeditev	Razporeditev in zasnova prostora sta videti logični in urejeni.
	KAK3	Vizualno privlačno	Okolje se mi zdi vizualno privlačno.
Funkcionalnost	FUN1	Prostori za sedenje in počitek	Okolje ima primerne prostore za sedenje in počitek.
	FUN2	Uporabna in dobro vzdrževana oprema	Oprema, kot so klopi, usmerjevalne table in osvetljava, je videti dobro vzdrževana in uporabna.
	FUN3	Privlačne prostočasne dejavnosti	Tu so na voljo privlačne prostočasne dejavnosti.
	FUN4	Zagotavlja zavetje ali senco	Okolje zagotavlja zadostno zavetje ali senco.
Privlačnost	PRI1	Raznovrstne prostorske prvine	Okolje vključuje raznovrstne prostorske prvine.
	PRI2	Vizualno bogat z izrazitimi prvinami	Prostor je zaradi številnih posebnih prvin vizualno zelo zanimiv.
	PRI3	Izstopajoči detajli	Okolje ima opazne in privlačne prostorske detajle.
	PRI4	Edinstveni detajli pritegnejo pozornost	Edinstvene prvine ali presenetljivi detajli v okolju zlahka pritegnejo mojo pozornost.
	PRI5	Pisane barve	Pestre barve ustvarjajo vizualno zanimivo okolje.
Sprostitev	SPR1	Spokojno in mirno	Okolje se mi zdi spokojno in mirno.
	SPR2	Zelenje ustvarja sproščujoče vzdušje	Zelenje ali naravne prvine, ki jih tu vidim, ustvarjajo sproščujoče vzdušje.
	SPR3	Odprtost in razgledi pomirjajo	Odprtost prostora in razgledi v okolju me pomirjajo.
	SPR4	Osvetlitev in barve delujejo blagodejno	Osvetlitev in barvna shema v okolju blagodejno vplivajo na moje oči in misli.
	SPR5	Prijetni kotički za umik	Tukaj so prostori, kamor bi se zlahka umaknil in se sprostil.

Opomba: Vse postavke so bile ocenjene na petstopenjski Likertovi lestvici (1 = močno se ne strinjam, 5 = močno se strinjam).

veljavnost je bila dosežena: vrednosti AVE so pri vseh faktorjih presegle 0,50, kar pomeni, da vsak latentni faktor pojasni več kot polovico variance svojih spremenljivk (Fornell in Larcker, 1981).

Izsledki glede diskriminacijske veljavnosti so podprli faktorsko strukturo in hkrati utemeljili uporabo modela drugega reda (preglednica 3). Vse vrednosti kriterija HTMT so bile nižje od 0,85 (tj. 0,687–0,836), kar kaže na ustrezno razločljivost med štirimi faktorji. Kljub temu Fornell-Larckerjev kriterij (AVE > MSV) ni bil dosežen pri vseh faktorjih, kar potrjuje precejšnjo skupno varianco med njimi. Navedeni vzorec se teoretično ujema s faktorsko strukturo višjega reda: faktorji se konceptualno razlikujejo, vendar so med seboj močno povezani, saj vsi odražajo vidike širšega konstrukta (tj. obnovitvene zmožnosti urbanih okolij).

Preglednica 5: Primerjava gnezdenih modelov (Δ glede na predhodni model) za določitev invariantnosti med tipi urbanih prostorov

Model	Δdf	$\Delta\chi^2$	*p*	ΔCFI glede na prejšnji model	ΔRMSEA glede na prejšnji model	Interpretacija
Konfiguralni (osnovni)	–	–	–	–	–	Sprejemljiva invariantnost
Metrični (enake uteži)	65	149,436	< 0,001	−0,011	+0,001	Invariantnost ni potrjena.
Strogi (enake kovariance)	15	35,375	< 0,002	−0,020	+0,002	Invariantnost ni potrjena.

Opomba: Primerjalne vrednosti (Δ) so bile izračunane glede na manj restriktivni model v prejšnjem koraku. Kriteriji odločanja: ΔCFI ≤ 0,010 in ΔRMSEA ≤ 0,015 pomenita sprejemljivo invariantnost. Konfiguralna invariantnost je bila potrjena (CFI = 0,934, RMSEA = 0,030), kar kaže na ustrezno prileganje štirifaktorske strukture pri vseh šestih tipih urbanih prostorov. Metrična invariantnost ni bila potrjena ($\Delta\chi^2$ (65) = 149,436, p < 0,001, ΔCFI = −0,011). Tudi stroga invariantnost ni bila potrjena ($\Delta\chi^2$ (15) = 35,375, p = 0,002, ΔCFI = −0,020).

Preglednica 6: Pomen faktorjev se razlikuje glede na tip urbanega prostora: standardizirane faktorske uteži

Tip urbanega prostora	Kakovost (β)	Funkcionalnost (β)	Privlačnost (β)	Sprostitev (β)
Rekreacijsko območje	0,908	0,858	0,815	0,872
Stanovanjsko območje	0,847	0,867	0,979	0,901
Območje javnih ustanov	0,819	0,761	0,875	0,810
Ulični prostor	0,841	0,914	0,954	0,764
Trgovsko območje	0,783	0,972	0,999	0,912
Potniški terminal	0,683	0,971	0,908	0,881

Opomba: Navedene vrednosti so standardizirane regresijske uteži faktorjev prvega reda na faktorju drugega reda. Vrednosti v krepkem tisku pomenijo najpomembnejši faktor za posamezen tip urbanega prostora.

V preglednici 4 je predstavljena končna lestvica obnovitvene zmožnosti urbanih okolij s 17 postavkami, urejenimi po faktorjih, s kodami postavk in kratkimi opisi, ki so bili uporabljeni v analizah in pri poznejšem poročanju.

3.2.1 Kriterijska veljavnost

Da bi avtor ugotovil, ali rezultati lestvice obnovitvene zmožnosti urbanih okolij napovedujejo splošno zadovoljstvo z okoljem, je z metodo enostavne regresije preveril odvisnost postavke o zadovoljstvu od faktorja obnovitvene zmožnosti urbanih okolij. Povezava med njima je bila močna in statistično značilna (β = 0,888, p < 0,001, R^2 = 0,788), kar pomeni, da ta faktor pojasni približno 79 % variance splošnega zadovoljstva. To potrjuje, da oblikovana končna lestvica obsega vidike okoljske kakovosti, ki pomembno napovedujejo celostno oceno okolja.

3.2.2 Pristranskost zaradi uporabe skupne metode

Ker so bile vse spremenljivke izmerjene s samooceno s samo eno meritvijo, je bila možna pristranskost zaradi uporabe skupne metode preverjena z dvema pristopoma. Harmanov enofaktorski test je pokazal, da je prvi nerotirani faktor pojasnil samo 32 % variance, kar je precej pod pragom 50 %, ki bi nakazoval problematično pristranskost. Poleg tega se z vključitvijo dodatnega neizmerjenega latentnega faktorja v potrditveno faktorsko analizo ni izboljšalo prileganje modela, niti se niso pomembno spremenile faktorske uteži, kar kaže, da varianca skupne metode ni vplivala na opaženo faktorsko strukturo.

3.3 Preverjanje merske invariantnosti

Avtor je s preverjanjem merske invariantnosti analiziral psihometrično enakovrednost faktorske strukture lestvice obnovitvene zmožnosti urbanih okolij in faktorskih uteži pri vseh šestih tipih urbanih prostorov. Rezultati večskupinske potrditvene faktorske analize so navedeni v preglednici 5.

Ker metrična in stroga invariantnost nista bili potrjeni, se interpretacija pomena postavk lestvice obnovitvene zmožnosti urbanih okolij razlikuje glede na proučevano urbano okolje. Natančneje, faktorske uteži in relativni pomen štirih faktorjev pri opredeljevanju skupne obnovitvene zmožnosti urbanih okolij se pomembno razlikujejo glede na tip urbanega prostora. Navedena odvisnost je ponazorjena v preglednicah 6 in 7, ki kažeta, kateri obnovitveni dejavniki prevladujejo v posameznih urbanih okoljih.

Preglednica 7: Standardizirane uteži (β) posameznih postavk na faktorjih prvega reda glede na tip urbanega prostora

Postavka (skrajšani opis)	Tipi urbanega prostora					
	Rekreacijski	Stanovanjski	Javna ustanova	Ulični	Trgovski	Potniški terminal
Kakovost						
Čisto in dobro vzdrževano	0,724	0,576	0,726	0,731	0,693	0,760
Vizualno privlačno	0,702	**0,834**	**0,852**	**0,811**	**0,868**	**0,836**
Logična razporeditev	**0,730**	0,627	0,682	0,799	0,576	0,754
Funkcionalnost						
Uporabna in dobro vzdrževana oprema	0,612	**0,786**	0,757	0,715	**0,804**	0,699
Prostori za sedenje in počitek	**0,888**	0,732	**0,772**	0,690	0,760	0,760
Privlačne prostočasne dejavnosti	0,667	0,773	0,620	**0,838**	0,752	0,711
Zagotavlja zavetje ali senco	0,599	0,661	0,603	0,632	0,623	**0,764**
Privlačnost						
Izstopajoči detajli	0,663	0,775	0,793	0,757	**0,811**	**0,799**
Raznovrstne prostorske prvine	0,615	0,752	**0,821**	0,792	0,719	0,798
Vizualno bogat z izrazitimi prvinami	0,692	0,778	0,744	**0,817**	0,807	0,760
Edinstveni detajli pritegnejo pozornost	0,679	0,734	0,793	0,653	0,720	0,760
Pisane barve	**0,744**	**0,797**	0,735	0,782	0,798	0,798
Sprostitev						
Spokojno in mirno	0,773	0,706	0,762	0,751	0,831	0,788
Zelenje ustvarja sproščujoče vzdušje	**0,741**	**0,823**	0,854	0,704	0,799	0,703
Odprtost in razgledi pomirjajo	0,730	0,800	**0,864**	**0,802**	0,739	0,743
Prijetni kotički za umik	0,686	0,744	0,705	0,794	**0,845**	**0,880**
Osvetlitev in barve delujejo blagodejno	0,740	0,738	0,763	0,791	0,829	0,705

Opomba: Navedene vrednosti so standardizirane regresijske uteži postavk na njihovih pripadajočih faktorjih prvega reda.

V preglednici 7 so navedene faktorske uteži na ravni posameznih postavk glede na tip urbanega prostora (vrednosti v krepkem tisku pomenijo največje uteži posameznega faktorja). Postavka »vizualno privlačno« je na primer najmočnejši kazalnik kakovosti v vseh okoljih, razen na rekreativnih območjih, kjer je najpomembnejša »logična razporeditev«.

Čeprav je lestvica obnovitvene zmožnosti urbanih okolij na splošno pokazala močne psihometrične lastnosti, odsotnost merske invariantnosti med tipi urbanih prostorov kaže, da se obnovitvena zmožnost razlikuje glede na okolje. Navedena ugotovitev ima pomemben vpliv na to, kako je treba vrednotiti in oblikovati urbana okolja, kar je podrobneje obravnavano v nadaljevanju.

4 Razprava

Urbana okolja lahko podpirajo psihološko obnovo, vendar so orodja za ocenjevanje obnovitvene zmožnosti zasnovana predvsem za naravna okolja. V tej raziskavi je bila oblikovana in preverjena lestvica obnovitvene zmožnosti urbanih okolij – teoretično zasnovano mersko orodje, prilagojeno značilnostim urbanističnega oblikovanja. Na podlagi teorij o obnovi pozornosti in zmanjšanja stresa so bili opredeljeni štirje faktorji

obnovitvene zmožnosti urbanih okolij: kakovost (estetska urejenost in skladnost okolja), funkcionalnost (opremljenost in udobje), privlačnost (vizualna zanimivost in mehka fascinacija) in sprostitev (mir in psihološki umik). Potrditvena faktorska analiza je potrdila to strukturo in pokazala, da so ti štirje faktorji konceptualno različni, a med seboj empirično povezani, kar se sklada z ugotovitvijo, da obnovitvena urbana okolja aktivirajo več psiholoških mehanizmov hkrati. Navedeni faktorji se ujemajo z uveljavljenimi konstrukti iz okoljske psihologije, hkrati pa obsegajo prvine, značilne za urbana okolja, ki so pri lestvicah, ki temeljijo na naravnih okoljih, pogosto prezrte.

Psihometrične analize so pokazale močno zanesljivost in veljavnost lestvice. Vsi štirje faktorji prvega reda so imeli visoko stopnjo notranje konsistence ter ustrezno konvergentno in diskriminacijsko veljavnost. Faktorji so bili med seboj precej povezani, kar utemeljuje uporabo hierarhičnega modela drugega reda, pri katerem so kakovost, funkcionalnost, privlačnost in sprostitev različni, a med seboj povezani vidiki širšega konstrukta obnovitvene zmožnosti urbanih okolij. Taka hierarhična struktura ima praktično uporabnost: končni rezultat na lestvici obnovitvene zmožnosti urbanih okolij zagotavlja celovito oceno obnovitvene zmožnosti, rezultati faktorjev pa razkrivajo specifične prednosti in slabosti okolij (npr. visoko funkcionalnost, a nizko privlačnost). Močne korelacije med faktorji kažejo, da urbana okolja z visoko stopnjo obnovitvene zmožnosti po navadi dosegajo odlične rezultate pri več faktorjih hkrati in pomanjkljivosti na enem področju ne kompenzirajo z izrazitimi prednostmi na drugem.

Lestvica obnovitvene zmožnosti urbanih okolij je poleg tega pokazala tudi močno kriterijsko veljavnost: faktor drugega reda je napovedal 79 % variance pri splošnem zadovoljstvu z okoljem. Navedena močna povezava kaže, da lestvica vključuje zaznavne značilnosti, ki imajo ključni vpliv na to, kako ljudje vrednotijo urbana okolja. Čeprav na podlagi te presečne povezave ni mogoče opredeliti vzročnosti, ta delno potrjuje, da se v rezultatih lestvice kažejo pomembni vidiki kakovosti okolja, ki pomembno vplivajo na preference uporabnikov.

4.1 Odvisnost zaznane obnovitvene zmožnosti urbanih okolij od tipa prostora

Obnovitvena zmožnost se v različnih urbanih okoljih kaže različno. Preverjanje merske invariantnosti je pokazalo, da so udeleženci štiri izbrane faktorje na oblikovani lestvici različno utežili glede na tip urbanega prostora. Na rekreacijskih območjih (parki in druge zelene površine) je bila najpomembnejša kakovost (ki izraža čistočo, estetsko urejenost in skladnost prostora), najverjetneje zato, ker jih ljudje uporabljajo za sproščanje in prostočasne dejavnosti, pri čemer jim dobra vzdrževanost okolja sporoča, da je to varno in da zanj lepo skrbijo. Na stanovanjskih in trgovskih območjih, območjih javnih ustanov in ulicah, kjer lahko vizualna zanimivost in lepa arhitektura nadomestita pomanjkanje naravnih prvin, je kot najpomembnejši faktor prevladovala privlačnost. Pri potniških terminalih je bila najpomembnejša funkcionalnost, kar se ujema z raziskavami, ki kažejo, da osnovno udobje in jasna orientacija v prostoru zmanjšujeta stres, povezan s potovanji (Evans in Wener, 2007). Sprostitev je bila cenjena pri vseh prostorih, vendar nikjer ni bila prevladujoči faktor, kar kaže, da je za obnovitveno zmožnost okolij nujna, vendar sama ne zadošča.

Navedeni izsledki nasprotujejo zamisli o univerzalni formuli za oblikovanje obnovitvenih urbanih okolij. Da so prostorski posegi učinkoviti, morajo biti prilagojeni posameznemu okolju. Tako bi bilo v parkih na primer treba izboljšati vizualno urejenost prostora, na ulicah bi bilo treba uvesti zanimive arhitekturne prvine, na potniških terminalih pa bi bilo treba izboljšati usmerjevalne oznake in sedišča. Čeprav zaradi presečne zasnove raziskave ni mogoče opredeliti vzročnih povezav med izsledki, ugotovljeni vzorci dajejo znanstveno utemeljeno podlago za razvrščanje oblikovalskih posegov v posameznih urbanih okoljih po pomembnosti.

4.2 Teoretični in praktični vplivi

Ugotovitve raziskave razširjajo teorijo obnove pozornosti na tri pomembne načine. Prvič, oblikovana lestvica obnovitvene zmožnosti urbanih okolij je pokazala, da je mogoče temeljne obnovitvene faktorje smiselno vključiti tudi v posameznikove presoje vsakdanjih urbanih okolij, ne samo naravnih prostorov ali parkov. Začetna validacija štirifaktorske strukture lestvice je pokazala, da obnovitvena zmožnost urbanih okolij vključuje tako mehanizme teorije obnove pozornosti (tj. privlačnost kot mehko fascinacijo in sprostitev kot obliko odmika) kot značilnosti grajenega okolja, ki jih lestvice, pripravljene za naravna okolja, ne upoštevajo (tj. kakovost kot estetska urejenost in funkcionalnost kot fizična uporabnost prostora). Drugič, odsotnost merske invariantnosti med tipi urbanih prostorov kaže, da je zaznana obnovitvena zmožnost odvisna od okolja, ne univerzalna. To se sklada s sodobnimi pozivi k preseganju modelov obnove, ki se osredotočajo na naravna okolja (Joye in Dewitte, 2018; Bornioli in Subiza-Pérez, 2023), ter idejo o več načinih doseganja psihološke obnove (Menardo idr., 2024). Različna okolja omogočajo obnovo z različnimi mehanizmi: parki na podlagi urejenosti in zelenja, potniški terminali z jasno orientacijo v prostoru in udobjem, trgovska območja pa z vizualno privlačnostjo. Tretjič, hierarhična faktorska struktura kaže, da prostori, ki jih ljudje dojemajo kot zelo obnovitvene, praviloma dosegajo visoke vrednosti pri več faktorjih hkrati, ne zgolj samo pri enem. Močne korelacije med faktorji tako

nakazujejo, da okolja z visoko stopnjo obnovitvene zmožnosti po navadi dosegajo odlične rezultate na več področjih hkrati, kar nasprotuje razlagam, ki zagovarjajo zadostnost samo enega mehanizma (npr. dovolj je dodati zelenje), pogoste v poljudnih razpravah.

Lestvica obnovitvene zmožnosti urbanih okolij je uporabno diagnostično orodje za urbanistično in arhitekturno prakso, saj omogoča prepoznavanje, na katerih področjih so potrebni prostorski posegi. Namesto enotne uporabe splošnih načel oblikovanja obnovitvenih okolij lahko strokovnjaki na podlagi rezultatov lestvice oblikujejo izboljšave, prilagojene tipu prostora. Na rekreacijskih območjih je tako smiselno dati prednost vzdrževanju ter vizualni urejenosti in berljivosti okolja (tj. kakovosti), na stanovanjskih in trgovskih območjih ter območjih javnih ustanov pa je priporočljivo krepiti arhitekturno zanimivost, umetniške poudarke in vizualno raznovrstnost prostora (tj. privlačnost). Na potniških terminalih naj bo poudarek na preglednih usmerjevalnih tablah, sedišči, zavetju in osnovnem udobju (tj. funkcionalnosti), na vseh urbanih prostorih pa bi bilo treba zagotoviti priložnosti za psihološki odmik in sproščanje (tj. celovito sprostitev).

Pomembno je tudi spoznanje, da ni treba, da urbano okolje posnema naravo, da bi ga ljudje doživljali kot obnovitvenega. Tudi zelo prometne trgovske ulice ali postajališča javnega prometa omogočajo psihološko razbremenitev, če so oblikovani z upoštevanjem značilnosti zadevnega okolja. Tako je lahko na primer potniški terminal z jasnimi usmerjevalnimi oznakami, udobnimi sedišči in zadostno senco ali zavetjem bolj obnovitven kot slabo vzdrževan park.

Ker merska invariantnost med faktorji lestvice obnovitvene zmožnosti urbanih okolij ni bila potrjena, je potrebna previdnost pri uporabi skupnih rezultatov za razvrščanje ali neposredno primerjanje tipov urbanih prostorov (npr. parki dosegajo višje vrednosti kot postajališča javnega prometa). Lestvica je najprimernejša za uporabo v okviru posameznih tipov prostorov, bodisi za primerjanje alternativnih zasnov bodisi za spremljanje sprememb skozi čas. Lestvica tako zagotavlja okvir za znanstveno podprte oblikovalske odločitve, hkrati pa kaže, da obnovitvena zmožnost ni univerzalna formula, temveč je odvisna od okolja, saj nanjo vplivajo značilnosti posameznega okolja in potrebe uporabnikov.

4.3 Prednosti, omejitve in nadaljnje raziskave

4.3.1 Prednosti

Raziskava ima več pomembnih prednosti. Lestvica obnovitvene zmožnosti urbanih okolij zapolnjuje prepoznano vrzel, saj je zasnovana izrecno za urbana okolja, ne le na podlagi merskih orodij, ki so že bila oblikovana za naravne prostore. Poleg tega velik vzorec in širok razpon starosti udeležencev zagotavljata stabilne ocene parametrov in dobro reprezentativnost. S celovito psihometrično analizo, vključno s primerjavami alternativnih modelov ter preverjanjem veljavnosti in merske invariantnosti, so bile jasno potrjene struktura in značilnosti lestvice. Z uravnoteženim naborom dražljajev (po 19 fotografij za šest tipov urbanih prostorov) in zasnovo raziskave, pri kateri je vsak udeleženec ocenjeval samo eno fotografijo, so bili dodatno preprečeni učinki prenosa, hkrati je to omogočilo zanesljive večskupinske primerjave. H kakovosti podatkov in notranji veljavnosti raziskave so dodatno prispevali standardizirani pogoji ogleda fotografij in preverjanje pozornosti udeležencev.

4.3.2 Omejitve

Raziskava ima tudi nekatere omejitve. Udeleženci so bili izbrani s priložnostnim vzorčenjem v samo enem mestu, kar omejuje posplošljivost njenih izsledkov na širšo populacijo. Raziskavo bi bilo treba ponoviti v več kulturnih okoljih, kar bi pokazalo, ali se struktura faktorjev in vzorci, značilni za posamezni tip prostora, ponavljajo v drugih kulturnih okoljih. Za merjenje so bile uporabljene statične fotografije, ki zajamejo vizualne značilnosti, ne pa tudi multisenzoričnih, časovnih in družbenih razsežnosti živete izkušnje. Čeprav ta pristop omogoča čim večji eksperimentalni nadzor, je potrebna validacija na terenu, s katero se preveri, ali rezultati lestvice dejansko napovedujejo obnovitvene učinke v realnem okolju. Poleg tega podatki, pridobljeni z enkratno samoocenjevalno meritvijo, omejujejo možnost sklepanja o zanesljivosti ponovljenega testiranja in dopuščajo možno pristranskost zaradi uporabe skupne metode, čeprav so statistična preverjanja pokazala minimalno verjetnost za takšno pristranskost.

Čeprav so štirje faktorji, ki jih vključuje lestvica, teoretično utemeljeni in so pokazali dobre psihometrične lastnosti, morda lestvica ne zajema vseh razsežnosti obnovitvene zmožnosti urbanih okolij. Nekatere postavke, ki se nanašajo na privlačnost okolja, se lahko v nekaterih primerih razumejo kot močnejša spodbuda, z nadaljnjimi izboljšavami pa bi se formulacija lahko omilila, pri čemer bi se ohranila potrjena struktura lestvice. Odsotnost merske invariantnosti med tipi urbanih prostorov pomeni, da primerjave povprečij med prostori niso psihome-

trično upravičene. Raziskava ponuja začetne izsledke o zanesljivosti in izbranih vidikih veljavnosti lestvice, za prihodnje raziskave pa je še vedno nujna zunanja validacija na podlagi ločenih meritev posameznih vidikov obnovitvene zmožnosti (npr. fiziološkega okrevanja in sposobnosti vzdrževanja pozornosti).

4.3.3 Nadaljnje raziskave

Z nadaljnjimi raziskavami je mogoče razumevanje obnovitvene zmožnosti urbanih okolij izboljšati na tri načine. Najpomembnejša je validacija na terenu, s katero bi preverili, ali rezultati lestvice obnovitvene zmožnosti urbanih okolij dejansko napovedujejo obnovitvene učinke v realnem okolju. Z raziskavami, ki vključujejo ekološko veljavno ocenjevanje v trenutku, merjenje spremenljivk pred spremembo oblikovanja prostora in po njej ali fiziološke meritve (npr. sprememb srčnega utripa ali ravni kortizola), bi ugotovili, ali je zaznane ocene mogoče prevesti v merljive učinke obnove. Metode virtualne resničnosti bi lahko premostile vrzel med nadzorovanimi laboratorijskimi razmerami in kompleksnimi razmerami v realnem okolju. Drugič, raziskavo je treba ponoviti v drugih kulturnih okoljih, s čimer bi ugotovili, kako posplošljivi so njeni rezultati. Raziskave v več mestih in kulturnih okoljih bi razjasnile, ali je štirifaktorska struktura lestvice univerzalna ali se lahko uporablja samo v nekaterih kulturnih okoljih ter ali so v raziskavi ugotovljeni vzorci, odvisni od okolja (npr. kakovost kot najpomembnejši faktor v parkih), posledica univerzalnih psiholoških procesov ali lokalnih norm in pričakovanj. Tretjič, v prihodnjih raziskavah bi bilo treba mersko lestvico izpopolniti in razširiti, kar bi povečalo njeno uporabnost. Med prednostnimi nalogami so določanje zanesljivosti ponovnega testiranja, preverjanje konvergentne veljavnosti z uveljavljenimi lestvicami obnove (npr. PRS), preverjanje diskriminacijske veljavnosti glede na sorodne konstrukte (npr. estetske preference in zaznano varnost) in ugotavljanje, ali alternativne sheme razvrščanja urbanih prostorov pokažejo podobne vzorce. Razširitve bi lahko vključevale oblikovanje krajših različic lestvice za hitro ocenjevanje ali obsežnejših različic, ki bi vključevale posebnosti posameznih okolij (npr. vprašanja o usmerjevalnih prvinah na potniških terminalih).

5 Sklep

Avtor je v raziskavi oblikoval in validiral lestvico obnovitvene zmožnosti urbanih okolij – teoretično zasnovano mersko orodje, ki omogoča ovrednotenje obnovitvene zmožnosti v vsakdanjih urbanih okoljih. Psihometrične analize, opravljene s 1.001 udeležencem, so pokazale precejšnjo začetno zanesljivost in veljavnost lestvice ter potrdile uporabo štirifaktorske hierarhične strukture (kakovost, funkcionalnost, privlačnost in sprostitev). Glavna ugotovitev raziskave je, da je obnovitvena zmožnost urbanih okolij odvisna od tipa urbanega prostora: kakovost je najpomembnejša na rekreacijskih območjih, privlačnost na stanovanjskih in trgovskih območjih, funkcionalnost pa na potniških terminalih. Navedeno nasprotuje smernicam univerzalnega oblikovanja in potrjuje, da so smotrni posegi, prilagojeni posameznim tipom okolij. Za prakso je lestvica uporabno diagnostično orodje, ki omogoča prepoznavanje specifičnih prednosti in slabosti, kar je lahko podlaga za znanstveno utemeljene oblikovalske odločitve. Teoretično je raziskava pokazala, da je teorijo psihološke obnove mogoče smiselno razširiti na urbana okolja, če meritve poleg naravnih prvin vključujejo tudi prvine grajenega okolja.

Raziskava je pokazala, da ljudje obnovitveno zmožnost običajnih ulic, trgov in potniških terminalov doživljajo različno, odvisno od oblikovalskih značilnosti teh prostorov, kar odpira priložnosti za oblikovanje urbanih okolij, ki lahko bolj blagodejno vplivajo na človekovo psihološko počutje.

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Zhen XU

Javno zdravje kot alternativni vidik za razumevanje urbanističnega načrtovanja

Izvleček: V zadnjih dveh desetletjih se je število raziskav o vplivu urbanističnega načrtovanja na javno zdravje močno povečalo, pri čemer so bili številni izsledki preneseni v prakso na področju vrednotenja politik in urbanističnega oblikovanja. V nasprotju s tem je raziskav o vplivu javnega zdravja na urbanistično načrtovanje še vedno zelo malo. Proučevanje zgodovine urbanističnega načrtovanja z vidika javnega zdravja je dragoceno za razumevanje raznovrstnih plasti urbane preobrazbe in interpretacijo dejanske narave mesta kot človeškega habitata. S poznavanjem zgodovine urbanističnega načrtovanja je mogoč podrobnejši vpogled v razvoj in prostorski kontekst javnega zdravja, kar je ključno za prenos spoznanj v prihodnje urbanistično načrtovanje in oblikovanje.

Ključne besede: javno zdravje, zgodovina načrtovanja, urbana preobrazba, interpretacija

Zdravje prebivalcev in urbanizacija sta že od nekdaj neločljivo povezana pojma (Hutchison, 2010: 876–879). Skrb za zdravje je bila sestavni del načrtovanja najzgodnejših človeških naselbin, kar je razvidno že iz Hipokratove razprave *O zraku, vodi in krajih* (400 pr. n. št.) (Schneider in Lilienfeld, 2008: 5–24). Podobno kot vojne, naravne nesreče, družbenoekonomska nihanja in tehnične inovacije so tudi vprašanja javnega zdravja od 19. stoletja pomembno vplivala na preobrazbo mest.

Med izbruhom kolere v Londonu v petdesetih letih 19. stoletja je delo zgodnjih reformatorjev na področju urbanega zdravja pripomoglo k institucionalizaciji določanja namembnosti rabe tal, gradbenih predpisov, pitne vode in kanalizacije (Hutchison, 2010: 876–898; Porter, 1999: 403–415). Ti ukrepi so hkrati spodbudili razvoj sodobnega javnega zdravja, urbanističnega načrtovanja in sanitarnega inženirstva. Od takrat je prizadevanje za zdrava mesta postalo razlog za urbanizacijo in vizija urbanizacije ali celo izgovor zanjo (Castex in Samuels, 2004; Carr, 2014: 1–8), pri čemer so zdravstveni vidiki vse bolj določali obliko mest v 21. stoletju (Hall, 2001; Porter, 1999: 662–667, 710–718).

V zadnjih dveh desetletjih se je število raziskav o vplivu urbanističnega načrtovanja na javno zdravje močno povečalo, pri čemer je bilo veliko spoznanj prenesenih v prakso na področju vrednotenja politik in urbanističnega oblikovanja (Hutchison, 2010: 859–862, 876–898; Giles-Corti idr., 2016; Davis, 2022). Nasprotno je raziskav o vplivu javnega zdravja na urbanistično načrtovanje še vedno malo. V primerjavi z etiološko indukcijo rezultatov na področju javnega zdravja kot posledic urbanističnega načrtovanja in gradnje so tovrstne raziskave, ki temeljijo na družbenokulturni interpretaciji in sklepanju (Jackson idr., 2013; Scheer, 2016; Davis, 2022; Hensley idr., 2020), pogosto bolj zapletene in dvoumne. Zato je prav negotovost pri dedukciji in rekonstrukciji morda glavni razlog za vrzel na tem raziskovalnem področju.

Kratek pregled epidemij bolezni, ki se prenašajo po zraku, lahko razkrije zapletene in večplastne povezave med javnim zdravjem in grajenim okoljem, ki so izziv za interdisciplinarne raziskave. Med epidemijo kolere v Londonu v tridesetih letih 19. stoletja se je v skladu s takratnim prevladujočim zdravniškim znanjem – dediščino Hipokratovih prepričanj o vplivu zraka – bolezen pripisovala miazmam, ki naj bi jih povzročali vlaga, tema in slaba prezračenost mest (Porter, 1999: 662–667; Schneider in Lilienfeld, 2008: 403–415). Odprtost mestnega tkiva, ki je omogočila prodor svetlobe in zraka, je postala ena od priporočenih rešitev, skupaj s prostorskim ločevanjem, ki so ga utrjevali s skupnostnim upravljanjem. Novi tip trga obdanega s stanovanjskimi stavbami so podpirali investitorji, družbeni reformatorji in epidemiologi, hkrati pa je vplival na razvoj velikih mestnih parkov in koncepta predmestne hiše z

vrtom (Lawrence, 1993). Leta 1854 je John Snow, utemeljitelj sodobne epidemiologije, z analizo razširjenosti epidemije, vodnjakov in aktivnosti ljudi na ulici ugotovil, da kolere, ki je ubila na tisoče ljudi, ne povzročajo miazme, temveč mikrobi. Teorija o mikrobih kot povzročiteljih bolezni je nato vodila v postopno razhajanje med javnim zdravjem in urbanističnim načrtovanjem (Hutchison, 2010: 876–879). Vendar so v sedemdesetih letih 19. stoletja v Londonu ljudje dejansko umirali zaradi onesnaženega zraka (Schneider in Lilienfeld, 2008: 282–285), ta tudi danes še vedno povzroča smrti v številnih mestih. Ukrepi prostorskega ločevanja in razprševanja (vključno s suburbanizacijo), ki so bili pred sto leti uvedeni za izboljšanje javnega zdravja, danes ne povzročajo le onesnaženja zraka, temveč tudi kronične bolezni. Strokovnjaki s področja javnega zdravja so se zato ponovno povezali z urbanističnimi raziskovalci, da bi opredelili in obravnavali družbene dejavnike zdravja, in sodelujejo z urbanističnimi načrtovalci pri uvajanju ustreznih prostorskih posegov (Perdue, 2003; Hutchison, 2010: 876–879; Giles-Corti idr., 2016).

Tudi urbana preobrazba, ki se neposredno odziva na problematiko javnega zdravja, je večplastna, kar se kaže v urbanističnih predpisih in izvedbi. Dinamična zapuščina javnega zdravja je zapletena, saj vključuje nacionalne in lokalne kulturne posebnosti. Zato je proučevanje urbanih preobrazb in načrtovalskih pogledov ob skrbi za javno zdravje zahtevno in dolgotrajno, vendar kljub temu daje dragocene vpoglede v to, kako in zakaj so bila mesta zgrajena, ter v pretekle teorije urbanističnega oblikovanja (Moudon, 1997; Davis, 2022).

Za razumevanje, kako se je urbanistično načrtovanje spreminjalo v povezavi z javnim zdravjem, je pomemben okvir idej, interesov in institucije, pri katerem oblike in dinamika urbanistične morfologije razkrivajo elemente in procese v grajenem okolju (Conzen, 2018; Larkham, 2022; Hensley idr., 2020).

Od antike do srednjega veka je bila obramba ena izmed glavnih funkcij mest, ki so pri načrtovanju dajala prednost utrdbam. Čeprav sta bili v Rimu že leta 500 pr. n. št. zgrajeni *cloaca maxima* (velika kanalizacija) in druga pomembna sanitarna infrastruktura, se je sodobni kanalizacijski sistem v mestih na Zahodu ponovno uveljavil šele po javnozdravstveni krizi sredi 19. stoletja (Schneider in Lilienfeld, 2008: 5–24). Pozneje, v obdobju industrializacije, so sanitarni in higienski sistemi postajali čedalje pomembnejši, pomen obrambne funkcije pa se je manjšal. Učinek fiksacijske črte, ki ga ustvarja mestno obzidje, je postopno nadomestila sodobna infrastruktura, vključno s sanitarnimi in higienskimi sistemi, ki so omogočili širitev mest (De Feo idr., 2014; Rehman, 2022). Nastanek obmestnih zelenih pasov na začetku 20. stoletja lahko večinoma pripišemo gospodarskim in gradbenim ciklom. Za edvardijanske obmestne pasove so bili značilni obsežni odprti prostori, ki so omogočali raznovrstno rabo zemljišč, vključno s tisto, povezano z javnim zdravjem. Danes so priznani kot ekološki, kulturni in posledično tudi zdravju prijazni koridorji, v katerih je treba ohranjati odprtost prostora ali jo celo krepiti (Whitehand, 1994 3–17; Larkham, 2022: 205–209). Na ravni sosesk in posameznih parcel se težnja po zdravih krajih in zdravem življenju – zlasti v povezavi s svežim zrakom, svetlobo in možnostmi za telesno dejavnost – že od industrijske dobe kaže v raznovrstnih arhitekturnih in krajinskih prototipnih zasnovah (Carr, 2014: 1–8).

Vprašanja javnega zdravja in zlasti zdravstvenih kriz so dinamični dejavniki, ki vplivajo na grajeno okolje in načrtovalske politike. V 17. stoletju je bil na primer Nantes zaradi vlažnega zraka in organskih odpadkov, povezanih z industrijo, nehigiensko mesto. Od 18. stoletja so pozitivni posegi, kot so ravnanje in širjenje ulic, gradnja podzemne kanalizacije in zasipavanje rek, trajno preoblikovali urbano tkivo in strukturo mesta (Benzerzour idr., 2011). Kolera, ki je bila pozneje pripisana vodi, onesnaženi z mikrobi, ne več zraku (Porter, 1999: 402–415), je pomembno prispevala k odpiranju urbanega tkiva v Londonu, Parizu in drugih evropskih mestih od 19. stoletja (Lawrence, 1993). V zadnjem desetletju so bile sprejete številne prakse in politike, kot so pobuda za zdrava mesta v okviru ciljev trajnostnega razvoja OZN, strategija zdravega naroda in politika zdravega mesta na Kitajskem (obe sprejeti leta 2017), načrt za zdrav Los Angeles in načrt za razvoj Melbourna med letoma 2017 in 2050, ki bodo v bližnji prihodnosti verjetno vplivale na obliko mest.

Javno zdravje zato omogoča dodatno interpretacijo tega, kako se mesta oblikujejo, čeprav njegove povezave z urbanistično politiko in načrtovalskimi fazami morda niso tako stalne in vseprisotne kot gospodarski cikli. Gradnja in rušitve, javna infrastruktura in objekti, zakonodaja in institucionalni okvirji zagotavljajo opisni in razlagalni pogled na to, kako so na urbanistično načrtovanje vplivala javnozdravstvena vprašanja, kar je mogoče dodatno obogatiti z vidiki raznih akterjev, institucij in procesov ter ustrezno primerjalno analizo.

Proučevanje, kako se urbanistično načrtovanje spreminja v kontekstu javnega zdravja, je dragoceno za razumevanje raznovrstnih plasti urbane preobrazbe in interpretacijo dejanske narave mest kot človeških habitatov (Moudon, 1997). Tovrstne raziskave so pomembne tudi za poučevanje urbanističnega načrtovanja, saj so vprašanja javnega zdravja danes ključna tako na svetovni kot lokalni ravni. Univerze zagotavljajo skupne študijske programe s tega področja, ob tem se je število predmetov, povezanih z zdravjem in grajenim okoljem, izra-

zito povečalo. Hkrati številni študijski programi s področja urbanizma čedalje bolj poudarjajo pomen urbane morfologije, zgodovine urbanističnega načrtovanja in urbane dediščine (Moudon, 2015; Gu, 2018; Oliveira, 2018; Hein in van Dooren, 2020). S poznavanjem zgodovine urbanističnega načrtovanja je mogoč podrobnejši vpogled v razvoj in prostorski kontekst javnega zdravja, kar je ključno za prenos spoznanj v prihodnje urbanistično načrtovanje in oblikovanje. Poleg tega lahko vidik javnega zdravja obogati razumevanje družbeno-političnih vizij mest, kot smo jih lahko spremljali med pandemijo covida-19, in s tem prispeva k razumevanju prihodnje urbane preobrazbe v širšem smislu.

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Biografija

Zhen Xu je urbanist z državno licenco in profesor na Visoki šoli za krajinsko arhitekturo Univerze za gozdarstvo v Nandžingu na Kitajskem. V raziskavah se ukvarja s krajinsko analitiko, urbanističnim oblikovanjem, odprtim prostorom, zdravimi kraji, urbano morfologijo, krajinsko zgodovino in zgodovinskimi GIS. Članek je bil napisan v okviru dveh projektov, ki jih je financirala Kitajska nacionalna fundacija za naravoslovje in v katerih je bil glavni raziskovalec: Raziskava morfologije odprtega prostora v Nandžingu z uporabo zgodovinskega GIS (projekt št. 52078254) in Raziskava telesnih dejavnosti na odprtih mestnih prostorih na podlagi ocene vpliva na zdravje (projekt št. 51208264).

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A comprehensive assessment of social sustainability in the North Kazakhstan Region of Kazakhstan

With increasing territorial disparities in Kazakhstan, there is a growing need for a systematic assessment of social sustainability at the subregional level. This study develops and pilots an integrated social sustainability index for the districts of the North Kazakhstan Region based on fifteen indicators grouped into five key components: demography, healthcare, education, quality of life, and social integration. The methodology includes data normalization, indicator aggregation, and spatial analysis using GIS tools. The analysis reveals a stable yet markedly asymmetric territorial structure of social sustainability: although the regional centre (Petropavl) has relatively high values across most components, the majority of rural districts show persistent signs of demographic decline, social vulnerability, and insufficient access to basic services and infrastructure. A sensitivity analysis confirms the model's applicability under conditions of incomplete statistical reporting. Based on the results, a typology of districts is developed, and directions for territorially oriented social policy are proposed. The proposed methodology can be applied for interregional monitoring, social risk assessment, and justification of sustainable development priorities in regions with transitional demographic structures.

Keywords: social sustainability, demographic structure, spatial differentiation, North Kazakhstan Region, GIS, sustainability index, sustainable development goals

1 Introduction

Regional social sustainability is gaining relevance amid the implementation of the UN sustainable development goals (SDGs) and current socioeconomic challenges. Research highlights that social sustainability extends beyond basic needs, encompassing equity, inclusiveness, adaptability, and spatial justice. Accordingly, regional-level analysis is crucial because subnational territories often reveal the most acute disparities in access to services and development opportunities. The North Kazakhstan Region illustrates these challenges, marked by population decline, infrastructure gaps, and migration dependence. Despite national efforts to promote sustainable development, spatial differences in social sustainability across Kazakhstan's regions remain underexplored.

This study quantitatively assesses social sustainability across the North Kazakhstan Region's districts using a composite index. Emphasis is placed on selecting relevant indicators aligned with the SDGs and regional conditions, applying normalization techniques and using cartographic analysis. Spatial disparities are highlighted, and an evidence base is provided for a differentiated regional policy aimed at promoting sustainable territorial development.

The concept of social sustainability has undergone significant evolution in academic discourse, gaining increasing analytical significance within the context of regional sustainable development strategies. Studies emphasize that social sustainability goes beyond the simple provision of basic needs, encompassing aspects of inclusivity, equality, participation, and the capacity of communities to adapt to transformations. Eizenberg and Jabareen (2017) proposed a conceptual framework for social sustainability as a hybrid category combining the values of justice, safety, recognition, and participation, with a strong emphasis on spatial and social structures. Their work laid the foundation for integrating social sustainability into urban and regional planning, particularly in peripheral territories.

A significant theoretical contribution was made by Vallance et al. (2011), who distinguished three dimensions of social sustainability: development, maintenance, and adaptation. They argue that underestimating cultural and symbolic aspects leads to simplified models incapable of explaining sustainability in complex local contexts. Shirazi and Keivani (2020) analyse social sustainability in the context of urbanization, emphasizing social inclusion, housing justice, and access to opportunities. Their approach is applicable for assessing spatial inequality in urban environments and can be used to analyse the disparities between Petropavl and the rural districts of the North Kazakhstan Region.

At the international level, significant progress has been made in formalizing composite index systems. Geniaux et al. (2009) classify sustainable development indicator systems based on degree of aggregation, spatial coverage, and analytical purpose. Their classification is useful for comparing approaches used in Kazakhstan. Lacmanović and Tijanić (2025) explore the progress of social policy in the EU by applying the Social Progress Index (SPI), and Wang and Chen (2022) apply principal component analysis to assess social sustainability, demonstrating its effectiveness in reducing multidimensional data. The annual report of the Social Progress Imperative (2025) offers updated data and methodologies for assessing social progress, focusing on rights, health, and opportunities. The World Social Report by the United Nations (2025) provides a framework for assessing social sustainability through the lenses of equity and solidarity. The Sustainable Development Report by SDSN (2024) justifies the metrics for achieving the SDGs and provides a foundation for constructing comparable subnational indices. Examples of regional differentiation in social sustainability highlight the potential for using GIS and remote sensing technologies.

Kazakh researchers have made a substantial contribution to the advancement of sustainable development assessment methodologies. Nyussupova et al. (2021) demonstrated the potential of using GIS to monitor SDG indicators, which is particularly relevant for spatial assessments of social infrastructure in the North Kazakhstan Region. Kuanova et al. (2023) developed a regional sustainability index for Kazakhstan based on national statistical data and normalization methods. Aidarkhanova et al. (2025) constructed a predictive model of sociodemographic processes using business intelligence systems. Studies by Bektemyssova et al. (2025) and Satybaldin et al. (2025) proposed methodological approaches to clustering and adaptive evaluation of regional sustainability, emphasizing multidimensional indices and comparative spatial assessment. ESCAP reports (United Nations, 2023) emphasize the importance of spatial analytics in sustainable governance and advance the integration of geoinformation platforms into regional sustainable development policies. Thus, a review of existing approaches to assessing social sustainability underscores the need to develop a regionally adapted model that takes into account the specific demographic, infrastructure, and socioeconomic features of the North Kazakhstan Region.

This research makes a new contribution because, for the first time, a long-term district-level assessment of social sustainability has been conducted for a region of Kazakhstan. Unlike previous studies limited to interregional comparisons, the methodology allows for the identification of hidden intra-regional disparities and their correlation with the SDGs. The findings complement international research on transitional economies

and offer a reproducible platform for regular monitoring at the level of local governance. The hypothesis of the study is that regional differentiation in social sustainability in the North Kazakhstan Region necessitates implementing targeted sustainable development programmes aimed at reducing territorial disparities and improving the quality of life of the population. To test this hypothesis, a composite social sustainability index was calculated, followed by a spatial analysis of its distribution across the region.

2 Materials and methods

This study is based on a quantitative assessment of social sustainability across the administrative districts of the North Kazakhstan Region, using a composite index specifically developed for this purpose. The empirical foundation of the analysis is official statistical data from the Bureau of National Statistics of the Republic of Kazakhstan (BNS). Regional-level data were collected for thirteen districts and the city of Petropavl over a thirteen-year period (2011–2023) from the Taldau information and analytical system (BNS Taldau, no date) and the Sustainable Development Goals National Reporting Platform of Kazakhstan (no date).

To construct the composite social sustainability index, fifteen indicators were carefully selected and grouped into five thematic domains: demography, healthcare, education, quality of life and basic infrastructure, and social integration and safety. This structure was designed to capture the multidimensional nature of social sustainability by encompassing key factors that affect the quality of life in the region. Among the selected fifteen indicators, four fully correspond to official SDG target indicators: the unemployment rate (SDG 8.5.2), the availability of medical doctors (SDG 3.c.1), the proportion of households with access to water (SDG 6.1.1), and the crime rate per 100,000 population (approximating SDG 16.1.4). An additional nine indicators were classified as alternative or proxy indicators. These include, for example, the crude birth rate, which corresponds to reproductive health metrics, and the digital literacy rate, which reflects adult ICT competence. Two further indicators – overall mortality and age structure – while not directly included in the SDG framework, are widely used in international assessments of demographic resilience, including those by UNDP and OECD (Table 1). The principal criteria for indicator selection were 1) data availability for all districts of the North Kazakhstan Region and 2) official validation of the indicators in Kazakhstan's national statistical systems.

In the set "social integration and safety", objective indicators were used: unemployment rate, ratio of average wage to the subsistence minimum, and crime rate. These indicators reflect the formal conditions of economic inclusion and public safety, available in official district-level statistics for 2011 to 2023. Admittedly, subjective dimensions such as life satisfaction, perceived social connectedness, trust, and sense of security are important components of social sustainability. However, due to the lack of representative data at the district level, they were not included in the social sustainability index calculations.

Due to the lack of regional data on enrolment in higher and vocational education, the digital literacy rate was used as a proxy, reflecting basic ICT skills and serving as an approximate indicator of educational capital. To fill temporal gaps, an average was calculated for 2018, 2020, and 2021. The selected indicators reflect both global SDG principles and the practical limitations of regional statistics, balancing analytical rigor with data availability and ensuring the index's relevance for monitoring and spatial comparison.

Normalization was conducted via linear scaling (0 to 1), allowing comparability across indicators and ensuring that higher values indicate stronger social sustainability. Aggregation occurred in two steps: first, sub-indices were calculated for each thematic block; second, the social sustainability index was computed as the mean of these sub-indices, yielding a comprehensive score for each district and the regional seat. To assess the robustness of the final results, a sensitivity analysis of sub-index weights was conducted to examine how the ranking of districts would change under alternative weighting schemes. In addition to the baseline model with equal weights (20% assigned to each sub-index), two alternative configurations were tested: a) weights proportional to the factor loadings of the first principal component, reflecting statistical variance explained by each thematic dimension, and b) expert-assigned weights, reflecting the perceived priority of each sub-index in light of regional development challenges: 30% for healthcare, 25% for education, 20% for quality of life, 15% for demography, and 10% for social integration and safety.

The expert weights were determined through a consensus-based consultation with five academic specialists in demography, regional development, and social geography from Al-Farabi Kazakh National University. All experts have extensive experience in human capital assessment and regional sustainability studies in Kazakhstan, and their input was used to balance statistical and contextual relevance when assigning thematic priorities.

This weighting scheme is consistent with approaches used in previous sustainability studies that apply expert-based calibration (Gan et al., 2017; Mikulić et al., 2015; Abreu et al., 2022; OECD, 2008). A comparison of district rankings calculated under the three weighting schemes demonstrated high robust-

Table 1: Key indicators of the social sustainability index for the North Kazakhstan Region.

Indicator	SDG	Alignment with global SDG framework	Function within sustainability framework
A. Demography			
a1: Crude birth rate	3.1	Alternative to SDG 3.7.2 (adolescent birth rate)	Reflects level of population reproduction; aligned with international demographic practice
a2: Crude death rate	3.2	—	Fundamental indicator for assessing health risks and population ageing
a3: Net international migration balance	10.7	—	Indicates scale of population "outflow" due to labour and educational migration
a4: Share of children 0–14 and elderly 65+	3.c	—	Characterizes age structure and dependency burden on working-age population
B. Healthcare			
b1: Infant mortality rate (< 1 year)	3.2.1	Alternative to SDG 3.2.2 (neonatal mortality rate)	Key indicator of child health, sensitive to quality of healthcare and living conditions
b2: Availability of medical doctors	3.c.1	Full correspondence with SDG 3.c.1 (health workforce density)	Reflects access to healthcare services and capacity of health system
C. Education			
c1: Number of preschool institutions	4.2	Alternative to SDG 4.2.2 (participation in organized learning)	Early childhood development indicator that provides the foundation for further learning
c2: Digital literacy rate of population	4.4	Alternative to SDG 4.4 (ICT skills among adult population)	Reflects level of core competencies and cognitive capital
D. Quality of life and basic infrastructure			
d1: Housing provision	11.1	—	Reflecting comfort of housing conditions and degree of overcrowding
d2: Households with access to piped water	6.1.1	Alternative to SDG 6.1.1 (proportion of population using safely managed drinking water services)	Infrastructure-related indicator, but does not guarantee water quality
d3: Households with access to sanitation	6.2.1	Alternative to SDG 6.2.1 (access to adequate sanitation and hygiene)	Reflects basic sanitary and hygiene conditions aligned with decent standard of living and health
E. Social integration and safety			
e1: Unemployment rate	8.5.2	Full correspondence with SDG 8.5.2 (unemployment rate)	Indicator of economic integration of population
e2: Ratio of average wage to subsistence minimum	1.2.1	Alternative to SDG 1.2.1 (national poverty rate)	Reflects level of relative income adequacy and risk of poverty
e3: Crime rate	16.1.4	Alternative to SDG 16.1 (reduction of violence)	Indicator of public safety and social cohesion

ness of the results. The Spearman rank correlation coefficients between the baseline and alternative models were 0.89 (with PCA-based weights) and 0.77 (with expert-assigned weights), confirming the reliability and reproducibility of the index.

For interpretative purposes, three simple diagnostics were used to flag districts with potentially unstable year-to-year social sustainability index dynamics from 2011 to 2023: the coefficient of variation (CV) of annual social sustainability index values; the count of inter-class switches across the five social sustainability index tiers from year to year; and a mean-reversion share, defined as the proportion of years in which the absolute deviation from the district's long-run mean declined relative to the previous year. As a heuristic threshold, districts with CV > 0.12 and/or ≥ 4 tier switches over the period were treated as high-volatility cases for discussion. Short-term var-

iations were interpreted as oscillations that are not sustained over time and tend to revert toward the district's long-run average. These diagnostics are intended to guide interpretation and avoid over-generalization from small-number effects in sensitive indicators (e.g., infant mortality or crime), rather than to provide formal statistical testing.

The number of social sustainability levels was determined using Sturges' formula, which is commonly applied for categorizing small samples into statistically meaningful classes. The final range of the composite index values was evenly divided into five intervals. Based on this classification, districts were categorized as having low, below average, average, above average, or high levels of social sustainability. Using the distribution of the final social sustainability index, the following interval thresholds were determined for the North Kazakhstan Region: low (0.000–0.380), below average (0.381–0.490), average (0.491–0.600), above average (0.601–0.710), and high (above 0.711).

This approach ensures consistency and comparability of classification over time, allowing for stable gradation in future monitoring cycles. Spatial analysis was performed using methods of cartographic visualization and geoinformation modelling in ArcGIS 10.8. Spatial data were integrated into the system to produce thematic maps showing the distribution of the composite index and its component sub-indices across administrative-territorial units. The cartographic outputs made it possible to identify geographical patterns that reveal both sustainable and vulnerable district-level positions within the region.

3 Results

3.1 Long-term trends (2011–2023)

Between 2011 and 2023, the composite social sustainability index of the North Kazakhstan Region had a complex and uneven trajectory. The initial years of the study period were characterized by relatively low index values across most districts, primarily due to a combination of demographic decline, infrastructure deficits, and economic constraints. However, from the mid-2010s onward, a gradual upward trend in social sustainability scores became evident. This improvement is associated with the implementation of social sector modernization programmes, enhanced access to healthcare and education services, and a degree of stabilization in infrastructure development. The pace of this growth, however, was tempered by ongoing demographic pressure: population loss driven by both natural decline and out-migration remained a persistent structural constraint (UNDP Kazakhstan, 2020). By 2017–2019, index values across districts began to converge, indicating that several territories had reached a relative plateau of sustainability. During this period, further positive changes slowed, and inter-district differentiation stabilized. The COVID-19 pandemic, which peaked in 2020–2021, introduced short-term disruptions to the established dynamics. A decline in index values was observed, primarily due to deteriorating health indicators (increased mortality and a greater burden on healthcare systems) and a temporary reduction in quality of life (World Bank, 2021). Nevertheless, by 2022, conditions had partially stabilized, and key sub-indexes returned to pre-pandemic levels. Despite this recovery, the overall demographic situation continued to worsen, thereby constraining the full rebound of the composite index.

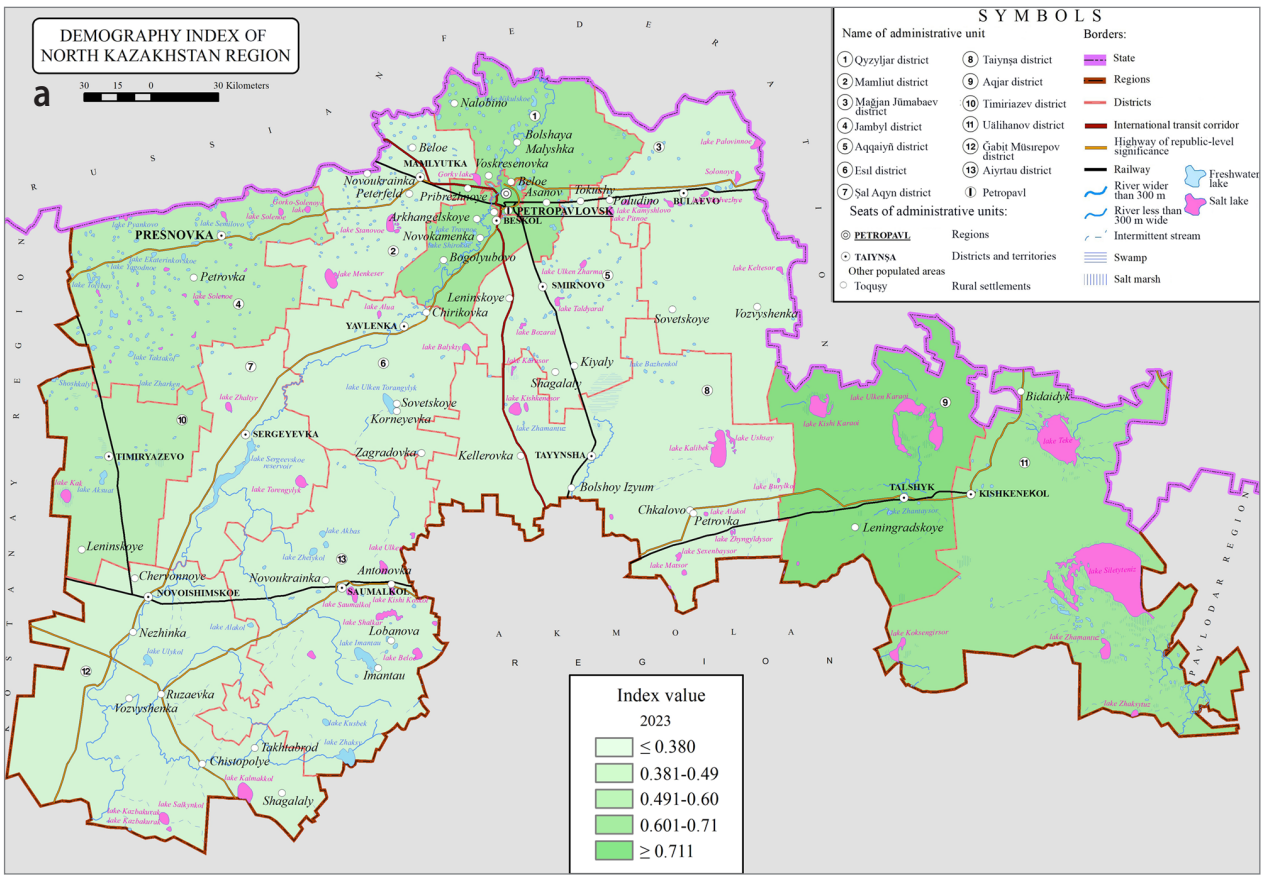
As a result, over the entire study period, the social sustainability index for the North Kazakhstan Region had a moderately positive dynamic, without evidence of a pronounced breakthrough. Improvements in education, healthcare, and quality of life have largely offset the negative effects of ongoing demographic trends. According to official sources, the region's population declined by nearly 9% over the past decade (BNS, no date), which has constrained the potential for sustained growth in the composite index. Thus, the observed trajectory reflects the emergence of a stable yet unevenly distributed positive trend, marked by stagnation in recent years. A significant gap persists between districts with high and low levels of social sustainability, indicating the need for targeted policy and investment efforts aimed at strengthening resilience in the region's most vulnerable territories.

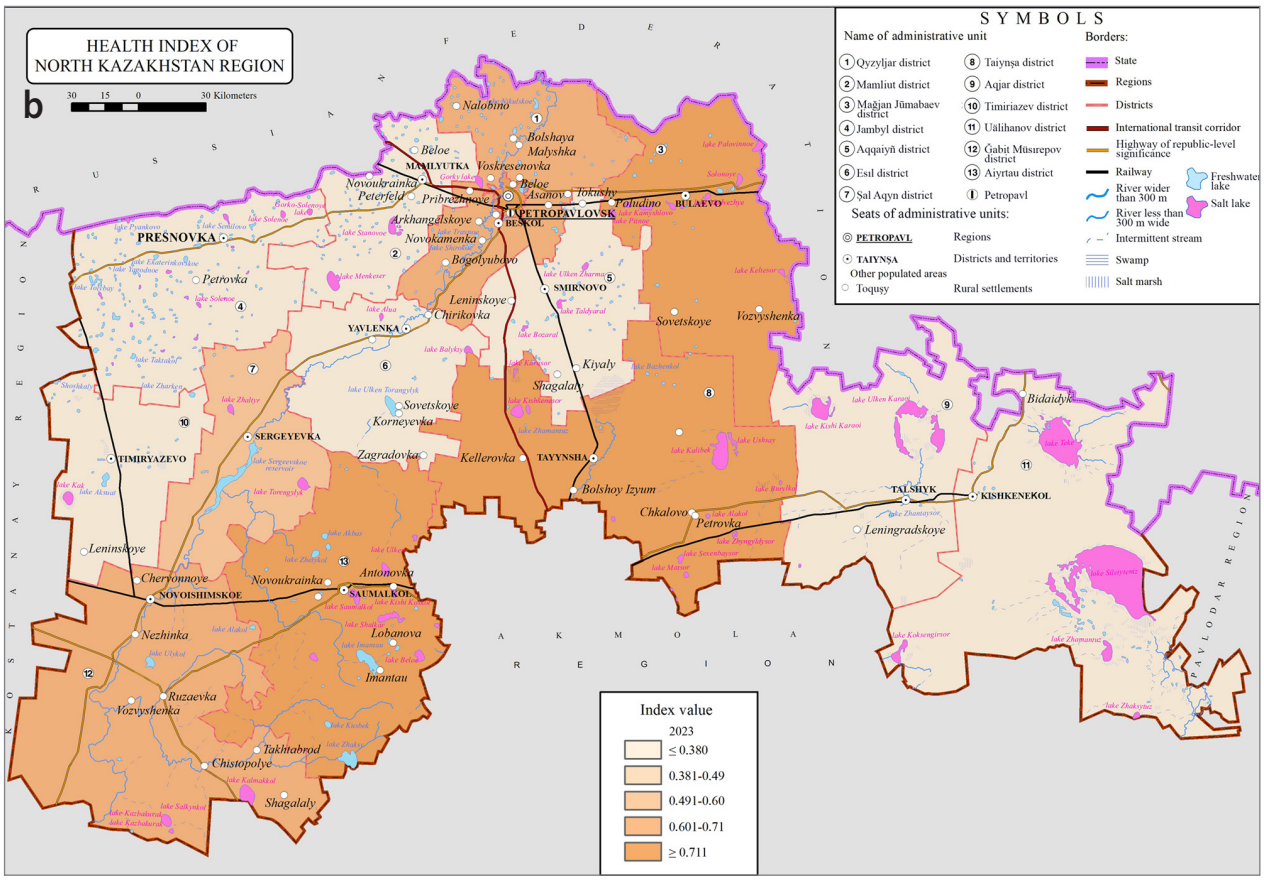
3.2 Regional clustering of sustainability

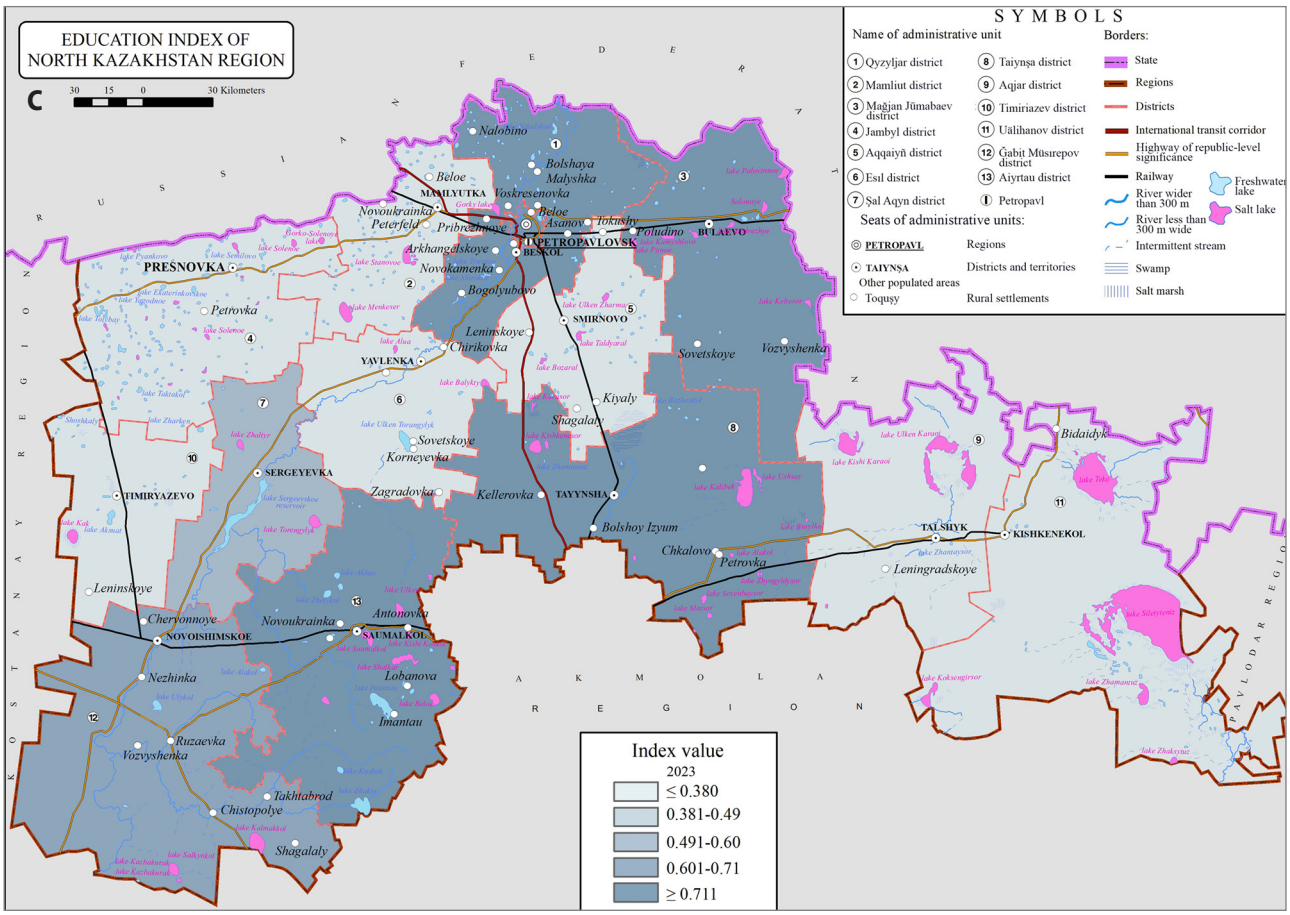
By the end of 2023, all thirteen districts and the city of Petropavl were grouped into five categories based on their social sustainability levels, derived from the composite index. These categories reveal clusters of territories with similar profiles across key sub-indices: demography, healthcare, education, quality of life, and social integration. A high level of social sustainability was recorded only in Petropavl, which outperformed all districts across major components. This is linked to the city's concentration of socioeconomic resources, strong institutional capacity, and developed infrastructure. High access to healthcare and education, reliable gas and water systems, and comparatively low poverty and unemployment contribute to its comprehensive and resilient sustainability profile.

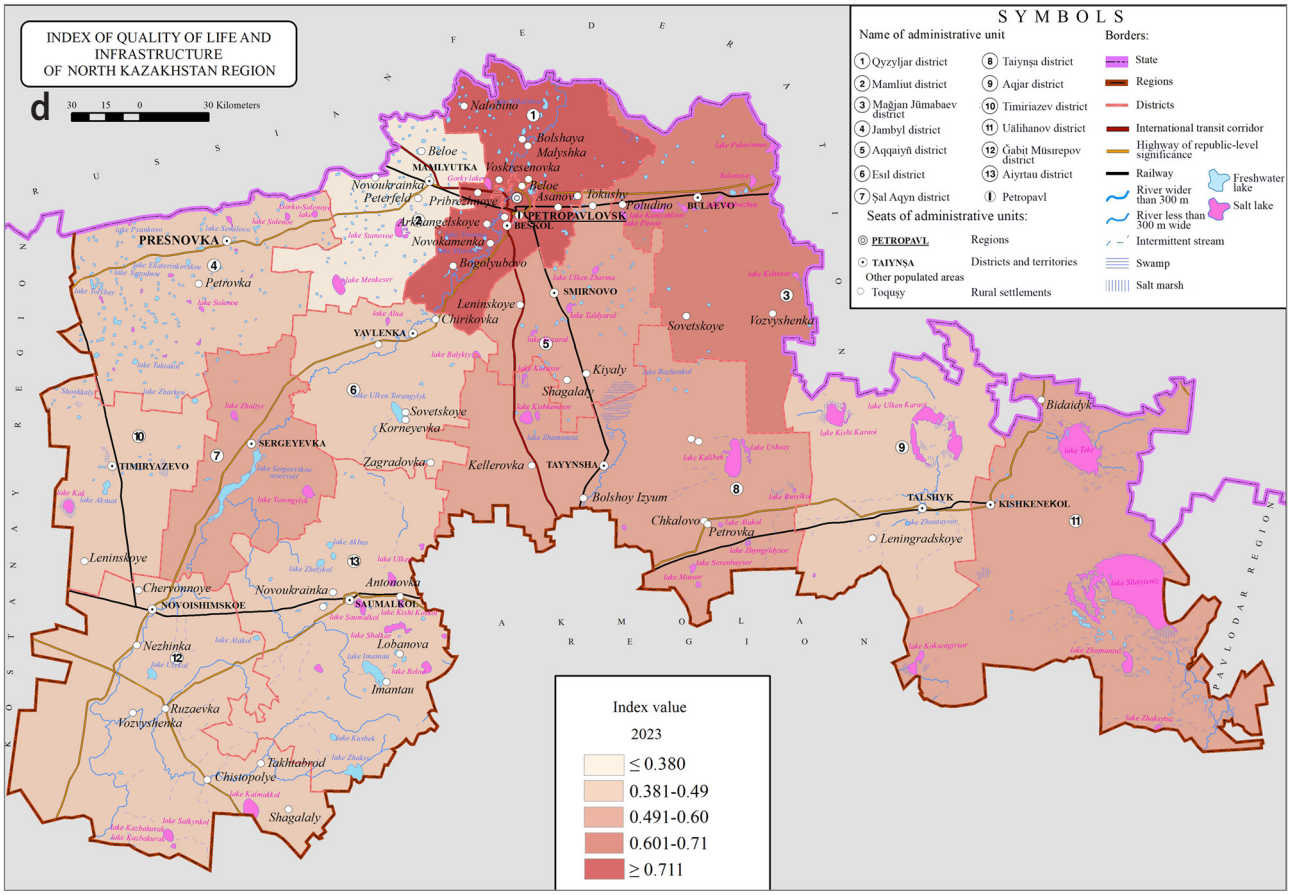
The above-average sustainability group includes the Qyzyljar district and Ǧabit Müsırepov district. The former benefits from its geographic proximity to the regional seat, and the latter stands out due to its agro-industrial base and recent improvements in social infrastructure. Both districts consistently demonstrate strong performance in the sub-indices of healthcare, education, and quality of life (Figure 1).

Figure 1: Spatial distribution of social sustainability sub-index values across the districts of the North Kazakhstan Region, 2023: a) demographic index; b) health index; c) education index; d) index of quality of life and infrastructure; e) index of social integration and environmental safety (maps: authors, based on official statistical data).






EDUCATION INDEX OF
NORTH KAZAKHSTAN REGION
c
30 15 0 30 Kilometers
SYMBOLS
Name of administrative unit
1 Qyzyljar district
2 Mamliut district
3 Mağjan Jūmabaev district
4 Jambyl district
5 Aqqaiyň district
6 Esil district
7 Şal Aqyn district
8 Taiynşa district
9 Aqjar district
10 Timiriazev district
11 Ualihanov district
12 Ğabit Müsirepov district
13 Aiyrtau district
Petropavl
Seats of administrative units:
PETROPAVL Regions
TAIYNŞA Districts and territories
Other populated areas
Toquşy Rural settlements
Borders:
State
Regions
Districts
International transit corridor
Highway of republic-level significance
Railway
River wider than 300 m
River less than 300 m wide
Intermittent stream
Swamp
Salt marsh
Freshwater lake
Salt lake
Index value
2023
≤ 0.380
0.381-0.49
0.491-0.60
0.601-0.71
≥ 0.711
PRESNOVKA
MAMLYUTKA
PETROPAVLOVSK
BESKOL
BULAEVO
SMIRNOVO
YAVLENKA
SERGEYEVKA
TIMIRYAZEVO
TAYYNSHA
TALSHYK
KISHKENEKOL
NOVOISHIMSKOE
SAUMALKOL
Nalobino
Bolshaya Malyshka
Beloe
Voskresenovka
Novoukrainka
Peterfeld
Pribrezhnoye
Asanov
Tokushy
Poludino
Arkhangelskoye
Novokamenka
Bogolyubovo
Petrovka
Leninskoye
Chirikovka
Sovetskoye
Voziyshenka
Kiyaly
Shagalaly
Korneyevka
Zagradovka
Kellerovka
Bolshoy Izyum
Chkalovo
Bidaidyk
Leningradskoye
Cheryomnoye
Antonovka
Nezhinka
Lobanova
Imantau
Ruzaevka
Takhtabrod
Chistopolye
KOSTANAY REGION
AKMOLA REGION
PAVLODAR REGION


INDEX OF QUALITY OF LIFE AND
INFRASTRUCTURE
OF NORTH KAZAKHSTAN REGION
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SYMBOLS
Name of administrative unit
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Bolshaya Malyshka
Beloe
Voskresenovka
Novoukrainka
Peterfeld
Pribrezhnoye
Asanov
Tokushy
Poludino
Arkhangelskoye
Novokamenka
Bogolyubovo
Petrovka
Leninskoye
Chirikovka
Sovetskoye
Voziyshenka
Kiyaly
Shagalaly
Korneyevka
Zagradovka
Kellerovka
Bolshoy Izyum
Chkalovo
Bidaidyk
Leningradskoye
Cheryomnoye
Antonovka
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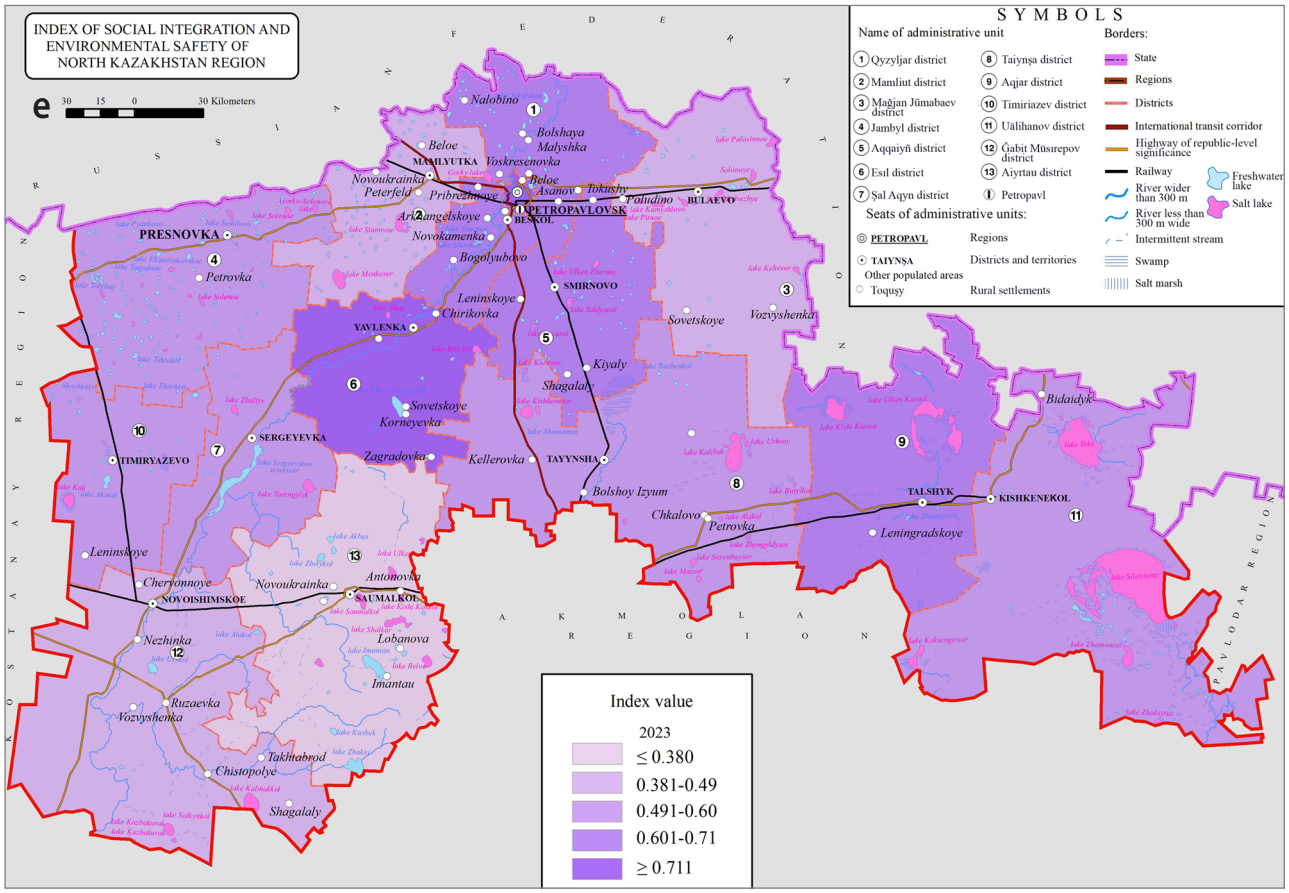

A medium level of social sustainability was recorded in the Taiynşa, Aiyrtau, Jambyl, and Mamliut districts. These territories are characterized by balanced performance across all components, without notable achievements or severe deficiencies. Their sub-index values fluctuate near the regional average, reflecting a relatively stable, though unspectacular, sociodemographic profile. The below-average group includes the Aqqaiyñ district and Mağjan Jūmabaev district. These areas are constrained by relatively weak demographic indicators, limited access to quality healthcare, and insufficient basic infrastructure. The accumulation of social challenges in these districts has resulted in lower composite index values (Institute of Economic Research, 2021). The low sustainability group comprises the districts of Aqjar, Uälihanov, and Şal Aqyn. These remote and sparsely populated rural areas exhibit critically low values across all components. Their profile is shaped by infrastructure isolation, demographic decline, and limited employment opportunities – factors that collectively contribute to chronic social vulnerability. Access to education, healthcare, and essential living conditions in these districts remains significantly below the regional average.

This spatial distribution of social sustainability confirms the city-centric nature of regional development: Petropavl forms a distinct core of social resilience, and the more remote districts remain in a zone of persistent vulnerability. Most rural territories occupy intermediate positions, underscoring the need for a territorially differentiated regional policy aimed at addressing spatial disparities and enhancing local capacities.

3.3 Structural decomposition of the index

An analysis of the structure of the composite index reveals the territorial specificity in the formation of social sustainability. The five sub-indices collectively determine the overall assessment; however, their relative contributions vary significantly between leading and lagging districts.

Petropavl has a balanced and uniformly high profile, with all five sub-indices exceeding the regional average (Figure 2). Three of them – education, healthcare, and quality of life – reach the highest values across the entire region. Petropavl holds a leading position in the education component due to its high rates of preschool and higher education coverage, supported by the presence of universities and vocational colleges.

The city also ranks first in the healthcare sub-index, benefiting from a high density of medical personnel, the presence of specialized facilities, and favourable demographic health indicators, including infant mortality and life expectancy (Sus-

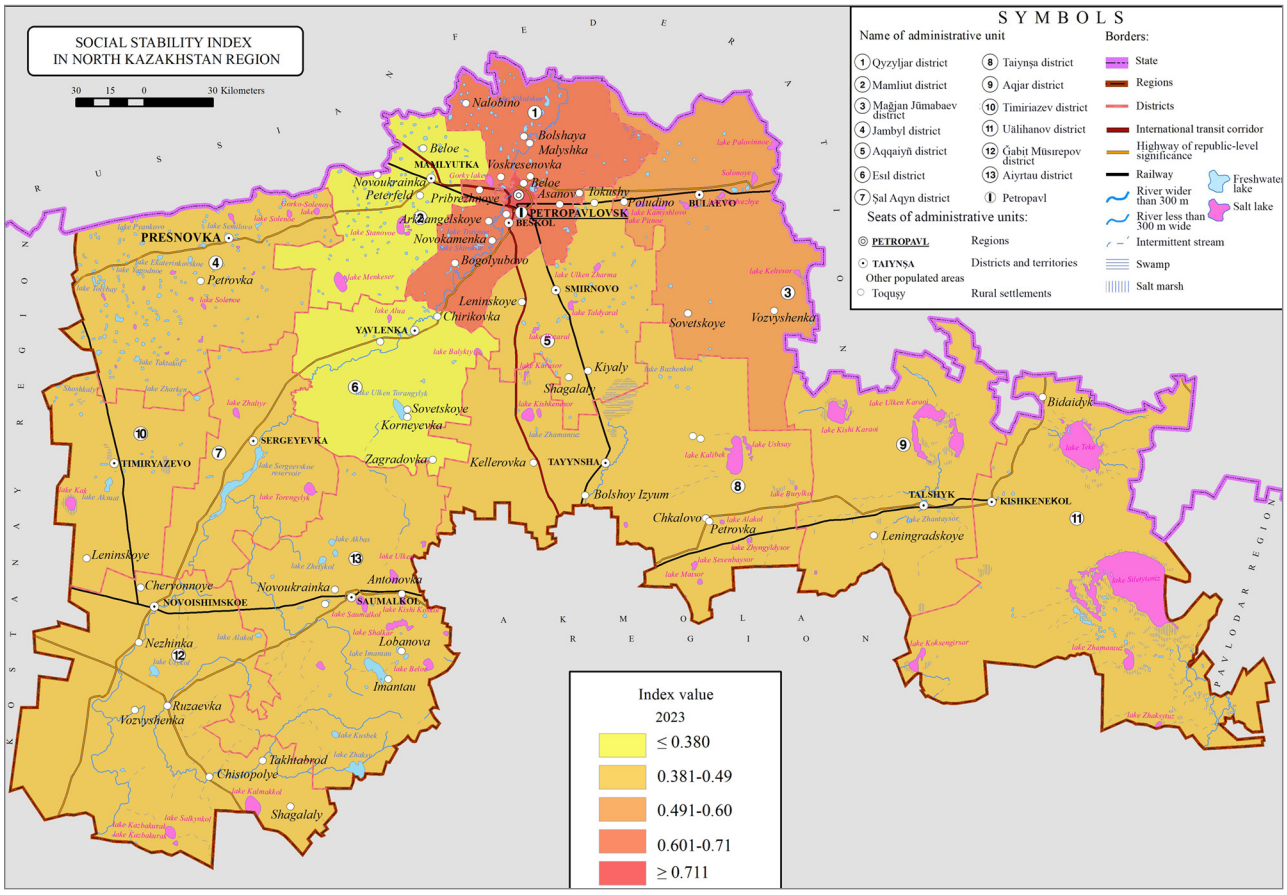

Figure 2: Spatial distribution of the social sustainability index across districts of the North Kazakhstan Region, 2023 (map: authors, based on official statistical data).

tainable, no date). The quality of life sub-index in Petropavl is driven by its extensive coverage with utility services: more than 95% of households are connected to centralized water supply and heating, and a significant portion have access to gas. Active residential construction and the availability of apartment housing further contribute to strong infrastructure performance.

In the social integration sub-index, the city has moderately high values supported by low unemployment and a relatively small proportion of the population living below the subsistence minimum. The only relatively weaker dimension is safety because the level of registered crime in the city is traditionally higher than in rural areas, which slightly reduces the final value of the social integration sub-index (BNS, no date).

In contrast, districts such as Uälihanov and Aqjar have what may be described as a "declining profile": the values across all five sub-indices remain low, without any significant compensatory advantages (Figure 2). The demographic component pulls down the composite index due to persistently high mortality rates, which exceed birthrates, and active out-migration. The healthcare sub-index is negatively affected by personnel shortages, remoteness from medical institutions, and less favourable health outcomes. The education component in these remote districts is largely limited to primary and secondary education, and the share of the population with higher education is significantly lower than in the regional seat. Infrastructure provision is chronically underdeveloped: many villages lack a reliable water supply and centralized heating, road quality remains poor, and gasification levels are minimal. Social integration is further weakened by a high share of the population living below the poverty line, restricted access to labour markets, and general economic stagnation. Under such conditions, even a relatively low crime rate has little impact on improving the overall index score.

Consequently, leading districts benefit from multi-component reinforcement, in which each sub-index amplifies the effects of the others, producing a synergistic effect. In contrast, lagging districts experience a cumulative weakening, in which negative factors across multiple domains undermine the structure of sustainability as a whole. This imbalance calls for a territorially differentiated policy approach. In the case of Petropavl, the key task is to maintain the level of sustainability achieved and to enhance resilience to future shocks. In contrast, peripheral districts require targeted interventions in their most vulnerable components – primarily infrastructure, healthcare, and demographic stability – to overcome structural disadvantages and close the sustainability gap.

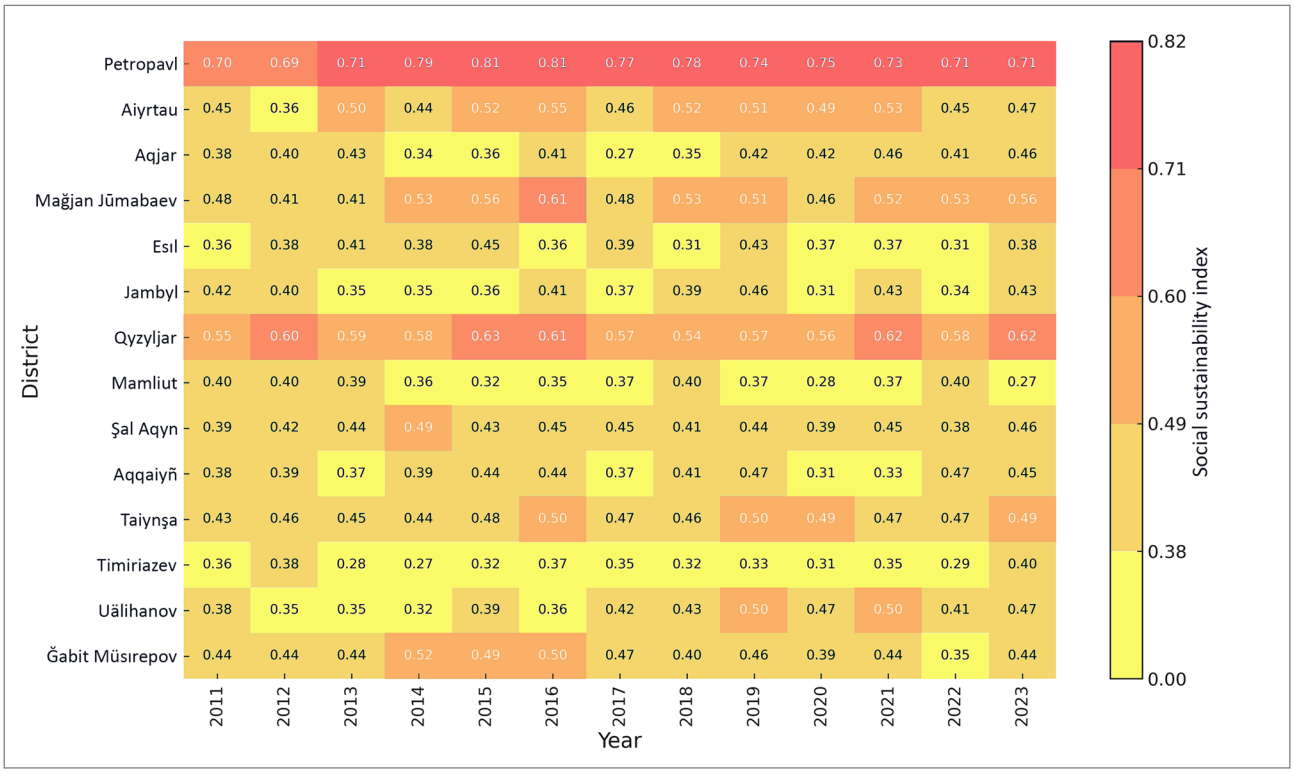

Figure 3: Dynamics of the social sustainability index across the districts of the North Kazakhstan Region, 2011–2023 (illustration: authors, based on official statistical data).

3.4 Typology of districts in the North Kazakhstan Region by level of social stability

An analysis of the dynamics of the social sustainability index across the administrative districts of the North Kazakhstan Region from 2011 to 2023 reveals both consistently stable and highly volatile territories. Stability is observed at both the high and low ends of the sustainability spectrum. For example, Petropavl consistently held a leading position in the composite index throughout the entire study period. At the opposite end, chronically low-performing districts were also identified. The Uälihanov and Şal Aqyn districts remained in the bottom quintile of the regional ranking over the entire period. Minor year-to-year fluctuations did not affect their overall standing, indicating entrenched socioeconomic disparities and the absence of effective mechanisms for adaptation to demographic and infrastructure challenges.

In addition to persistently high- and low-performing districts, several areas in the region exhibited considerable variability in sustainability performance. For instance, the Taiynşa district was initially classified at a medium level of sustainability but, due to investments in the social sector, the modernization of educational and transport infrastructure, and the launch of new industrial facilities, it improved its standing in the 2020s and entered the above-average category (Prime Minister, 2020). A reverse trend was observed in the Mağjan Jūmabaev district. The district performed near the regional average during the first half of the period, but a marked decline was recorded after 2017. Increased out-migration, the downsizing of the social service network, and the deterioration of basic infrastructure led to falling sub-index values, placing the district in the below-average sustainability category (MTRK, 2021; Figure 3).

Sparsely populated districts tend to exhibit higher year-to-year volatility of the social sustainability index. Using the screening definitions introduced in Section 2 (CV and tier-switch counts, complemented by a simple mean-reversion share), several districts are flagged as high-volatility cases, in which small absolute changes in sensitive components (e.g., infant mortality or crime) can produce visible swings in normalized values. In most such cases, the direction of change is not persistent beyond one to two years, and the index reverts toward its long-run average, which is termed *short-term variation* here. With regard to policy, this pattern supports a distinction between maintenance and incremental improvement in consistently high-sustainability districts, and stabilization measures in high-volatility districts – multiyear funding cycles, protected staffing for physicians and teachers, and territorially targeted governance instruments – to dampen acute swings and reduce exposure to shocks.

4 Discussion

4.1 Interpretation of findings

The integrated assessment of social sustainability in the districts of the North Kazakhstan Region (2011–2023) reveals persistent spatial polarization, with marked differences between urban and rural areas. The highest index values are concentrated in Petropavl, confirming an urban-centric sustainability model, in which population density, resources, and institutional capacity support high levels of social provision. The balanced performance across all sub-indices indicates integrated urban development, despite a slightly elevated crime rate. Rural districts display considerable variation. Although some central and southern districts (e.g., Qyzyljar and Ğabit Müsırepov) show positive trends, aided by proximity to the regional seat and investment, northeastern and border areas remain at consistently low levels. This reflects not only current socioeconomic conditions but also structural legacies: demographic decline, weak infrastructure, and poor connectivity.

Sub-index analysis reveals that underperformance in lagging districts stems from systemic deficits: demographic shrinkage, limited service access, infrastructure gaps, and persistent poverty. These factors reinforce each other, producing cumulative vulnerability. In terms of temporal dynamics, although urban centres and selected districts have improved, others – such as Aqjar, Uälihanov, and Şal Aqyn – remain chronically low-performing. This inertia suggests structural resistance to change and a lack of adaptive policy measures. The overall stability of rankings confirms both the model's robustness and the entrenched nature of territorial inequality.

4.2 Comparison with previous studies

The findings of this study are consistent with the conclusions drawn in earlier research on territorial resilience and regional differentiation in post-Soviet and developing countries. As noted by Gan et al. (2017) and Abreu et al. (2022), the resilience of territories is shaped not only by formal macroeconomic indicators, but also by structural balance in access to basic social services, demographic potential, and the quality of the environment. From this perspective, the observed dominance of the regional seat and the vulnerability of remote districts align with global trends in asymmetric regional development, as documented in Central Asia, eastern Europe, and Latin America.

In the case of Kazakhstan, these results corroborate and expand upon findings by UNDP Kazakhstan (2020), the Institute of Economic Research (2021), and Zhanibayeva (2022), which emphasize the structural inequality between urban and rural areas. In particular, issues such as limited access to basic services, a shortage of labour resources, and low income levels in rural districts of the northern regions have previously been identified as key barriers to achieving sustainable regional development (OECD, 2008). Unlike more aggregated approaches as part of which analysis is conducted at the oblast or macroregional level, this study offers a micro-level perspective by mapping social sustainability at the district level. This approach makes it possible to identify not only general development patterns but also intra-group disparities that are often obscured by aggregated indicators. Furthermore, the use of an integrated index with sensitivity analysis of weights helps mitigate methodological bias, enhancing the reliability of inter-territorial comparisons. Similar models have been applied in studies in India, Turkey, and Latin America, where district- or municipal-level assessments have proven highly effective in identifying local hotspots of social vulnerability (CEEW, 2020; DST-GoI, 2024; Tanır et al., 2022; IPEA, 2015; Menezes et al., 2018; León-Cruz et al., 2024). Thus, the results obtained are in line with and confirm international trends while making a significant contribution to the understanding of Kazakhstan by providing high spatial resolution and a comprehensive calculation model. This enhances their relevance for integration into policy-making and regional governance practices.

4.3 Strengths and limitations of the approach

The proposed approach to assessing social sustainability has several important methodological and practical strengths. By integrating five interrelated sub-indices it provides a comprehensive assessment of the social sphere at the district level, moving beyond fragmented analyses toward a holistic understanding of sustainability. A major advantage lies in transparent data normalization and the use of multiple weighting schemes. Sensitivity analysis confirmed the consistency of district rankings across these models, enhancing the robustness of results and reducing potential bias, in line with international guidelines (Gan et al., 2017; OECD, 2008). The use of GIS tools, particularly ArcGIS, allowed the visualization of index values and dynamics, revealing spatial patterns and areas of elevated risk. These visual outputs improve the accessibility of results for both experts and decision-makers.

However, several limitations should be noted. The reliance on official district-level statistics constrains the ability to capture intra-district disparities, especially between urban centres and remote villages, potentially leading to aggregation bias. In addition, some dimensions – such as informal institutions, perceptions of justice, or governance quality – remain beyond the scope of available data and would benefit from complementary qualitative research. The timeframe (2011–2023) is

adequate for short- and medium-term analysis, but it limits insight into the long-term impacts of structural reforms. Future studies should consider extending the temporal horizon and integrating scenario-based forecasts. In sum, despite these constraints, the methodology proves effective in data-limited contexts and offers a sound basis for monitoring social sustainability and informing regional policy.

The absence of comparable subjective indicators at the district level – such as life satisfaction, social cohesion, and trust – limits the completeness of the "social integration" dimension. For future monitoring rounds, the following is proposed 1) introducing a survey module of eight to ten questions with an annual stratified sample of three hundred to four hundred respondents; 2) hybridizing the index through a latent variable "social engagement" (confirmatory factor analysis) calibrated against unemployment, income, and crime indicators; and 3) regularly incorporating municipal administrative data (participation in volunteering) as indirect proxies.

4.4 Policy and planning implications

The results obtained directly link the initial research hypothesis with the need for targeted sustainable development programmes at the subregional level. The social sustainability index mapping revealed a stable core (Petropavl and adjacent municipalities) and a perimeter of chronic vulnerability (remote, sparsely populated districts). This indicates that universal equalization measures will be insufficient: differentiated intervention packages are required, combining infrastructure investments (water supply, gasification, roads, and digital connectivity), strengthening of human capital in healthcare and education, and economic incentives to retain young people and qualified specialists. In practical terms, this implies a transition toward district-level "sustainability roadmaps", in which goals and funding are aligned with subindex profiles, and monitoring is conducted based on the annual updating of social sustainability index indicators.

To align the findings with local policy implementation, it is advisable to cluster policy measures as follows:

- A high-sustainability core (Petropavl): maintaining achieved levels through preventive health programmes, urban safety initiatives, fine-tuning of education and ICT competencies, and effective management of migration and housing.
- Medium and above-average sustainability (the Qyzyljar and Ğabit Müsırepov districts): implementing "growth accelerators" such as upgrading infrastructure to urban standards, expanding access to specialized medical services, vocational colleges and IT courses, and developing local employment programmes.
- Below-average and low sustainability (Uälihanov, Aqjar, Şal Aqyn, and others): ensuring stabilization through basic infrastructure improvements (water, sanitation, roads, communications), targeted medical staffing and incentive contracts for teachers and doctors, creation of local economic activity hubs (small-scale processing and logistics), and prioritized targeted support for households.

The findings have strong practical relevance for regional policy, particularly regarding the sustainable development goals – reducing inequality (SDG 10) and promoting health (SDG 3), education (SDG 4), infrastructure access (SDG 11), and institutional capacity (SDG 16). The concentration of high social sustainability in Petropavl and nearby suburbs underscores the need to revise uniform infrastructure policies. Structural disparities in rural areas require adaptive planning and targeted support for districts with persistently low sub-index values – especially in healthcare, infrastructure, and demography. The clustering of districts by sustainability levels supports a differentiated policy approach. Lagging areas such as Aqjar and Uälihanov require integrated strategies: upgrading medical and educational facilities, improving transport and digital connectivity, and fostering employment through local enterprise development. Social support must be closely linked to economic and infrastructure interventions.

Another priority is the institutionalization of monitoring mechanisms. The composite index developed can be incorporated into regional development tools, allowing regular data updates, dashboard visualizations, and integration with funding programmes. This would facilitate more effective needs-based investment planning. Promising districts such as Taiynşa and Qyzyljar, which show upward trends, can serve as pilots for innovation in social services and the digital economy. Scaling successful models while adapting them to local contexts may foster a more balanced and resilient regional system. In conclusion, this study offers not only a snapshot of current territorial disparities but also a policy framework to reduce spatial inequality and enhance the adaptive capacity of vulnerable districts.

5 Conclusion

Using an integrated social sustainability index, persistent territorial disparities and long-term spatial inequality trends were identified in the North Kazakhstan Region. Urbanized and resource-concentrated areas, such as the city of Petropavl and its surrounding suburbs, are the most sustainable areas in this region. In contrast, remote and sparsely populated districts exhibit structural vulnerability, characterized by demographic depopulation, limited access to basic services, and a weak economic base. This confirms the existence of a spatial divide

that cannot be addressed through universal policy measures and instead requires territorially sensitive strategies. Priority areas should include the stabilization of demographic processes, improvement in the accessibility and quality of healthcare and education, infrastructure modernization, and human capital support in peripheral districts. Moreover, the integration of spatial planning tools and digital technologies is essential to improve the targeting and effectiveness of decision-making.

Thus, the hypothesis that territorial differentiation of social sustainability in the North Kazakhstan Region necessitates targeted programs to reduce disparities and improve quality of life is confirmed. The results presented in this study can serve as a foundation for monitoring regional disparities, guiding territorial development planning, and shaping equitable social policy within Kazakhstan's sustainable development agenda. The composite index developed can be adapted for application in other regions of the country, integrated into the monitoring system of territorial development programmes, and used to justify the priority allocation of resources. The proposed typology of districts and the operationalized subindices make it possible to directly translate the results into the design of district-level sustainable development programmes, results-based budgeting, and annual monitoring of target indicators.

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Selecting a bus terminal location in Uşak, Turkey, using a hybrid multicriteria decision-making model

The location of a bus terminal is crucial for efficient urban transportation and sustainable urban mobility. The location determines visitors' access to the city and safe, accessible, and economical transportation options. It also affects residents' access to employment, education, and health services and their efficiency, shaping the city's overall socioeconomic wellbeing. This study determines the optimal location for a new bus terminal in Uşak, Turkey, considering efficient operation of the city's transportation systems. The methodology employs a hybrid multicriteria decision-making model that evaluates twenty criteria, integrates the needs of residents and local authorities, and draws on urban transportation planning expertise for a comprehensive assessment of accessibility. The AHP method was used to assign weights to twenty evaluation criteria, and seven alternative areas were ranked using the MOOSRA, ARAS, and VIKOR methods. The findings revealed the most suitable location, demonstrating the robustness of the model and its applicability in urban planning.

Keywords: bus terminal, multicriteria analysis, location selection, MOOSRA, ARAS, VIKOR

1 Introduction

Bus terminals are key components of national, regional, and local transportation systems, where passengers transfer between services (Rodrigue, 2024). Their planning should reflect their critical importance in transportation networks and connectivity, as well as the added value they create as vital urban spaces. Bus terminals are more than just terminals for urban transportation (Sun et al., 2017).

These facilities are key points where passengers transfer between various types of bus lines (Curzel et al., 2019). They are important mobility points, where access for vehicles, pedestrians, and bicyclists is critical for the public transport network (Munir et al., 2024). Bus terminals have also emerged as integrated urban elements that influence spatial organization and social interaction. They function as catalysts for place-making and contribute to shaping the urban fabric (Vigneau, 2019).

In today's rapidly urbanizing cities, transportation and mobility policies have become integral to urban planning, alongside land uses such as housing, workplaces, education, and public facilities. The location of bus terminals is therefore a key planning decision that affects traffic performance, network efficiency, and the overall dynamics of urban development (Ayuningtyas et al., 2019).

Selecting an appropriate location for a bus terminal is a complex yet critical task. Although various approaches have been proposed, the application of multicriteria decision-making (MCDM) methods remains relatively limited. This is a significant gap because MCDM is particularly well suited for decisions involving multiple, often conflicting, criteria. As noted by Nedeljković (2023), location selection is influenced by both quantitative data and qualitative factors, which MCDM methods can effectively integrate. Similarly, Chakraborty et al. (2013) emphasize that MCDM provides a robust framework for addressing complex facility location problems that require balancing competing priorities.

Standard MCDM methods have inherent limitations in addressing complex and interrelated decision criteria, which often limit the accuracy and robustness of the results. Hybrid MCDM is an integrated decision-support approach combining two or more MCDM techniques to overcome the limitations of a single method, improving the accuracy, robustness, and interpretability of results (Poklepović & Babić, 2014). Adopting a hybrid MCDM framework provides a more comprehensive and reliable basis for evaluating bus terminal locations. Systematic integration of quantitative data and qualitative judgments ensures a data-driven, context-sensitive, and analytically balanced evaluation, allowing more precise weighting of criteria and consistent ranking of alternatives within a multidimensional context (Xu et al., 2024).

This study was conducted as part of the location selection project for the Uşak bus terminal together with the Uşak district. The study evaluates and determines the most appropriate site for Uşak's bus terminal using MCDM methods. It is postulated that integrating a hybrid MCDM approach will enhance analytical robustness and methodological reliability, thereby more effectively identifying the optimal terminal location.

Determining the optimal location of a vital infrastructure investment such as a bus terminal, together with assessing its interaction with the city's transportation axes, is highly complex. Such a decision cannot be made by depending solely on one person, decisionmaker, or method. Therefore, three different new and compromise solution methods are used.

Hybrid MCDM methods have proven effective in addressing various decision-making problems, but few studies improve existing techniques and integrate them. This article introduces a refined methodological framework that not only advances established MCDM approaches but also combines them into a coherent hybrid model. The framework is tested by selecting the location of the bus terminal, illustrating its practical applicability. The study contributes at two levels: methodologically, it enhances and integrates existing techniques into a novel hybrid approach, and empirically it demonstrates how this approach can be applied in a real-world case. Thus, this article is both an effort to extend the methodological toolkit and also a case-based demonstration of the effectiveness of hybrid MCDM applications.

Seven alternatives were evaluated to determine the optimal terminal location in Uşak's city centre. Results from three different methods were compared to select the best site. The Uşak district then reviewed the findings and started building the terminal. This study is significant and original because it moves beyond theoretical analysis to practical implementation.

Cities are systemic structures composed of many subsystems. Almost all urban subsystems (e.g., business, shopping, education, health, recreation, administration, industry, and residential) are linked and interact with each other. Their dynamic land-use typologies form a multidimensional and complex urban structure shaped by demographic, social, economic, administrative, natural, and spatial dynamics. Integrating these subsystems depends largely on the urban transportation network for accessibility. Because land use and transportation systems are mutually dependent, each land-use type generates specific travel needs. As transportation quality and accessibil-

ity improve, spatial value increases, leading to changes in land use. This interaction emphasizes the necessity for holistic and strategic spatial planning to achieve coherent and sustainable urban development (Oliveira & Hersperger, 2018; Hersperger et al., 2019).

Intercity transportation strengthens the interaction between different land uses by linking cities with surrounding towns and villages. Bus terminals are essential components of this system, acting as key nodes for intercity and intracity transportation. These terminals should be accessible, safe, flexible, and efficient. Ideally, they should be integrated with other transportation modes (e.g., air, rail, bicycle, and pedestrian) as well as green networks, creating a holistic urban mobility structure. As convergence points, bus terminals are vital for efficient transportation systems (Arifa & Sholahuddin, 2022). As key transit network hubs, their strategic location and design greatly influence urban development and economic growth in surrounding areas (Memon et al., 2023; Abdullah et al., 2019).

Because terminal areas drive the flow of people, goods, and traffic at urban and inter-urban scales, they have strong productive qualities. In addition to facilitating mobility, they are catalysts for economic and spatial integration, generating employment and jobs (Mello & Silva, 2021). Their spatial and functional characteristics influence surrounding land uses, reinforcing their capacity to attract or repel activities depending on their scale and structure.

As a general principle, terminals must be 1) places of movement providing urban access through effective planning and management; 2) associated with public spaces; 3) considered "good places" for the public; 4) places where people gather, serving as meeting points for public transport and pedestrian–vehicle interaction; 5) interactive for sectors such as industry, trade, and tourism; 6) connected with residential areas and pedestrian/bicycle spaces; 7) connected with other modes; 8) waiting and transition areas for passengers and vehicles; and 9) safe, secure, and comfortable.

In short, bus terminals are critical components of urban mobility and transportation infrastructure. They are dynamic and high-intensity nodes allowing the interaction of multiple transport modes, contributing significantly to the spatial organization and place-making of urban environments (Zhang et al., 2022; Lindberg et al., 2021).

2 Materials and methods

This study proposes an innovative hybrid MCDM model that combines the AHP (analytical hierarchy process), MOOSRA (multi-objective optimization by simple ratio analysis), ARAS (additive ratio assessment), and VIKOR (Srb. *višekriterijumska optimizacija i kompromisno rešenje* 'multicriteria optimization and compromise solution') methods to determine the most suitable location for the bus terminal. Because the number of examples in the literature with similar techniques used together is limited, this adds to this study's innovativeness. The goal of the hybrid model is to select the optimum location for the bus terminal (Figure 1). The hybrid MCDM model was chosen for its advantages and ability to combine multiple methods effectively.

In the first stage of the model, the AHP method is used to compare criteria in pairs to establish priorities, providing a logical basis for determining their weights (Iswari et al., 2019; Nguyen, 2023). Integrating AHP with other MCDM methods improves their reliability by providing a structured approach to weight determination. In land-suitability assessments, AHP makes possible nuanced pairwise comparisons that reduce bias and enhance result validity (Subiyanto et al., 2018). Its ability to convert qualitative judgments into quantitative weights allows a more comprehensive evaluation of alternatives (Yumoto, 2019). These weights, reflecting the relative importance of each criterion, serve as key inputs for the MOOSRA, ARAS, and VIKOR methods in MCDM to select the optimum bus terminal location.

A key feature of the MOOSRA method is its ability to address both beneficial and non-beneficial criteria through a direct ratio analysis (Ulutaş et al., 2021). This approach simplifies decision-making and reduces the influence of negative values that can skew the results in other MCDM methods. The MOOSRA method has been compared favourably with other MCDM techniques and has often yielded similar or superior results in ranking alternatives (Jagadish & Ray, 2014).

The ARAS method calculates a utility function value for each alternative that directly corresponds to the criteria's values and weights (Ecemiş & Coşkun, 2022). This feature is crucial because it maximizes the utility function while addressing the different measurement scales of the criteria, thus correcting for inconsistencies arising from varied measurement units (Zavadskas et al., 2023). When evaluating alternatives, ARAS simplifies complex decision-making scenarios, generating clear rankings by highlighting alternatives that perform better against established benchmarks (Liao et al., 2019). The ARAS method has proven effective in various applications, including mobile game selection based on user preferences and evaluating corporate social responsibility criteria (Meidelfi et al., 2022).

Central to the VIKOR method is the capability to balance the trade-off between maximizing group benefits and minimizing individual regrets. This provides decisionmakers with

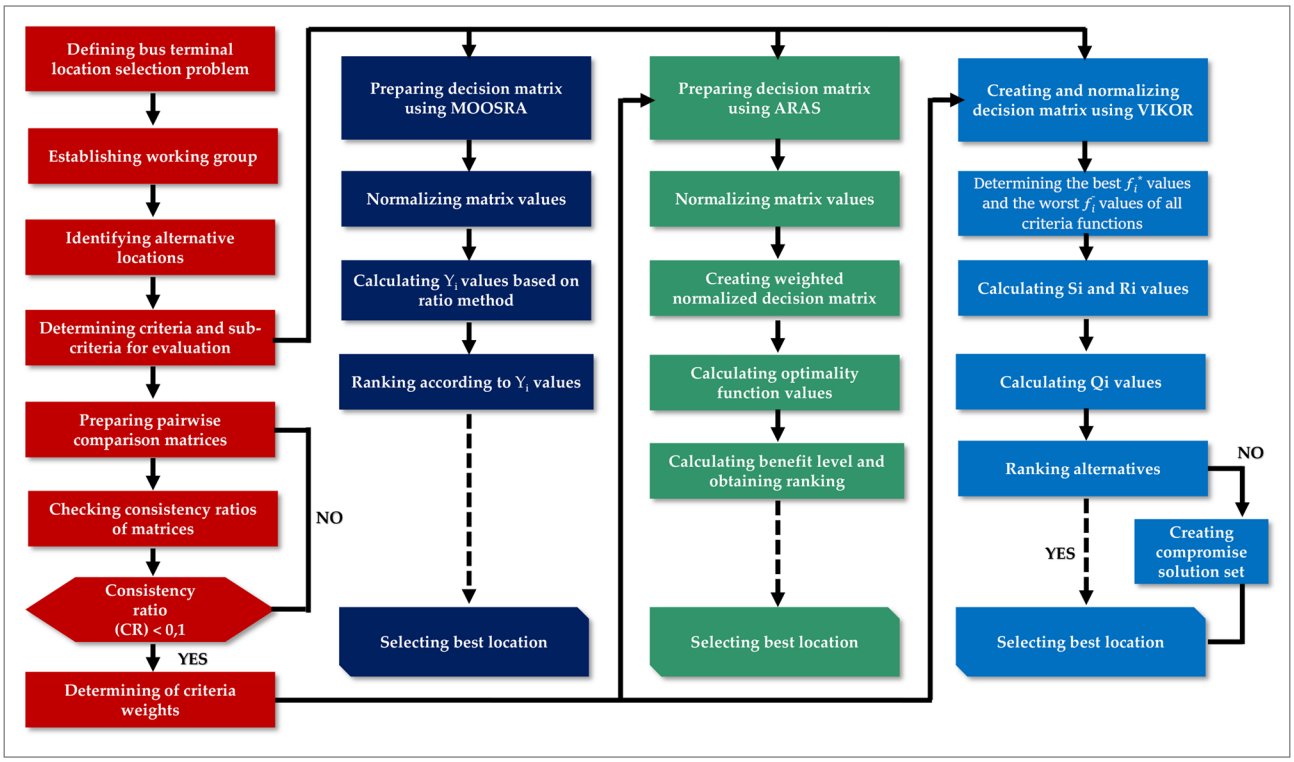

Figure 1: The basic network structure of the hybrid MCDM model used (source: authors).

compromise solutions that are more likely to be accepted by stakeholders (Elsotohy et al., 2023; Effatpanah et al., 2022). The VIKOR method has been effectively applied in diverse contexts, such as supplier selection in the nuclear power industry (Wu et al., 2016), vaccine selection during the COVID-19 pandemic (Öztürk et al., 2021), and optimization of welding parameters (Meikeerthy & Ethiraj, 2024). More information about each method can be found in the appendix (only available in the online version of the article).

2.1 Formation of the working group

A working group of managers and experts was formed to select the new bus terminal area. The primary objective was to ensure research-based and systematically organized decision making by combining the practical experience of city administrators with the academic expertise of specialists. The aim of including senior managers and department managers in the Uşak district was to increase the effectiveness of the decision-making. The group consisted of three senior managers, four department managers, and three expert academicians. The decisionmakers' work experience ranged from eight to thirty years, their ages ranged from thirty to fifty-two, and all had at least a bachelor's degree.

The district initially proposed several potential areas, including vacant land, public property, and other sites, which were examined by the working group. Its members conducted literature reviews and collected detailed data on successful bus terminal projects worldwide and in Turkey to guide the location selection. The information collected was evaluated within a framework compatible with the study's criteria. Based on the group's expertise and understanding of the city's spatial, infrastructural, and environmental characteristics, seven alternative locations were identified.

2.2 Determination of alternatives

Uşak is located in western Turkey, between Central Anatolia and the Aegean Region (Figure 2). The province of Uşak has six districts: Banaz, Eşme, Karahallı, Sivaslı, Ulubey, and Uşak. Uşak's city centre had a population of 236,366 in 2022 (Turkish Statistical Institute, 2023).

Field studies were carried out directly by the authors to determine the current land use and spatial structure of Uşak. The information collected then underwent a geographical information system (GIS) analysis, based on which the area' land use was updated in November 2023 (Figure 3). The study area covers 11,132 hectares and its boundaries are based on current zoning plans. Agricultural, water, and wooded areas constitute 44.52% of the area, and residential areas 14.41%. Roads comprise approximately 11.64%. The current bus terminal area is 2.32 hectares. Accordingly, the gross density of the city is 60 to 70 people per hectare, referring to the entire built-up urban area.

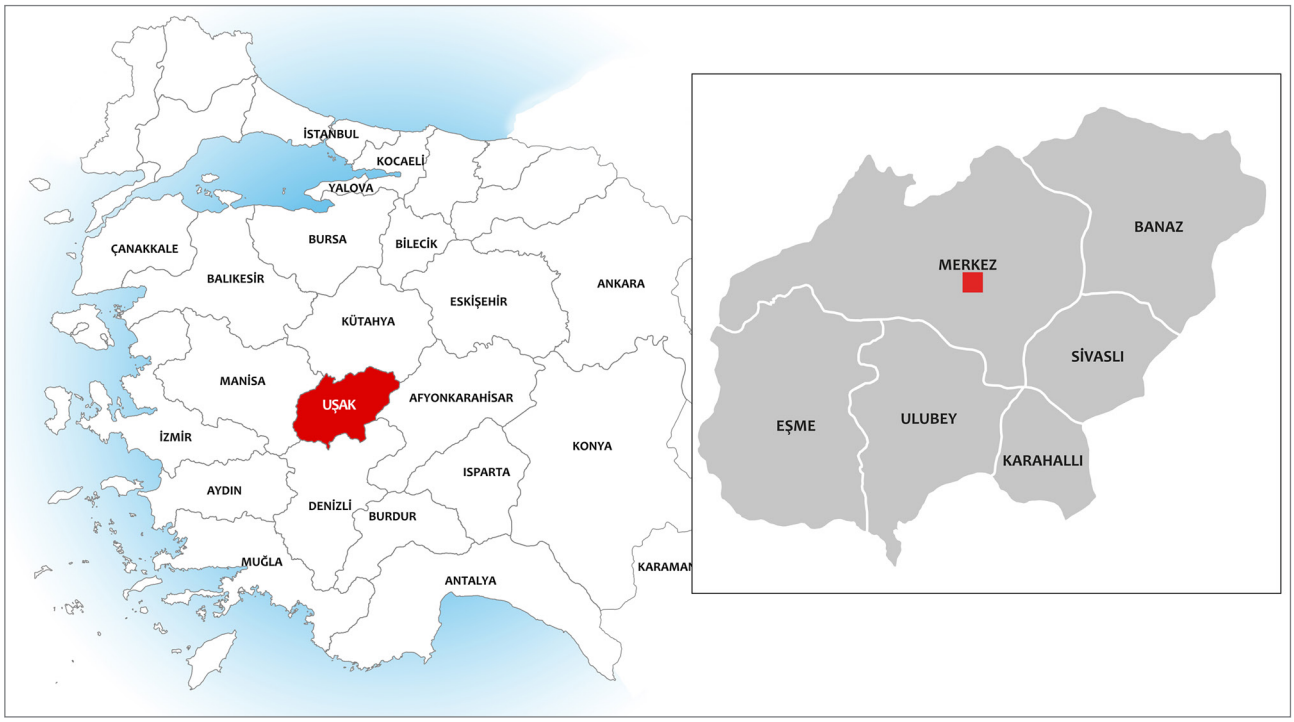

Figure 2: Location of Uşak (source: authors).

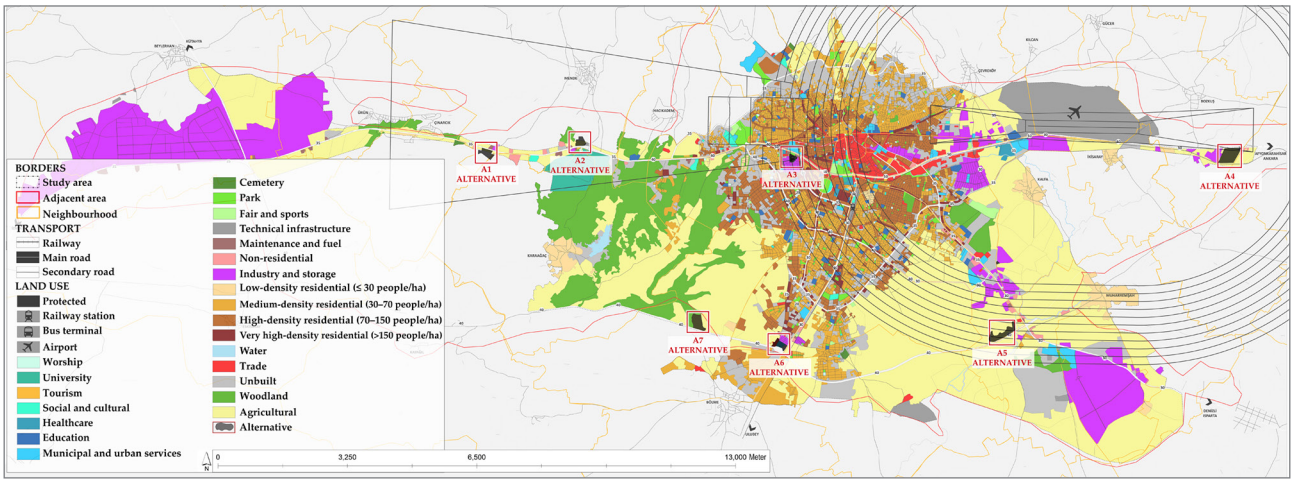

Figure 3: Land use in Uşak in November 2023 and possible bus terminal locations (illustration: authors, based on Uşak district GIS data and Google Maps).

Based on previous district assessments and the evaluations by the working group, seven alternative locations were identified. The locations considered are close to the city centre of Uşak (Figure 4).

The first university location (Figure 4a) has an area of 5.6 hectares and is 9.3 km from the city centre. It is on the road to the university and 2.5 km from it. The location is public property in a rural area surrounded by agricultural land and lacks developed infrastructure, but it includes reserve areas suitable for future development. It only provides a connection to the city centre. There is currently no public transportation to the area.

The second university location (Figure 4b) has an area of 4.9 hectares and is 7.0 km from the city centre. It is located on the road to the university, directly across from the campus, and has adequate infrastructure. There are no residential areas nearby, but the location is surrounded by developable reserve land. The land is privately owned and has access to the public transportation line serving the university campus.

The current terminal location (Figure 4c) has an area of 2.3 hectares. The terminal is in the city centre, with high traffic density and inefficient intersections. The terminal faces significant challenges for manoeuvring vehicles, and it is outdated

Figure 4: Alternative locations: a) university (Alternative 1); b) university (Alternative 2); c) current bus terminal (Alternative 3); d) airport (Alternative 4); e) Çanlı Bridge (Alternative 5); f) Ulubey Road (Alternative 6); g) west of the Ulubey junction (Alternative 7; illustration: authors, based on Google Maps).

and insufficient. Although reconstructing a new terminal at the exact location might seem cost effective, this would require resolving major infrastructure issues, realigning key roads, and expropriating nearby small industrial units to expand the area. A significant drawback is that incoming bus traffic must pass through the city centre to reach the terminal, exacerbating traffic congestion on main corridors and straining transportation. The location lacks direct integration with the railway network, but it remains a critical transportation hub with robust public transit connections. It is publicly owned.

The airport location (Figure 4d) has an area of 14.6 hectares and is 9.4 km from the city centre. There are industrial and storage facilities nearby, and the open sides of the area are surrounded by reserve areas suitable for development. The area is currently used as agricultural land. It is located on Ankara Road at the intersection with the southern ring road, which is under construction. The area, which is directly adjacent to the railway and the airport, is zoned for commercial activity is expected to become an industrialized region (Uşak District, 2021). The area is publicly owned and cannot be accessed by public transportation.

The Çanlı Bridge location (Figure 4e) has an area of 10.8 hectares and is 7.1 km from the city centre. It is opposite the Çanlı Bridge, at the junction with Sivaslı Road. It is an undeveloped area surrounded by agricultural land. This strategic transportation node is on the route from Isparta to Denizli and directly adjacent to the southern ring road. The area's sloping topography would make construction of the bus terminal relatively costly, requiring additional excavation, grading, and stabilization. The area is mainly publicly owned and is accessible by public transportation.

Table 1: Evaluation criteria for location selection.

Category, code, and criterion	Method, data source
Land use and environmental impact	
C1: Spatial plan compliance	Examination of zoning plans (Uşak District, 2021)
C2: Usable area	Land-use analysis
C3: Distance to centre	GIS point density analysis
C4: Topography	Slope analysis to assess terrain suitability
C5: Disaster risk	Analysis using AFAD (2021) data
Economic and social factors	
C6: Project costs, infrastructure constraints	Project cost estimate (land acquisition, technical/environmental factors)
C7: Investment attraction potential	Current/potential investment review; local government interviews
Transportation and mobility	
C8: Road width	Analysis based on land-use data
C9: Daily access route traffic volume	Vehicle counts for all vehicle types
C10: Daily access route bus volume	Counts and route data from existing bus terminal
C11: Road safety	Analysis of accident hotspot map
C12: Distance to closest intersection	Measured from land-use data using GIS
C13: Distance to rail	Shortest network travel distance calculated using land-use data
C14: Distance to high-speed train	Closest distance to the high-speed train project
C15: Distance to airport	Shortest network travel distance calculated using land-use data
C16: Distance to public transport	GIS analysis using data from Uşak Directorate of Transportation Services
C17: Pedestrian/bicycle accessibility	Analysed using accessibility data from land-use and transportation studies
C18: Distance to university	Analysed using GIS point density
C19: Distance to industrial zone	Shortest network distance calculated using land-use data
C20: Proximity to residential area	Analysed using GIS point density

The Ulubey Road location (Figure 4f) has an area of 4.9 hectares and is 4.7 km from the city centre. It is directly adjacent to the Ulubey junction on the road to the Ulubey district and the southern ring road. This is an important transportation node with the potential for access to the city from all directions. Currently, the area is a commercial area, district service area, and unbuilt area, suitable for development to the east. This area has advanced infrastructure facilities, and it has been zoned as a cultural facility and urban service area (Uşak District, 2021). The area is also close to planned dense residential development areas to the south and southeast. The area is publicly owned and well connected to public transportation. Adjacency to the railway from the east would allow the bus terminal to operate as an integrated transfer station with an additional railway line.

The location west of the Ulubey junction (Figure 4g) has an area of 7.8 hectares and is 7.0 km from the city centre. It is 2.5 km west of the Ulubey junction and faces the southern ring road. This is a critical transportation node with the potential for access to the city from all directions with the completion of the southern ring road. It is currently an agricultural area with slopes on three sides. If a bus terminal is built in the area, infrastructure will need to be built. In addition, effective operation would require a north–south primary connection between the highway from Ankara to İzmir and the southern ring road close to the city centre. The district partially owns the area, which currently does not have a connection to public transportation lines.

2.3 Determination of criteria

A comprehensive literature review was first conducted to identify the relevant criteria for selecting the location of the bus terminal. Its findings are summarized below.

One essential criterion is spatial proximity to population centres and other transport facilities. Roquel et al. (2021) underscore the importance of evaluating the distance between bus terminals and high-demand areas such as residential zones, commercial centres, and transit routes. Proximity facilitates access for passengers and promotes reliance on public transport. Koblar and Mladenovič (2020) stress approaches that encourage compact, mixed-use urban areas, improving efficiency and user experiences. Bus terminals should ensure effective multimodal integration by providing seamless connections to rail, pedestrian, and cycling networks (Abdullah et al., 2019). This connectivity enhances mobility and accessibility (Taghavi et al., 2021).

The location of bus terminals has significant implications for land use and the surrounding environment. Integrating environmental sustainability into planning has become an indispensable aspect of urban planning. Studies emphasize the need to consider both ecological and economic dimensions when selecting a terminal location (Tuames & Widyastuti, 2020; Memon et al., 2023). Bus terminals exert influence beyond the transportation sector, serving as economic and social hubs. Integrating terminals with commercial areas increases their value as nodes of trade and tourism while also transforming surrounding public spaces into "good places" for social interactions (Abdullah et al., 2019). Bus terminals should not be regarded merely as mobility and transport infrastructure. Rather, they must be understood as vibrant, dense, and continuously utilized urban nodes – key elements in the interaction of urban modes and the creation of "good places."

Like previous research, which has systematically examined a wide range of spatial, environmental, economic, and social factors, this study also sought to establish an extensive set of potential criteria. Initially, sixty criteria were identified, and detailed evaluations by the working group refined the list to twenty criteria most essential for decision-making. This participatory approach enhanced the contextual relevance of the criteria and strengthened the practical applicability of the location selection approach.

The twenty finalized criteria were classified into three main categories: 1) land use and environmental impact, 2) economic and social factors, and 3) transportation and mobility. This reflects not only the theoretical foundations of the criteria but also their practical significance.

The methodological framework adopted in this study is a multistage elimination process by the working group, integrating a literature review and expert evaluation. Table 1 presents a detailed list of the criteria along with the data sources.

3 Results

3.1 Criteria weights determined by AHP

In applying the AHP method, the twenty criteria were evaluated through pairwise comparison, based on which a comparison matrix was created. Then the matrix was normalized and the criteria weights were calculated. The weights obtained express the general priority levels of the criteria. The consistency rate was calculated to evaluate the reliability of the analysis, and it was determined that the consistency rate was below 10% (0.092377). Therefore, the study was valid and reliable. Table 2 presents the criterion weights determined by the AHP, along with the twenty criteria and their values used in the decision matrices of the ARAS, MOOSRA, and VIKOR methods.

Based on the weights assigned, the category Transportation and Mobility ranked first with 0.542 points, and the category Land Use and Environmental Impact ranked second with 0.339 points. The criteria that received the highest weight in the AHP analysis were Disaster Risk, Usable Area, Distance to Residential Area, Project Cost and Infrastructure Constraints, and Distance to Public Transport. These factors were considered the most critical.

3.2 MOOSRA selection

To apply the MOOSRA method, the data in Table 2 were normalized by first calculating the sum of squares for each column, taking their square roots, and then dividing each value by the corresponding column's square root. Next, the AHP weights were multiplied by the normalized values to form the weighted normalized decision matrix. Beneficial and non-beneficial criteria were then separated (the criteria marked † in Table 2 representing non-beneficial ones) and their sums calculated. This categorization produced the results shown in Table 3.

Finally, alternatives were ranked by performance values, with higher values indicating better suitability. The ranking revealed that Alternative 6 (Ulubey Road) ranked first, followed by Alternative 3 (current bus terminal) and Alternative 2 (second university location; Table 3).

Table 2: Criterion weights determined by AHP and the decision matrix.

Category, code, and criterion	Alternatives							Weight
	1	2	3	4	5	6	7	
Land use and environmental impact								
C1: Spatial plan compliance (Likert)	2	3	5	2	3	3	1	0.035
C2: Usable area (ha)	5.6	6.4	2.3	14.6	10.8	4.9	6.4	0.121
C3†: Distance to centre (km)	10.7	8.3	3.3	10.0	6.8	7.7	8.2	0.013
C4: Topography (Likert)	3	5	1	3	2	5	3	0.048
C5: Disaster risk (Likert)	5	5	1	2	3	5	5	0.122
Economic and social factors								
C6†: Project costs (Likert)	5	3	3	5	3	2	5	0.106
C7: Investment attraction potential (Likert)	1	5	1	2	3	5	2	0.014
Transportation and mobility								
C8: Road width (m)	35	35	50	30	40	30	40	0.027
C9†: Traffic volume (daily number of vehicles)	30,568	30,568	33,176	17,667	2,052	16,146	3,250	0.041
C10: Bus volume (daily number)	264	264	800	543	30	80	20	0.042
C11: Road safety (Likert)	5	5	1	5	3	3	5	0.013
C12†: Distance to intersection (km)	4.6	2.3	0.1	2.8	0.5	0.2	2.0	0.031
C13†: Distance to rail (km)	12.0	7.5	2.2	0.2	6.7	0.2	2.1	0.062
C14†: Distance to high-speed train (km)	22.0	17.4	14.0	17.0	11.0	8.0	9.5	0.044
C15†: Distance to airport (km)	16.0	13.6	8.4	3.6	10.0	11.0	13.3	0.015
C16†: Distance to public transport (km)	9.5	7.1	2.9	9.4	7.1	4.7	7.7	0.080
C17: Pedestrian/bicycle access (Likert)	1	2	5	1	2	3	1	0.053
C18†: Distance to university (km)	5.1	0.5	6	17.5	18.7	10.2	8.6	0.011
C19†: Distance to industrial zone (km)	6.0	8.5	13.8	24.7	21.4	15.6	13.6	0.007
C20†: Distance to residential area (km)	10.1	7.6	2.6	9.7	8.2	5.8	8.2	0.116

Note: A five-point Likert scale was used (1 = very low, 5 = very high). Criteria marked † were used in the minimization / cost case phase, and the others were used in the maximization / benefit case phase (for calculating Y_i values).

3.3 ARAS selection

The ARAS analysis evaluated the scores for the alternatives based on the criteria. Because the optimal values were not fully represented, the benefit or cost nature of each criterion was defined to calculate optimal values. To ensure comparability and eliminate unit effects, normalization was performed considering the benefit–cost characteristics of the criteria, producing the normalized decision matrix. The AHP weights were then multiplied by these normalized values to obtain the weighted normalized decision matrix.

Table 3: Ranking of alternatives according to MOOSRA.

Alternative	Y_i	Ranking
1	0.533607	7
2	0.924436	3
3	1.079570	2
4	0.848516	5
5	0.922459	4
6	1.612323	1
7	0.810362	6

Table 4: Optimality function values and alternative rankings.

Alternative	S_i	K_i	$\%K_i$
Optimal	0.241804892		
1	0.080000154	0.330845888	33.08
2	0.093320829	0.385934414	38.59
3	0.133164547	0.550710725	55.07
4	0.096110390	0.397470827	39.75
5	0.100526268	0.415732980	41.57
6	0.168023970	0.694874154	69.49
7	0.08804895	0.36413221	36.41

Table 5: The best f_i^* and the worst f_i^- values.

Code	f_i^*	f_i^-
C1	5	1
C2	491	56
C3	10	107
C4	5	1
C5	5	1
C6	2	5
C7	5	1
C8	50	30
C9	2052	33176
C10	800	20
C11	5	1
C12	2	46
C13	2	75
C14	8	174
C15	10	136
C16	29	95
C17	5	1
C18	5	187
C19	6	247
C20	26	101

Table 6: *S*, *R*, and *Q* values and ranking.

Alternative	S_i	R_i	Q_i
6	0.212373937	0.049493333	0.000000000
3	0.443452258	0.122000000	0.737771710
5	0.585031914	0.106535632	0.776811340
2	0.574150026	0.118774713	0.850013938
7	0.621309110	0.118774713	0.898539027
4	0.698298696	0.109813333	0.915961751
1	0.686624490	0.121000000	0.981091723

Table 7: Comparison of MOOSRA, ARAS, and VIKOR results.

Alternative	MOOSRA	ARAS	VIKOR	General ranking
1	7	7	7	Weak
2	3	5	4	Medium
3	2	2	2	Strong
4	5	4	6	Weak
5	4	3	3	Medium
6	1	1	1	Most suitable
7	6	6	5	Weak

Subsequently, optimality function values for each alternative were computed and converted into S_i and K_i scores, presented with rankings in Table 4. According to the ARAS analysis results, the most suitable area for the bus terminal location was Alternative 6 (Ulubey Road), which was close to optimal. Alternative 3 (current bus terminal) was in second place and Alternative 5 (Çanlı Bridge) in third.

3.4 VIKOR selection

In the VIKOR method, the decision matrix (Table 2) was normalized to ensure comparability among criteria, resulting in a weighted normalized matrix. Ideal (best f_i^*) and anti-ideal (worst f_i^-) values were determined for each evaluation criterion (Table 5), after which S_i and R_i values were calculated for the seven alternatives. The weight values from the AHP calculations in the previous stage were used at this stage. After obtaining S_i and R_i values, the Q_i values were calculated. The v value in the equation was 0.5, as in the study by Opricović and Tzeng (2004). The best alternative in the VIKOR method rankings has the smallest numerical value. The final rankings after obtaining the *S*, *R*, and *Q* values are presented in Table 6.

After obtaining the rankings, Condition 1 (acceptable advantage) and Condition 2 (acceptable stability in decision making) were tested to obtain a compromise solution. To test Condition 1, the inequality $Q(a'') - Q(a') \geq DQ$ must be checked. The DQ value in this equation is 0.16. If the value is greater than 0.16, alternative a' satisfies Condition 1. To test Condition 2, the best alternative based on the *Q* value (Alternative 6) must also hold the top *R* or *S* rankings. Because Alternative 6 ranks first in both *R* and *S* rankings, Condition 2 is met.

3.5 Comparison of results

To provide a more systematic overview, the results obtained from three different methods were compared (Table 7).

As seen in the table, all three methods consistently identified Alternative 6 (Ulubey Road) as the optimal site. This strong convergence indicates the robustness of the hybrid model and its ability to generate reliable, replicable results. Moreover, the outcome is reinforced by case-based evidence: Alternative 6 is strategically positioned near the southern ring road, directly adjacent to the railway line, and supported by the Uşak district's ongoing infrastructure investments. This integration of model-based results with practical planning realities confirms the validity of the findings.

4 Discussion

The hybrid MCDM model proposed in this study offers a systematic and analytical framework that assists decisionmakers in addressing complex, real-world problems. Incorporating stakeholders' diverse perspectives ensures that decisions are balanced and rational. The model's applicability is illustrated by the selection of the bus terminal location. The hybrid MCDM model selected Alternative 6 (Ulubey Road) as most suitable. This location is in an industrial zone between the Uşak railway line and the future Uşak ring road. The location can be connected to nearby main roads and junctions. Although the land is currently unused, zoning plans would change depending on future land-use decisions. Compared to other locations, Alternative 6 is the least sensitive regarding social and environmental issues. In addition, investment costs would be more affordable than in other locations.

The hybrid model employed in this study proved effective in handling complex decision-making by integrating both quantitative and qualitative dimensions. The findings indicate that Alternative 6 consistently achieved the highest ranking across all three methods. This outcome is primarily attributed to the site's advantageous accessibility, its compatibility with existing and planned land uses, and its strong potential for integration with future transportation corridors.

This study was carried out as part of the project for selecting the location of the Uşak bus terminal in cooperation with the Uşak district. When the project was completed, Alternative 6 was selected as a suitable location based on evaluations by the Uşak district. In line with this selection, construction of the new bus terminal in this area was started in 2024. This is an important indication that the research is not merely theoretical but also has practical applicability. In addition, the project's transformation into concrete implementation proves the validity and potential of the location selection model.

The study makes contributions to both theory and practice. From a theoretical perspective, it enriches MCDM literature by presenting a hybrid model that combines four methods in a complementary way. Although individual applications of AHP, MOOSRA, ARAS, and VIKOR are common, integrating them into a coherent framework for selecting a terminal location is a methodological innovation. The study also empirically validates the argument that hybrid models enhance decision robustness compared to single-method approaches. From a practical perspective, the research demonstrates the applicability of hybrid MCDM tools in real-world urban planning. The fact that district authorities relied on the results for policy implementation illustrates the potential of such models to bridge the gap between academic analysis and urban governance.

Nevertheless, the study has certain limitations. The analysis was restricted to seven possible locations and twenty criteria, which, although comprehensive, did not capture all qualitative aspects, such as passenger satisfaction, community acceptance, and user experience. Rather than adopting a static perspective, the study was conducted in line with existing upper- and lower-scale urban development plans. Accordingly, the analysis was bounded by Uşak's spatial and policy framework, which meant that long-term demographic shifts, future urban expansion, and climate-related risks were not explicitly modelled but were indirectly reflected through the planning framework.

Future research may overcome these limitations by enhancing stakeholder participation through structured approaches such as Delphi, SWOT, TOWS, or SOAR analyses (Cole et al., 2022; Ju & Kim, 2023; Lee et al., 2025). Incorporating dynamic weighting schemes that capture the varying influence of different actors would also improve the robustness of decision outcomes. In addition, integrating the hybrid MCDM framework with complementary tools – such as simulation modelling, network analysis, and GIS – could increase its capacity to address allocation and optimization problems involving multiple intermodal terminals. These methodological extensions would broaden the model's applicability and reinforce its relevance for contemporary issues in transportation and mobility planning, including intermodal network design, technology assessment, distribution management, and transport policy formulation.

5 Conclusion

The study identifies the Ulubey Road site as the optimal location for the bus terminal and makes a methodological contribution by refining hybrid MCDM models as well as a practical contribution by influencing city decision-making. By synthesizing empirical findings with theoretical insights and applied implications, the research demonstrates the potential of hybrid

decision-support tools to promote integrated, sustainable, and forward-looking urban transportation planning.

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Urban open spaces as recreational areas and emergency shelters: Lessons from the Malatya earthquake

Public open spaces (POSs) played an important role as gathering areas during the 2023 earthquake in Turkey. However, challenges arose after the earthquake because POSs struggled to fulfil their recreational functions and could not meet the daily needs of the population. This study evaluates the performance of and changes to six POSs in Malatya after the earthquake and suggests strategies for integrating sustainability principles into seismic protection plans. The post-occupancy evaluation method was used, including field analysis, semi-structured interviews with sixty municipal experts, and a survey with 240 users. The results show that POSs faced problems such as insufficient infrastructure, limited space for camps, and issues related to safety and maintenance during the earthquake. After the earthquake, most POSs had not regained their recreational identity, with some transforming toward commercial use, occupation by new users, and changes in land use. The study concludes that earthquake resilience depends not only on the size, accessibility, and location of a POS, but also on the area's capacity for rapid maintenance and its multifunctionality, which ensure its vitality after a disaster. Planning recommendations include integrating disaster preparedness into city planning and facilitating post-disaster restoration.

Keywords: public open spaces (POSs), earthquake resilience, post-disaster recovery, Malatya, Turkey

1 Introduction

Earthquakes are natural phenomena that cannot be prevented. However, their destructive effects can be significantly reduced through effective urban planning. By integrating disaster risk reduction strategies into planning, experts can create more resilient cities and minimize the devastating impacts of earthquakes (León & March, 2016). This approach is highlighted in international frameworks such as the Hyogo Framework for Action, the 2030 Agenda for Sustainable Development, and the Sendai Framework for Disaster Risk Reduction (UNISDR, 2015). The United Nations International Strategy for Disaster Reduction also emphasizes the role of urban design solutions in strengthening city resilience (UNISDR, 2017). Therefore, all urban elements – including streets, buildings, infrastructure, and green spaces – must be considered in disaster-resilient planning. In this context, public open spaces (POSs) are critical assets, providing opportunities to integrate disaster management with everyday urban life.

POSs form the structural backbone of cities and are key elements for disaster resilience (Koren & Rus, 2019). After earthquakes, people instinctively seek refuge in open areas, turning them into gathering points for safety and essential services (Godschalk, 2003). These spaces can serve as temporary shelters and support the distribution of relief supplies, medical care, and basic goods (Johnson, 2007; Mengi & Erdin, 2018). They also provide a platform for community interaction and social support, promoting collective recovery (Allan et al., 2013). In societies with strong earthquake memory, repeated aftershocks often reinforce the preference for staying outdoors (Atalay, 2008). Historical cases further illustrate this role: following the 1906 San Francisco earthquake (Law, 2018), parks hosted temporary camps; in Mexico City, open spaces became vital after the 1985 earthquake (Rodríguez et al., 2007); and in China the 2008 Wenchuan earthquake highlighted parks as recovery centres (Xiao & Tang, 2013). However, without effective emergency planning, evacuation and aid delivery may be disrupted, causing significant losses (Allan et al., 2013). Similarly, after the 2010 Chile earthquake, sports fields and local parks were transformed into temporary camps. These examples confirm that parks, playgrounds, and sports facilities should be strategically designed as dual-purpose spaces, supporting both daily urban functions and emergency needs.

Despite the importance of POSs, land is scarce in cities, and open spaces already bear environmental, social, and recreational responsibilities. They cannot be reserved solely for disaster use (French, 2017). Urban green spaces support biodiversity, purify air and water, filter wind and noise, regulate microclimates (Jayakody et al., 2016), and promote psychological well-being, social cohesion, and economic vitality (Kozamernik et al., 2024). However, when repurposed as shelters during disasters, the functions of POSs often deteriorate.

The literature shows that spaces designed primarily for emergency roles risk losing their daily appeal if they are not carefully maintained (Koren & Rus, 2019). Recent research highlights this tension. Yücel and Komar (2021) compared "earthquake parks", assessing design criteria for recreation versus disaster use. Çavuş and Perçin (2021) examined how post-disaster parks equipped with urban furniture could adapt effectively, and they proposed design improvements. Ünkaracalar and Aycı (2023) evaluated Turkish parks after the February 2023 earthquakes, showing variations in flexibility and adaptability. Research on temporary use of urban spaces in Koper demonstrates that, although such uses can activate underutilized areas, they may also undermine the long-term recreational identity of parks (Cotič & Uršič, 2024). Baylan et al. (2025) investigated how displaced survivors used green spaces for social attachment and psychosocial recovery. Collectively, these studies underline the need to integrate disaster management and urban planning to ensure resilience and continuity of functions (Song et al., 2017; Akar et al., 2024).

POSs are widely recognized as safe and suitable for gathering and shelter during earthquakes (Coburn & Spence, 2002). However, their dual role remains unresolved: from a disaster management perspective they must provide shelter capacity, and from an urban planning perspective they must sustain social, recreational, and ecological functions. In practice, many POSs are poorly prepared to serve both roles simultaneously (Šamić-Musemić & Zagora, 2021; Dinç & Gök, 2024; Anhorn & Khazai 2015; Alawi et al., 2023; Şahin et al., 2022). Similarly, this research address three key questions: 1) How did the intensity of use change after the earthquake? 2) How did types of activities shift? 3) What problems were experienced during the earthquake (sheltering phase) and after the earthquake (recovery phase)?

Turkey's geographical position along the Alpine–Himalayan seismic belt, combined with complex topography, makes it highly vulnerable to earthquakes (Bayrak et al., 2015; Gerdan & Özdemir, 2017; Onay, 2024). On 6 February 2023, two powerful earthquakes (M_w 7.7 and 7.8) struck Kahramanmaraş, affecting eleven provinces and claiming more than sixty thousand lives (AFAD, 2023). Widespread destruction disrupted daily life, forcing open spaces to serve as emergency shelters. This disaster therefore provided a unique opportunity to study the transformation of POSs under extreme conditions.

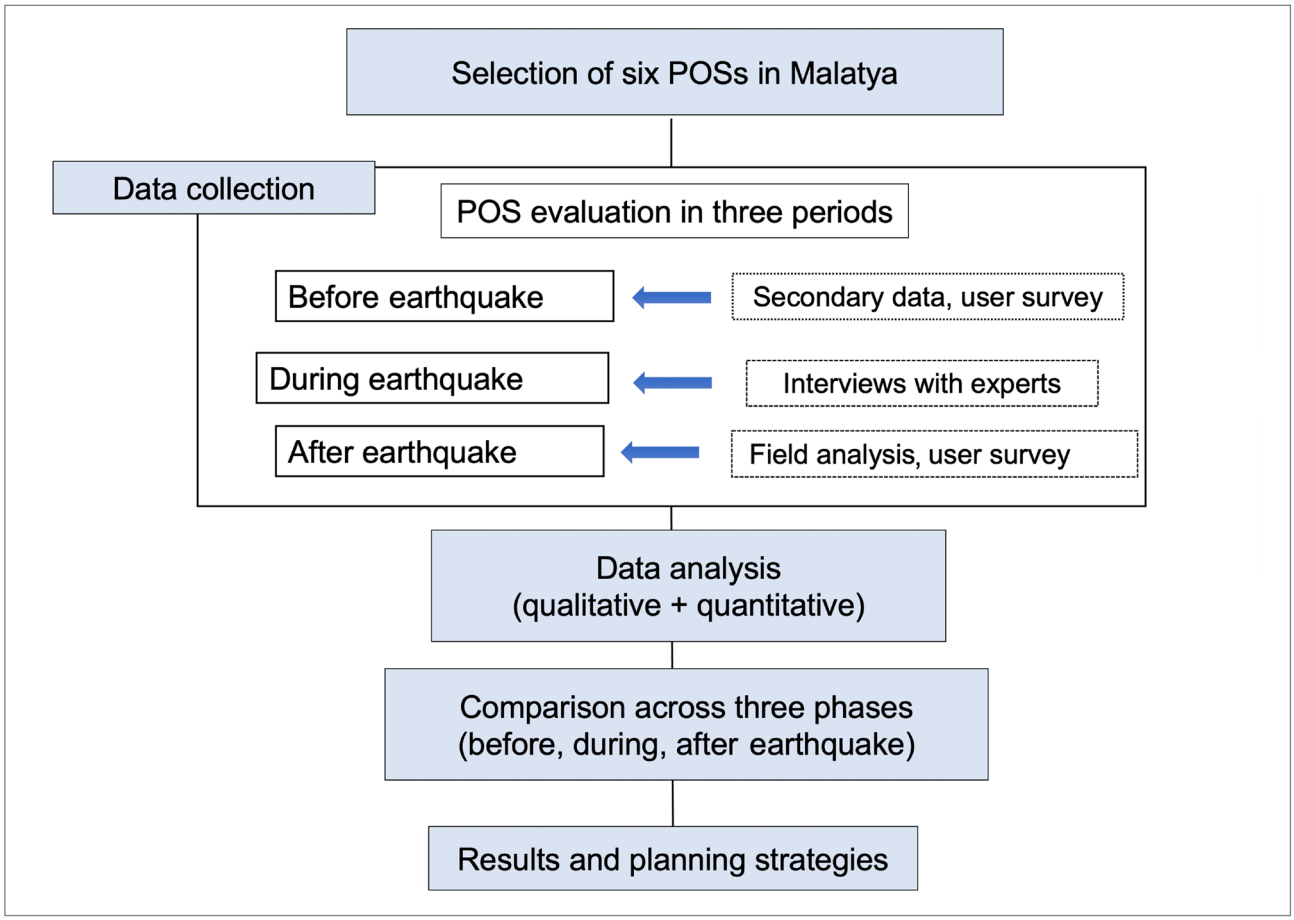

Figure 1: Flowchart of the research methodology (illustration: authors).

The primary aim of this study is to investigate the use of POSs in Malatya after the 2023 earthquake, focusing on their capacity to meet recreational needs and support daily life. The research analyses six major POSs in Malatya – one of the most severely affected cities – focusing on their functions before the earthquake, during the first 72 hours, and after the earthquake. Despite being designated by the Disaster and Emergency Management Authority (Turkish: *Afet ve Acil Durum Yönetimi Başkanlığı*, AFAD) as earthquake assembly areas, most POSs were not fully prepared for emergency sheltering. The findings will support planners and decisionmakers in creating earthquake-resilient POSs that can both reduce disaster impacts and sustain long-term urban recovery.

2 Materials and methods

This study used a post-occupancy evaluation (POE) approach to assess the functionality of six POSs in Malatya before, during, and after the 2023 earthquake. POE was chosen because it allows a comprehensive evaluation of how POSs function under real user conditions, particularly when exposed to unexpected stress such as natural disasters (Preiser & Vischer, 2005). The methodology combined on-site analysis, semi-structured interviews with officials, and a user survey to examine the physical, administrative, and social aspects of the POSs during and after the earthquake (Figure 1).

2.1 Study area

The province of Malatya, located in the western part of the Eastern Anatolia Region, is characterized by a harsh climate, with hot, dry summers and cold, rainy winters. The province extends along a north–south axis with a slight slope. The city of Malatya has a population of 807,947, approximately 78% of whom reside in the Battalgazi and Yeşilyurt districts. The overall population density is sixty-six people per km^2. Due to its mountainous terrain and active geological structure, the region is highly prone to seismic activity (Şahin, 2022).

Malatya was among the cities most severely affected by the February 2023 earthquakes in Turkey. Immediately after the disaster, the city experienced significant chaos. Many residents sought refuge in camp-like areas, tents set up in front of their homes, or public parks. Ongoing aftershocks prevented people from re-entering even structurally intact buildings (Türkmen

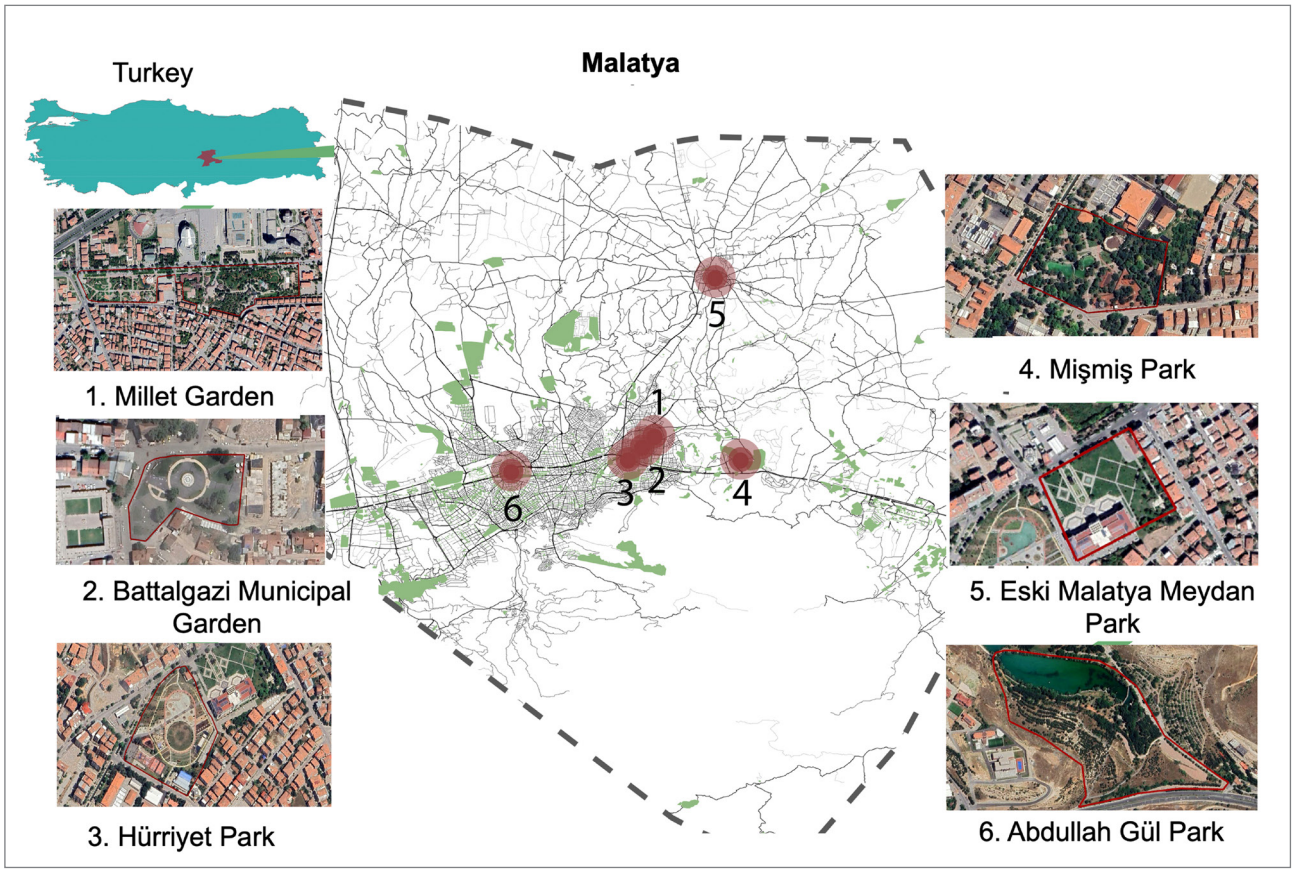

Figure 2: Location of the six POSs selected for this study in Malatya, Turkey (illustration: authors).

et al., 2023). During this emergency sheltering phase, serious challenges emerged, including delays in distribution of tents and relief supplies, as well as limited access to clean water, toilets, and bathing. In this study, the roles and functions of POSs during the earthquake in Malatya are analysed in line with the research objectives.

As shown in Figure 2, six major POSs in Malatya were selected for the analysis: Millet Garden, Battalgazi Municipal Garden, Hürriyet Park, Mişmiş Park, Eski Malatya Meydan Park, and Abdullah Gül Park. The general features and land uses of each POS are presented below.

Millet Garden covers 40,651 m². The park includes an enclosed parking lot in the lower section, a pond directly opposite the main entrance, and a seasonal plant parterre in the water area. There are also children's playgrounds, sports fields, a play pool, an amphitheatre, social facilities, hiking trails, an orchard, and aromatic medicinal gardens. A social centre of the Municipality of Malatya is also located in this area.

Battalgazi Municipal Garden is connected to the surrounding road axes. With an area of 32,844 m², it includes an enclosed parking lot, an ornamental pool directly opposite the main entrance with roses of various colours and scents, two libraries, a tea house, five pergolas, and walking paths. Solar panels and a rainwater storage system are installed on the roof of the community building.

Hürriyet Park covers 39,650 m² and has three entrances on the east, west, and north sides. The facilities include a parking lot, sports fields, a state registry office, a public library, cafés and restaurants, community social facilities, a children's playground, running tracks, a pond, walking paths, and an exercise area.

Mişmiş Park covers 400,020 m². It is a recreational area far from the city centre. There is a security post and access control at the entrance and exit. Walking paths provide uninterrupted access throughout the area, and there are picnic areas on the lake shore and in the park. A restaurant, a café, a market, a prayer room, children's playground, and toilets are all easily accessible. The park has a parking lot, and vehicles are not permitted in the picnic areas.

Eski Malatya Meydan Park covers 19,850 m². The park is located in the old market centre of Malatya and was restored by the Municipality of Battalgazi for conservation purposes. The

square features trees, various other plants, and large concrete areas. There is a pool in the centre and a pergola with fountains on the sides of the park.

Abdullah Gül Park covers 135,756 m². It is conveniently located near the Malatya municipal building and the Malatya Park Shopping Centre. The park features shops, a walking path, cafés, gazebos, benches, a children's playground, a restaurant, an area with sports equipment that can be used as a sports field, ornamental pools with fountains, and a smoke-free picnic area.

These POSs were chosen because they are heavily used by residents and were later designated by the Disaster and Emergency Management Authority (AFAD, 2022) as official earthquake assembly and shelter areas. This evaluation therefore provides valuable insights for administrators and urban planners, supporting more informed decision-making. It allows an assessment of both the immediate performance of POSs during the disaster and their long-term suitability as evacuation or protected areas.

2.2 Data collection

2.2.1 Field analysis

Field analysis provided an objective assessment of physical conditions, facilities, and environmental quality of each selected area for this research. To evaluate both the pre-earthquake conditions (using municipal archives and previous images) and the current state more than a year after the disaster, the researchers conducted field analysis between March 2023 and February 2024. Using geo-referenced photos and structured observation forms, each of the six POSs was inspected with an emphasis on accessibility, vegetation, infrastructure, and cleanliness. Playgrounds, toilets, walkways, and green areas were documented. Using geographic information system (GIS) and municipal planning data, more than five hundred photos and field notes were collected and validated. By demonstrating how the POSs changed from their pre-disaster state to their current post-earthquake condition, this comparative analysis helped identify and understand the functional and physical changes that occurred. Thus, it generated descriptive data on physical damage, loss of functionality, and changes in maintenance.

2.2.2 Semi-structured interviews with local officials

Professional knowledge of operation of the POSs during the event was obtained. Between April and June 2023, while the earthquake response was ongoing, the researchers individually conducted semi-structured interviews with sixty local officials (ten per site) from the municipalities of Yeşilyurt, Battalgazi, and Malatya. These included civil engineers, architects, landscape architects, agricultural engineers, and urban planners. They provided information on how the six POSs were used, maintained, and changed during the earthquake. Each session lasted around thirty to forty-five minutes and was documented using computerized summaries and handwritten notes. The interview transcripts were then coded thematically.

2.2. User survey

The purpose of the survey was to assess how the six POSs were used, perceived, and maintained before and after the 2023 earthquake. Organizing the survey by POS allowed respondents to evaluate each location individually. Using on-site convenience sampling in the six POSs, the researchers conducted the survey in person by orally administering it between September and December 2023. For each POS, participants were asked to rate three sections: the frequency of their visits before and after the earthquake (ranging from daily to rarely) to capture shifts in user behaviour, types of activities they engaged in before and after the earthquake (such as walking, resting, socializing, playing sports, or using the space as a thoroughfare), and the main issues noticed after the disaster, including urgent repair needs, loss of recreational functions, cleanliness problems, and challenges to restoration due to damage. Responses were collected through multiple-choice and five-point Likert scale questions, complemented by open-ended comments.

There were 240 participants in total, forty in each POS, and each interview lasted between ten and fifteen minutes. Convenience sampling was used to select participants, who were local residents that used or visited the POS and were available and willing to answer questions on-site. To ensure diversity, the researcher specifically selected people of all ages and both sexes, especially those that had visited the locations both before and after the earthquake. Respondents gave their verbal consent after being informed of the study's academic and private nature, and all data were stored in password-protected digital files. The collected data were then analysed comparatively to identify trends in changes to user behaviour, visit frequency, and perceived problems across the six POSs.

2.2.4 Data analysis

Each item of data collected from field observations, surveys, and interviews was manually recorded on paper before being digitally converted for systematic analysis. The quantitative data from the user survey was organized in Microsoft Excel to produce descriptive tables and comparative visualizations showing conditions before and after the earthquake. The qualitative materials, categorized and organized in Microsoft Word, included responses to open-ended questions, interview transcripts, and photos.

Figure 3: Views of selected POSs in Malatya after the 2023 earthquake: a) container settlement in Eski Malatya Meydan Park; b) large-scale tent settlement in Battalgazi Municipal Garden; c) container complexes in Millet Garden; d) kiosks and informal commercial activity in Abdullah Gül Park; e) damaged playground in Mişmiş Park; and f) informal market activities in Eski Malatya Meydan Park (photo: authors).

The data collected were analysed and used to compare the selected POSs. The sites were assessed mainly for functionality, maintenance and management, infrastructure and facilities, security, size, location, and user satisfaction before, during, and after the earthquake. These factors have already been emphasized in earthquake recovery in previous research (Yücel & Komar, 2021; Gökgöz et al., 2020; Madureira et al., 2018; Kabisch et al., 2015; Chiesura, 2004; León & March, 2016; Johnson, 2007; Jayakody et al., 2016).

3 Results

3.1 Field analysis (function and condition of the POSs)

Before the earthquake, the public frequently used Millet Garden as a recreational space both day and night, and as a social hub due to its proximity to the Municipality of Battalgazi and the city centre. Field visits after the earthquake revealed that the park has been converted into a commercial area dominated by container units. Green spaces and playgrounds have disappeared, replaced by small trading stalls. The infrastructure and restrooms have been damaged, lighting is inadequate, and hygiene issues are widespread. The site no longer functions as a social park but rather as a temporary commercial hub.

Battalgazi Municipal Garden was aesthetically pleasing before the earthquake due to its rich vegetation, floral landscaping, and shaded areas. After the earthquake, the landscaped area was replaced by a restaurant and bakery. These new developments have reduced the green space and altered the park's original character. Although some pavement repairs have been carried out, plant maintenance is minimal, and the garden now primarily serves brief or practical visits rather than leisure activities.

Before the earthquake, Hürriyet Park was a popular spot for socializing, walking, and family time, particularly on weekends. After a period of disuse following the earthquake, the park has gradually become active again. Cafés and restaurants have reopened, but the area is now mainly used as a thoroughfare. Some vegetation has survived, but playgrounds and other amenities show signs of deterioration.

Mişmiş Park, once a multiuse green space serving various purposes, has lost most of its recreational functions. After the earthquake, playgrounds and lawns were damaged, and social gatherings ceased. Temporary structures now occupy parts of the park, and, although some natural vegetation remains, the area has become quiet and underutilized, mainly frequented by a small number of locals and volunteers.

Before the earthquake, Eski Malatya Meydan Park was a meeting and transition point with significant pedestrian traffic due to its proximity to the bus terminal and Malatya's ancient core. After the earthquake, it was transformed into a container market and temporary housing area. Pavements are broken, and the space has become overcrowded and disorganized. It has lost its original identity and is now mostly used as a thoroughfare for pedestrians and temporary residents.

Abdullah Gül Park was once a prominent social and sports venue, especially at night. It has been turned into a dense area filled with container shops and temporary market stalls. Playgrounds and green spaces have been damaged, and infrastructure has weakened. The park's recreational purpose has declined, now mainly serving short-term visitors.

The field study showed that all six POSs in Malatya underwent major changes following the 2023 earthquake. Gradually, many of these areas lost their recreational purpose and were converted into temporary commercial spaces, such as container shops and kiosks. Figure 3 illustrates some of these physical and functional changes, highlighting the reduction in recreational value and the shift to emergency and informal uses.

3.2 Interviews

Millet Garden was chosen as a gathering point due to its central location and easy accessibility. Relief supplies and food were delivered directly to the area, and tents and containers were set up throughout the park. However, the space was insufficient for the number of people arriving, resulting in overcrowding and poor organization.

Battalgazi Municipal Garden served as an evacuation and aid distribution centre, benefiting from its proximity to the city centre. Most of the park was filled with tents, and food, clothing, and shelter were provided. Nevertheless, the site was too small to accommodate all evacuees. Local officials noted a lack of preparedness and inadequate maintenance and repairs during and after the crisis.

Although small, Hürriyet Park became a temporary shelter due to its accessibility from the city centre. It provided initial shelter and social services through a municipal facility on site. However, during the earthquake, it lacked sufficient seating, shade, toilets, and utilities.

Mişmiş Park, the largest open space at a safe distance from buildings, served as a major hub for containers and storage during the earthquake. Much of the area was converted into shelters where basic needs were met, including food distribution, children's activities, and aid packages. However, sanitation, lighting, and infrastructure were inadequate. Despite the park's size, the number of tents and containers was insufficient.

Eski Malatya Meydan Park hosted tents and distributed essential aid. However, damage to infrastructure and vehicle congestion limited its usability. The tents and containers were small and inadequate. Although it was a central aid hub, hygiene issues persisted.

Abdullah Gül Park accommodated tents and aid distribution during the earthquake due to its central location and open layout. Local officials reported security checks and infrastructure assessments during its use. Despite its size, the park faced challenges related to infrastructure and security.

Although these sites initially functioned as shelters, aid distribution points, or container settlements, problems with sanitation, safety, and damaged infrastructure hindered their overall effectiveness. A shortage of personnel and lack of prior preparation also limited their efficiency.

3.3 User survey

Of the 240 respondents, 35% were female and 65% were male. Seventy percent were married, and the majority had a university education. Sixty participants had personally used the parks as shelter or gathering spaces during the February 2023 earthquake.

3.3.1 Intensity and frequency of use

The respondents were asked about the frequency of visiting the area before and after the earthquake. The options ranged from once a day to infrequent visits. The results are shown in Figure 4. It is evident that the earthquake has affected the use of the POSs selected for this research.

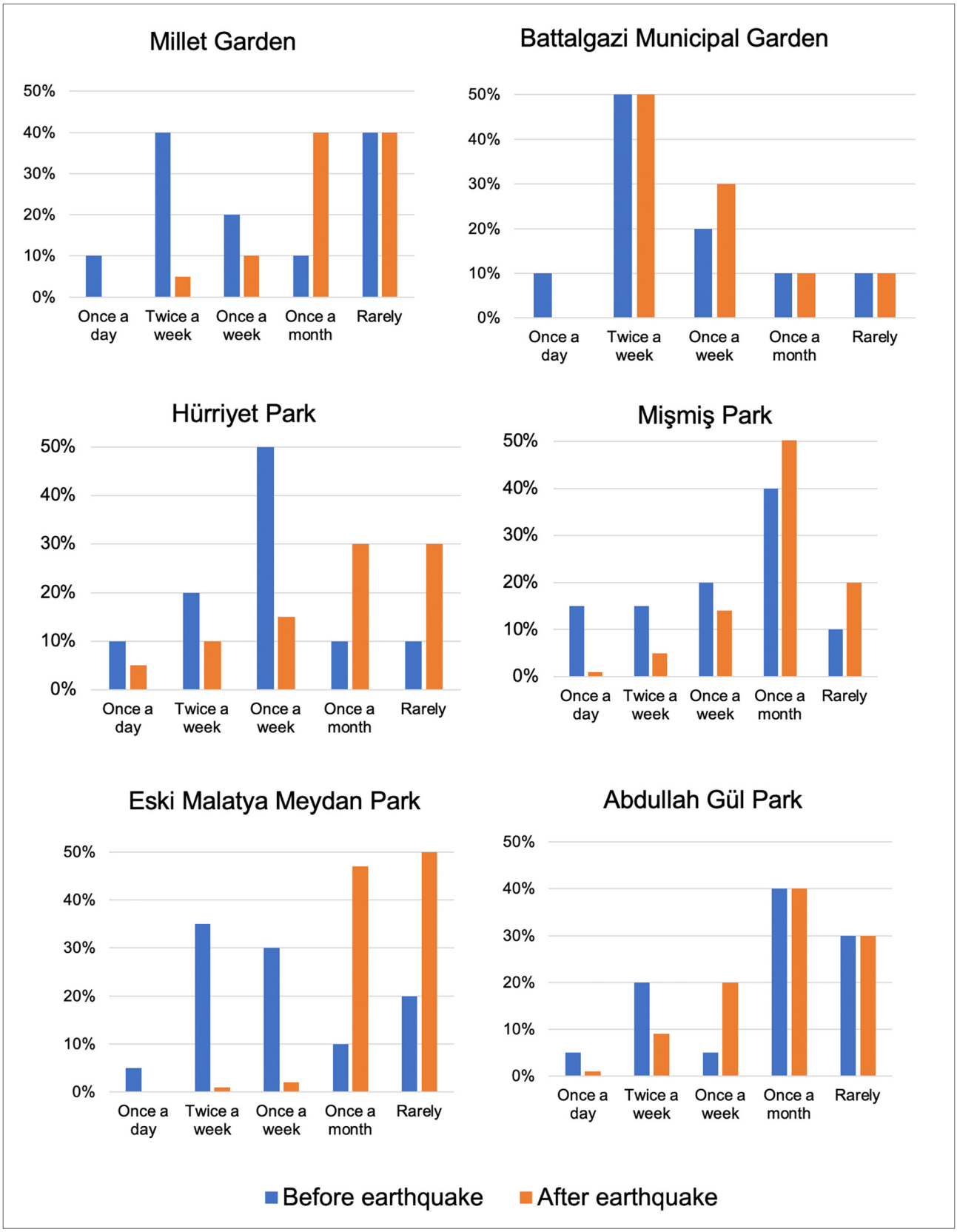

Figure 4: Comparison of the intensity and frequency of use in six POSs based on the survey (illustration: authors).

Before the earthquake, all the POSs were more frequently used. Many respondents visited Millet Garden, Hürriyet Park, and Eski Malatya Meydan Park twice a week or once a week, showing that these spaces were actively used for social and recreational purposes. Similarly, Battalgazi Municipal Garden recorded a strong concentration of visits twice a week, indicating its role as a regular gathering place. Abdullah Gül Park also attracted regular weekly visits, and Mişmiş Park showed a balanced distribution across daily, weekly, and occasional use.

After the earthquake, a noticeable shift occurred in visiting patterns. In Millet Garden, Hürriyet Park, and Eski Malatya Meydan Park, frequent visits declined sharply, with users instead reporting visits once a month or rarely, suggesting reduced accessibility, safety, or attractiveness in these areas. Battalgazi Municipal Garden showed less disruption because visits twice a week remained high, indicating its continued importance. Abdullah Gül Park shifted slightly toward less frequent visits (once a month), although usage did not collapse entirely. In contrast, Mişmiş Park saw an increase in monthly use, making it a more prominent space after the disaster. This pattern suggests that, although most parks lost their role as everyday social spaces, Mişmiş Park and, to some extent, Abdullah Gül Park gained or retained significance, highlighting variations in how POSs were perceived in the post-disaster context.

3.3.2 Types of activities

The next key question in the survey examined how the functions of the areas changed after the earthquake, aiming to understand the disaster's impact on their usage. Five main activities were considered: walking, meeting friends, resting and eating, play and sports, and using the space as a thoroughfare. As shown in Figure 5, there are clear differences in how POSs were used during the two periods. A comparative analysis reveals significant changes in POS usage after the earthquake, with two main trends: a sharp increase in using the POSs as thoroughfares and a notable decline in social activities.

Across the six POSs, activities were varied and balanced before the earthquake, reflecting diverse recreational uses. Millet Garden primarily served as a thoroughfare (about 45%) but also supported walking, socializing, and resting, highlighting its central location and accessibility. Battalgazi Municipal Garden offered a well-rounded mix of uses, especially meeting friends, walking, and resting, making it a key social spot. Hürriyet Park was primarily used for walking and social interaction, with many visitors coming for leisure and socializing. Mişmiş Park, the largest, had a multipurpose role, with walking, eating, sports, and social activities fairly evenly distributed. Eski Malatya Meydan Park primarily served as a thoroughfare, although some walking and social activities took place. Abdullah Gül Park had the most diverse user profile, supporting all five activities fairly evenly. Overall, before the earthquake, these POSs were lively recreational and social areas, with activities distributed among walking, resting, playing, and meeting friends. Thoroughfare use was present but was not dominant, except in Millet Garden and Eski Malatya Meydan Park.

After the earthquake, the functional use of all POSs shifted mainly to circulation and transit, with social and recreational activities significantly reduced. In Millet Garden, pathway use increased to about 60%, and socializing and resting declined because the area was transformed into a containerized trade centre rather than a leisure spot. Battalgazi Municipal Garden retained relatively more social functions, such as meeting friends and resting, compared to other POSs, likely due to its proximity to institutions that helped maintain community use. Hürriyet Park became primarily used as a thoroughfare (around 40%), losing much of its recreational character, which corresponds to its small size and role as a central connector. Mişmiş Park experienced the most significant change: thoroughfare use rose to about 55%, whereas sports and leisure activities almost disappeared, directly due to its conversion into a container and aid distribution area. Eski Malatya Meydan Park shifted almost entirely to thoroughfare use (about 60%), losing its cultural and social functions. Abdullah Gül Park, despite its large size, also became dominated by thoroughfare use (around 55%), although some activities continued, indicating only partial resilience.

3.3.3 Current issues (after the earthquake)

Respondents were asked about the current problems they observed in the POSs following the earthquake. The question was a closed multiple-choice question. Respondents were asked to select one or more issues from four predefined options, which were derived deductively from field observations and related literature on post-disaster public space assessment (e.g., Jayakody et al., 2016; León & March, 2016; Johnson, 2007). These options included 1) urgent repairs, including visible structural or surface damage requiring immediate maintenance; 2) loss of recreational function, or the inability of the area to support leisure or social activities due to damage or displacement of facilities; 3) cleanliness and hygiene, covering sanitation problems, waste accumulation, insufficient maintenance, and lack of basic facilities such as litter bins, toilets, and cleaning services after the earthquake; and 4) difficulty of restoration due to widespread damage, referring to major, long-term reconstruction problems caused by serious structural and infrastructural destruction, which required large-scale recovery efforts beyond regular maintenance. As shown in Figure 6, valid responses were coded numerically and analysed quantitatively in Microsoft Excel, calculating the percentage

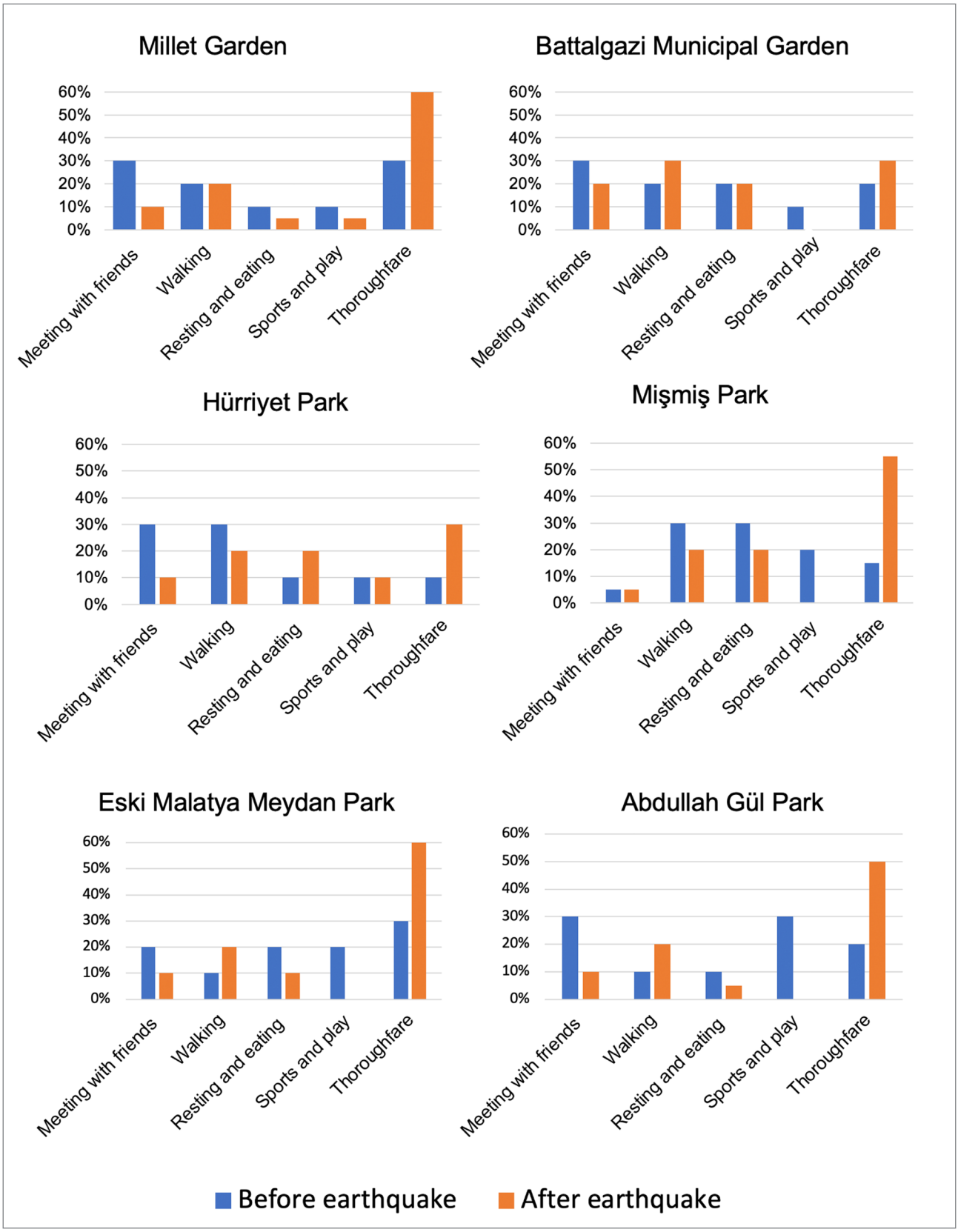

Figure 5: Analysis of activity types in the six POSs before and after the 2023 earthquake (illustration: authors). Forty participants were surveyed for each POS, for a total of 240 respondents.

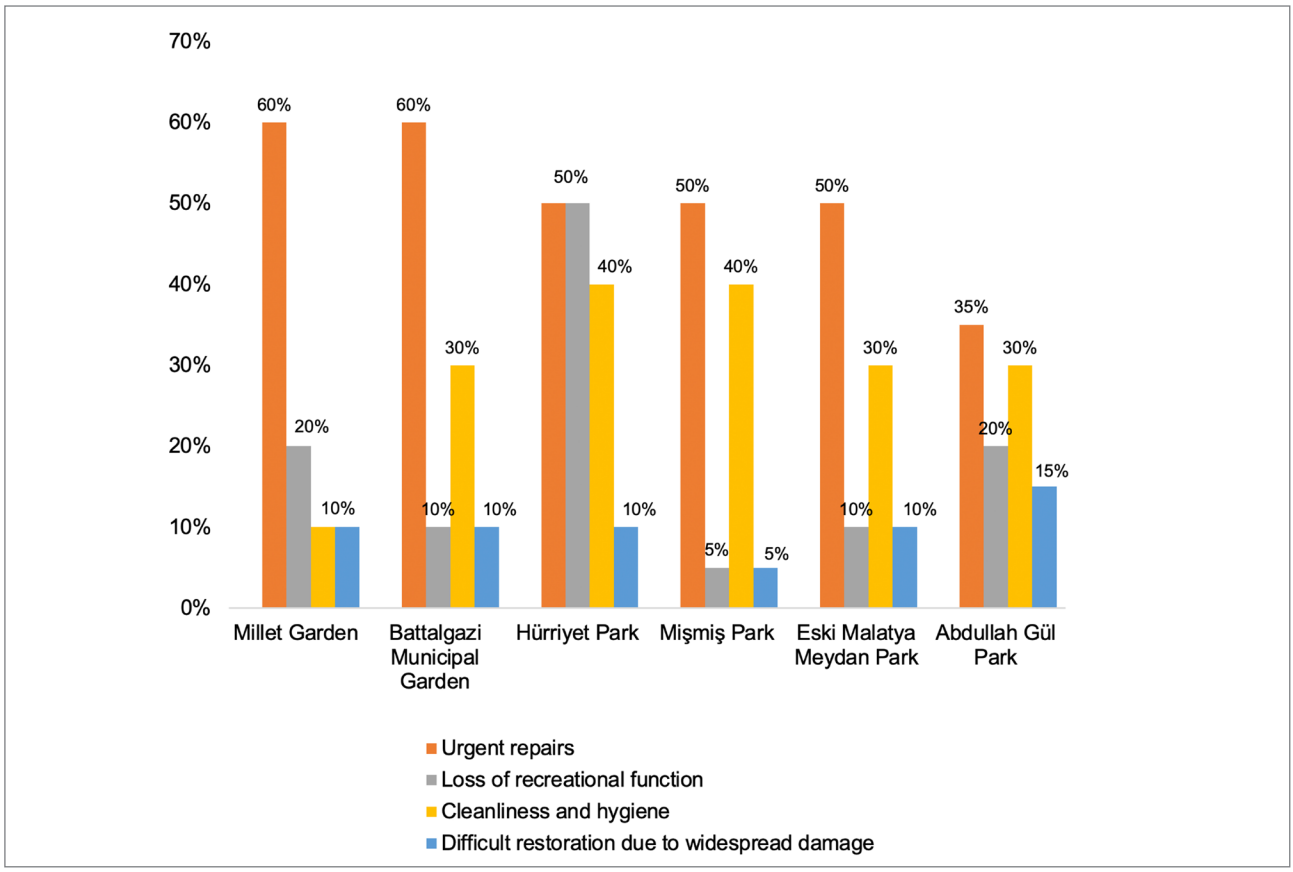

Figure 6: Users' perspectives on current issues in the six POSs according to the survey (illustration: authors). Forty participants were surveyed for each POS, for a total of 240 respondents.

of selections for each factor and comparing them across the six POSs.

The most common issue across all POSs was the immediate need for urgent repairs to infrastructure, such as benches, paths, fences, and lighting, after the earthquake. This problem was most acute in Millet Garden, Battalgazi Municipal Garden, Hürriyet Park, Mişmiş Park, and Eski Malatya Meydan Park, where 50% to 60% of users mentioned it. Although Abdullah Gül Park had a lower percentage, urgent repairs were still the most frequently reported problem there.

Many users across all POSs felt that these areas had lost their recreational function. This issue was most notable in Hürriyet Park and Mişmiş Park, with 40% of users citing it. This agrees with the data presented in Figure 5, which indicate a shift away from activities such as playing and resting.

Although concerns about cleanliness and hygiene were present in all six POSs, this was less prominent compared to urgent repairs or loss of recreational function. Abdullah Gül Park had the highest percentage of users mentioning cleanliness issues, followed by Millet Garden and Battalgazi Municipal Garden.

As seen in Figure 6, difficulty of restoration due to widespread damage was the least commonly reported problem but was still noted at all sites. Abdullah Gül Park had the highest percentage (15%) of users that found it difficult to restore the area. Millet Garden, Battalgazi Municipal Garden, and Hürriyet Park each had 10% of users reporting this issue.

Thus, although all six POSs suffered from an urgent need for repair, the specific secondary problems varied. Some areas faced more significant cleanliness challenges, whereas for others the primary issue was the complete loss of their recreational function.

Following the earthquake, each POS faced distinct challenges and underwent transformations shaped by the interplay of their physical conditions, management strategies, and user behaviours. Millet Garden ceased to function as a recreational area and was repurposed into a commercial zone, Battalgazi Municipal Garden shifted from a landscaped public space to a service-oriented area, Hürriyet Park rapidly regained its pre-disaster role due to its symbolic significance and central location, Mişmiş Park initially served as a crucial gathering point but later lost its cultural and recreational functions, Mey-

dan Park became a low-density corridor mainly frequented by temporary and non-local users, including vendors and residents of nearby temporary housing, and Abdullah Gül Park sustained considerable damage accompanied by a change in its user demographics.

4 Discussion

Analysis of field observations, interview data, and survey findings indicates that the most critical determinants influencing these outcomes were the quality of infrastructure, accessibility of location, and capacity of pre-disaster management. These integrated results substantiate the hypothesis that POSs with robust maintenance, central positioning, and symbolic importance tend to recover more quickly and retain their social value after disasters.

After the earthquake, all six POSs were primarily converted from leisure destinations into transit corridors. Movement through these spaces became the main activity, and their social, cultural, and recreational uses declined significantly. At the same time, the research findings show variations influenced by location, size, and infrastructure within each POS. Central POSs, such as Hürriyet, maintained their function as community hubs, whereas larger areas like Mişmiş Park, despite their considerable capacity, saw a decline in recreational and cultural use, serving mainly as thoroughfares. The park's extensive use for storage and containers, along with heavy vehicular traffic and temporary structures, caused significant damage to the ground, playgrounds, and green spaces. Due to inadequate repair and maintenance, the park could not regain its previous recreational role.

Previous research has highlighted that the resilience of POSs is influenced more by factors such as accessibility and maintenance than by size alone (Foški et al., 2024; Onay, 2024). Empirical field analysis supports this view, showing that park performance after the earthquake was not determined solely by spatial extent. For example, although Mişmiş Park and Abdullah Gül Park cover large areas, their ability to serve users effectively was reduced due to damaged infrastructure, deteriorated surfaces, and inadequate maintenance. In contrast, Hürriyet Park, a smaller park in a central location, continued to function as a communal gathering space because of better accessibility and more prompt municipal cleaning and repair. These observations suggest that POSs are highly adaptive yet vulnerable components of urban resilience infrastructure.

Persistent challenges identified through field analysis and user surveys after the earthquake included issues related to hygiene, security, and damaged infrastructure. Hygiene problems were related to broken sewage systems, insufficient cleaning, and a lack of temporary sanitation facilities such as toilets and showers at the sites after the earthquake. Security concerns were linked to inadequate lighting, lack of personnel, and unrestricted access. Infrastructure deficiencies included broken benches, damaged pavements, and limited waste collection. Overall, these conditions, confirmed by user evaluations, reduced satisfaction with POSs and delayed the resumption of normal recreational activities.

Based on the results obtained in this research, some key planning recommendations are suggested for POSs, particularly in earthquake-prone cities. First, POSs should use adaptive design by including multifunctional spaces that can quickly switch between recreational and emergency uses. Using modular paving, open lawns, and wide pedestrian paths can support temporary camping and container placement during crises. In addition, incorporating removable street furniture and lighting improves spatial flexibility while reducing long-term damage to the landscape. In this study, for example, Mişmiş Park initially functioned well as an emergency centre due to its large open area and flat ground, which made it easy to quickly set up tents and containers. Modular infrastructure and removable street furniture may help prevent ongoing damage to the ground, highlighting the need for flexible and adaptable design strategies in park planning.

Second, it is essential to use resilient earthquake-resistant materials in playgrounds and seating areas to prevent total infrastructure failure. Underground utilities such as water, electricity, and drainage should be designed with accessible maintenance points to allow quick repairs after seismic events. Emphasizing soil stabilization is also important to prevent surface deformation caused by heavy foot or vehicle traffic during emergencies. The example of Abdullah Gül Park, examined in this study, shows the significant damage to playground and seating areas due to the use of fragile materials. Pavement cracked under the weight of heavy vehicles used for aid distribution.

Third, it is essential to maintain a diverse mix of native drought- and stress-tolerant plants that can survive periods of neglect. Implementing a phased replanting and soil restoration plan is necessary to improve ecological health. Preserving mature tree canopies is particularly important because they provide natural shade, which benefits both relief efforts and recreational activities. The example of Battalgazi Municipal Garden showed that the POS lost much of its greenery when a temporary restaurant replaced the planted areas. The lack of a replanting plan and drought-resistant species reduced the site's ecological resilience.

Fourth, inadequate spatial planning can result in uncontrolled commercial encroachment. The open spaces of Millet Garden and Abdullah Gül Park, lacking designated emergency zones, were taken over by spontaneous container markets. In contrast, Hürriyet Park preserved its social function due to its compact layout, clearly defined pedestrian paths, and convenient access from the city centre. This aligns with the findings of Tatlić et al. (2024), who highlight accessibility as a crucial aspect of urban resilience. Emergency access routes should be planned to avoid disrupting recreational paths during normal use. Applying universal design principles – such as wide entrances, ramps, and sufficient lighting – improves both evacuation safety and everyday comfort. Maintaining open sightlines is also essential for safety and social visibility, helping reduce the sense of insecurity often felt after disasters.

Finally, maintenance and community engagement must be considered. After the disaster, Eski Malatya Meydan Park was gradually neglected and eventually turned into a street mainly used by transient residents. Its revival was hindered by the lack of a coordinated maintenance plan and community participation programs. In contrast, local initiatives at Hürriyet Park, such as reopening cafés and small cleaning tasks, helped restore user engagement, highlighting the importance of local involvement in post-disaster recovery. Developing a comprehensive maintenance plan that addresses both routine operations and emergency response situations is essential. In addition, it is crucial to train community organizations and municipal government to manage the transition after a disaster.

5 Conclusion

The findings confirm that POSs in earthquake-prone urban environments must serve a dual function: meeting everyday recreational needs and acting as critical infrastructure for emergency response. However, these roles often conflict. When disaster management and urban planning are conducted separately, POSs risk degradation or commercialization after crises, as seen in Millet Garden and Abdullah Gül Park. An integrated approach that incorporates flexibility, durability, and multifunctionality into design principles can ensure that open spaces remain dynamic and resilient components of the urban landscape.

In this study, POSs faced numerous challenges, including inadequate infrastructure, poor sanitation, and management problems, despite providing essential shelter and support functions immediately after the earthquake. Most POSs had not fully returned to recreational use six months after the earthquake; some had shifted to commercial purposes, and both security and user satisfaction had declined. These findings show that resilience relies on several factors, such as timely maintenance, robust infrastructure, and accessibility. This research offers new insights into the design and management of POSs to support both everyday use and emergency functions, bridging the gap between disaster management and urban planning.

The study underscores the need for systematic planning approaches that balance accessibility and safety, facilitate post-disaster repair, and integrate disaster preparedness into park design. A limitation of this study is its focus on six POSs in a single city, which may restrict the generalizability of the results. However, it provides valuable recommendations for planners and policymakers working in earthquake-prone urban environments, as well as a solid foundation for future comparative research.

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Modernist architecture as part of contemporary urban identity: Plečnik and Ravnikar in Ljubljana, and Grabrijan and Neidhardt in Sarajevo

This article examines the influence of modernist architecture on the formation of urban identity in two post-Yugoslav cities: Ljubljana and Sarajevo. A comparative analysis explores the contributions of key architects to shaping the urban fabric and identity of each city during the twentieth century, considering their shared socialist past and divergent sociocultural trajectories after the 1990s. The legacy of modernism is considered in light of sustainability, resilience, and the fluctuating notion of cultural identity. Special focus is placed on the works of Jože Plečnik and Edvard Ravnikar in Ljubljana, and Dušan Grabrijan and Juraj Neidhardt in Sarajevo.

Keywords: city identity, context, heritage, legacy, "human-centred" urbanism, Jože Plečnik, Edvard Ravnikar, Dušan Grabrijan, Juraj Neidhardt

1 Introduction

Urban identity, which distinguishes cities from one another, has been especially contested in recent decades, marked by globalization and homogenization of culture and the built environment. Although the advent of the international style and modern architecture in the early twentieth century embodied powerful universalizing and standardizing forces, there were also more sensitive practices that sought to respond to local contexts. Today, modernist heritage is contested, particularly from the perspective of sustainability, yet it remains important to assess its contribution to the contemporary urban identity of cities, particularly through the works of architectural avant-garde figures. This is particularly compelling in the case of the Western Balkans, especially the capitals of the former Yugoslav republics, which have been shaped by turbulent histories at the crossroads of cultures and further transformed through their shared socialist past and their post-socialist transition. This article examines the cities of Sarajevo and Ljubljana, which were both part of royal Yugoslavia until 1941 and in the second half of the 20th century under Federal People's Republic of Yugoslavia and Socialist Federal Republic of Yugoslavia.

This research highlights the key twentieth-century modernist architects that profoundly contributed to the unique urban identities of Sarajevo and Ljubljana by advancing contextual approaches and developing distinctive architectural expressions. A comparative interpretation of the works of Jože Plečnik, Edvard Ravnikar, Juraj Neidhardt, and Dušan Grabrijan reveals divergent yet context-sensitive articulations of urban modernity. This article first examines how local context resonates in each architect's work within his urban, cultural, and political environment. The research compares their contributions during the formative period of the urban identities of Sarajevo and Ljubljana amid the rise of modernism. It also explores how these modernist architectural legacies are reflected in these cities' contemporary urban narratives. The article has three main sections. After the introduction, a discussion of the background and concepts analyses notions such as the image of the city, urban identity, genius loci, critical regionalism, and contextualism. The next section presents the research methodology and case studies of Ljubljana and Sarajevo, focusing on the evolution of twentieth-century urban identity in dialogue with the local context. Finally, the results offer a comparative framework interpreting the contributions of these key architectural figures and reflecting on their significance today.

2 Theoretical background and key concepts

This study addresses urban identity with reference to the concept of the image of the city, as Kevin Lynch defines distinctiveness from other cities. This has three components: identity, structure, and meaning: "A workable image requires first the identification of an object, which implies its distinction from other things, its recognition as a separable entity. . . . Second, the image must include the spatial or pattern relation of the object to the observer and to other objects. Finally, this object must have some meaning for the observer, whether practical or emotional" (Lynch, 1960). In other words, architecture and objects play a vital role in shaping the character of a city – not in isolation, but in interaction with the broader urban context. Ultimately, urban identity is shaped not only by physical elements, but also by its intangible aspects – its sociocultural and symbolic dimensions, and the way people relate to and experience the city. The distinctive character of a city emerges at the intersection of its physical form (environmental, urban, architectural framework) and its social, cultural, and symbolic meanings. The exploration of urban identity in Sarajevo and Ljubljana cannot be separated from their complex historical backgrounds. Because this research focuses on the modernist legacy, it examines only one layer among many that constitute urban identity. Another valuable analytical tool is Christian Norberg-Schulz's theory of phenomenology of space and place, particularly his concept of genius loci, or the spirit of place: "A place is a space which has a distinct character. . . . To belong to a place means to have an identity" (Norberg-Schulz, 1980).

Despite its diverse expressions, regionalism is predominantly interpreted as a theoretical framework that opposes globalizing, universalizing, and standardizing forces, which often lead to the erosion of local identities and cultural diversity. Mumford (1947) reconceptualized regionalism as an active engagement with the global rather than a posture of outright resistance. Four decades later, Tzonis and Lefaivre (1981) introduced the theory of critical regionalism as a conceptual approach that invites reflective engagement with tradition, identity, and context, encouraging a critical self-examination within global architectural discourse. Further developed in 1983 by Frampton (2007), critical regionalism advocates for a cultural strategy to mediate between universal civilization and local culture. The approach also encourages dialogue between modern technology and natural context, accentuating architecture's experiential and tactile qualities. However, the importance of context in architecture and urbanism was fully recognized only in the last decades of the twentieth century. As Derrida (1967) famously stated, "Il n'y a pas de hors-texte"

('there is nothing outside the text'), highlighting the inseparability of meaning from context. This notion gained particular emphasis during the postmodern period and was advanced by architects and theorists such as Aldo Rossi, Thomas L. Schumacher, and Colin Rowe, who asserted that the architectural object should be understood as a fragment within a larger urban whole (Nesbitt, 1996).

Context can be analysed in both its physical (natural and built/urban) and non-physical (social and cultural) dimensions. In architecture and urban planning, context may be evoked either directly or implicitly (Zagora, 2012). The contribution of modernist architects to urban identity is exemplified by figures such as Antoni Gaudí in Barcelona, Oscar Niemeyer in Brasília, Otto Wagner in Vienna, and Alvar Aalto in Helsinki. These contributions predate the rise of the "star-architect" phenomenon, city branding strategies, and the commodification of architectural landmarks (Zhukin, 1995). In examining modernism and the shaping of urban identity in European cities during the first half of the twentieth century, it is essential to revisit the pioneers of the international style in architecture, who demonstrated a nuanced sensitivity to context. Le Corbusier (1930) emphasized the fundamental connection between architecture and urban planning, stating "Architecture en tout, urbanisme en tout . . . Une cellule = un homme; des cellules = la ville" ('Architecture in everything, urbanism in everything. . . . One cell = one man; many cells = the city'). In other words, building design and city planning are inseparable and can be compared to individual living units that together form a cohesive whole. Although Le Corbusier acknowledged that modern techniques, challenges, and solutions had become increasingly globalized over the decade prior to 1930, he stressed that local factors such as climate, geography, topography, and cultural diversity continued to play a crucial role in guiding context-sensitive design approaches. This article addresses how the concepts of context and genius loci, along with critical regionalist approaches, even prior to their formal articulation, and the philosophies of avant-garde modernist architects, influenced the work of selected Balkan architects throughout the twentieth century.

3 Materials and methods

The research methodology applied in this article combines a historiographical approach with contextual and interdisciplinary perspectives. The literature review is followed by a historical analysis of both cities. This is complemented by case studies of selected works by key architectural figures, typological analysis, and mapping, concluding with superimposition and comparative analysis. The urban identities of the two cities encompass all the historical layers in its streets, buildings, and riverbanks, from Roman to medieval times in Ljubljana, and in Sarajevo its Ottoman past as well. Both cities share an Austro-Hungarian, royal Yugoslav, and socialist Yugoslav history. Whereas Ljubljana evolved as a central European provincial capital, Sarajevo embodies the coexistence of Oriental and Occidental culture. The area and population of the two cities, historically and today, are comparable. This study focuses on how modernism was introduced in these two cities, how it evolved throughout the twentieth century, and which intellectual and professional exchanges shaped the distinctive approaches of their key modernist architects, particularly in dialogue with the local context. These approaches took diverse and distinct forms in each city. How did these modernist, context-aware approaches emerge and develop in Sarajevo and Ljubljana, and who were the key international modernist architects that influenced their architectural evolution?

Alongside other key avant-garde figures of the international style, Le Corbusier – the father of European architectural modernism – played a pivotal role in transmitting modernist architectural influences to the Balkans, also in Sarajevo and Ljubljana, not only because of his international reputation, but also due to his direct and implicit connections with Yugoslav architects of the time. When considering context and place-identity in these two cities, it is essential to examine the foundations of their urban identity formation. In Ljubljana, place-identity was shaped through references to classicism, particularly evident in the work of Jože Plečnik (Long, 2000), whereas in Sarajevo it was rooted in tradition and regionalism, as exemplified by Juraj Neidhardt (Idrizbegović-Zgonić & Džumhur, 2024). Ljubljana and Sarajevo were predominantly modernized by internationally educated architects that actively engaged with global networks of knowledge exchange while seeking inspiration from their local contexts. This duality highlights the critical role of international networks in disseminating modernist ideas while underscoring the enduring significance of context-sensitive design in shaping urban identities.

3.1 Ljubljana

The architectural and urban development of Ljubljana in the twentieth century was strongly influenced by Jože Plečnik (1872–1957) and Edvard Ravnikar (1907–1993), whose approaches to design and planning articulated a human-centred vision rooted in cultural specificity, historical continuity, and spatial symbolism. Plečnik profoundly reshaped Ljubljana through an approach recognized by UNESCO as a unique example of human-scale urban design that transformed the city's identity through sensitive integration with its historical context (Figure 1, Table 1). He played a pivotal role in shaping the cultural and spatial identity of Ljubljana through interventions that transformed the city into the symbolic capital of the

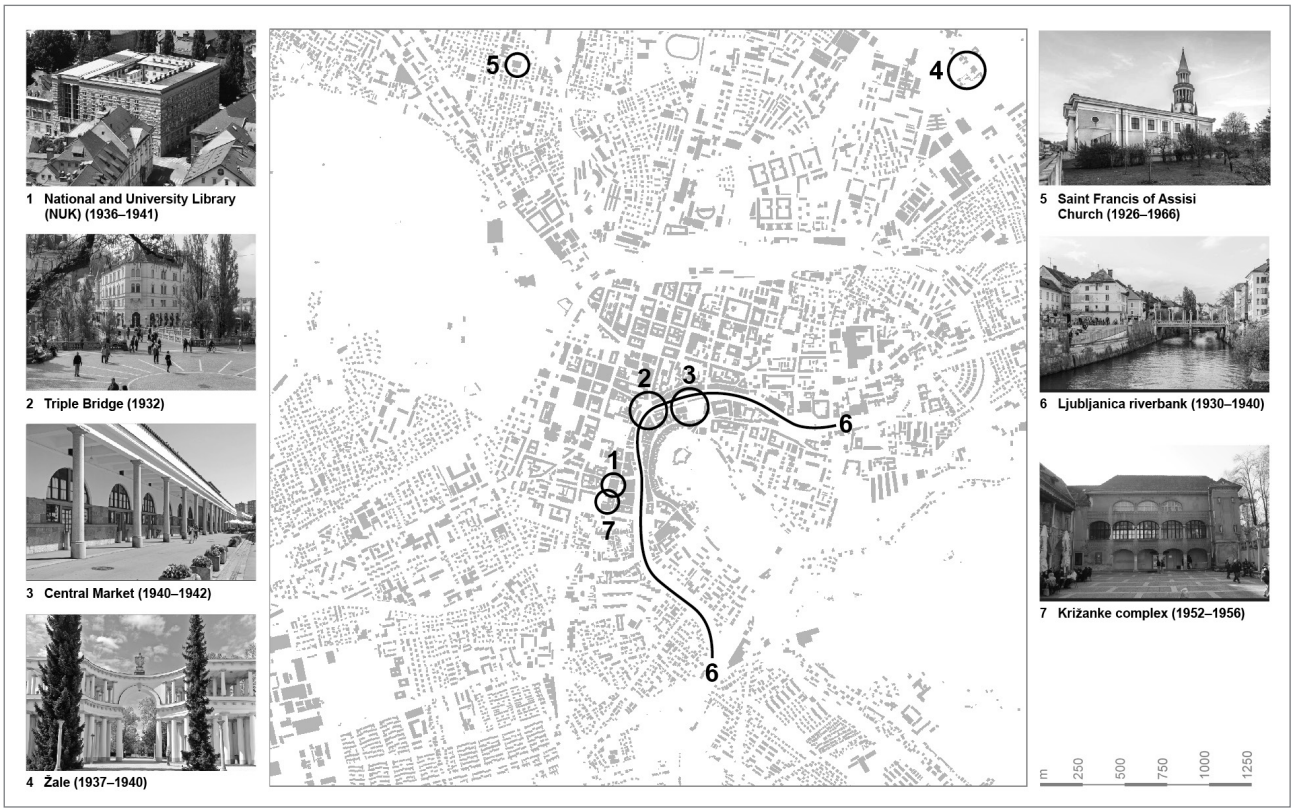

Figure 1: Plečnik's prominent works on a map of Ljubljana's city centre (source: authors; photos: Wikimedia Commons, Flickr Creative Commons, and B. Zupančič).

Slovenian nation (Vodopivec in Žnidaršič, 2010). His architectural language was characterized by reinterpreting classical forms, using local materials, and incorporating symbolic and spiritual motifs to articulate a unique urban identity within European architectural discourse (Mihelič, 2012; Prelovšek, 1992). His redesign of key public spaces – including the Triple Bridge, Congress Square, the Cobbler's Bridge, and the banks of the Ljubljanica River – established a distinctive urban morphology that transcended utilitarian function, introducing symbolic and aesthetic dimensions into the city's fabric. Major architectural works such as the National and University Library, Žale Cemetery, the Central Market, and the Križanke complex are not only iconic landmarks but also loci of national identity and collective memory, reflecting Plečnik's conception of architecture as both cultural narrative and civic ritual. His vision of the Ljubljanica River as a central urban axis has been reaffirmed through contemporary revitalization efforts, culminating in international recognition such as the European Prize for Urban Public Space in 2011. As a professor at the University of Ljubljana's former Technical Faculty, Plečnik developed a pedagogical model that profoundly influenced generations of Slovenian architects, embedding artistic, ethical, and contextual dimensions into architectural education (Mihelič, 2012; Vodopivec in Žnidaršič, 2010). By combining classical architectural vocabulary with modern functional imperatives and grounding them in local cultural and symbolic references, Plečnik's architectural language is a synthesis of classical and modern elements, positioning Ljubljana within the European architectural canon (Zupančič, 2019).

Edvard Ravnikar, a student of Plečnik and a leading figure in postwar Slovenian architecture, acquired his mentor's sensibility to place, context, and symbolic meaning, which he later reinterpreted through the lens of architectural modernism. Deeply influenced by Plečnik's artisanal and contextual approach, Ravnikar embraced Le Corbusier's modernism, the rationalist and functionalist principles of Bauhaus (especially the Ulm School of Design), regional traditions, and eventually structuralism and metabolism, continually evolving his architectural language throughout his career. His comprehensive and systematic approach to urban planning established the conceptual foundations for Ljubljana's postwar development, introducing a spatial language that synthesized international modernist principles with the local cultural and historical context (Mihelič & Kerbler, 2024). Ravnikar's urban vision was grounded in an open, polycentric city model that encouraged dialogue between historical structures and contemporary interventions, thereby redefining Ljubljana's civic and symbolic core (Figure 2, Table 2). This approach is exemplified in the design of Republic Square, a monumental civic space intended for democratic and state-forming functions, which redefined the urban core of Ljubljana (Mihelič & Kerbler, 2024).

Table 1: Plečnik's key projects and their impact on Ljubljana's identity.

Year	Project	Key architectural features	Impact
1936–1941	National and University Library (NUK): monumental library with brick and stone façade, symbolic design	Iconic symbol of Slovenian culture, education, and national identity	A cultural monument of national importance since 2009, NUK is well preserved and remains in active public and academic use, continues to shape the urban image, and serves as a model of heritage integration into contemporary city life.
1932	Triple Bridge: unique ensemble of three interconnected pedestrian bridges over the Ljubljanica River, connecting the medieval old town with the modern city	Iconic urban landmark uniting old and new	The Triple Bridge is fully preserved, protected as a cultural monument of national importance, and remains a vibrant pedestrian hub in the city centre. Its unique design continues to define the city's contemporary identity and international image.
1940–1942	Central Market: covered market complex with colonnades along the river	Connection between urban life and architecture	The Central Market is fully preserved, protected as a cultural monument of national importance, and remains the city's main marketplace and a vibrant social hub. The market continues to shape Ljubljana's identity as an open, lively, and people-oriented city.
1937–1940	Žale: cemetery complex as a "city of the dead" with a monumental entrance, chapels, and symbolic landscaping	Humanization of death and respect for tradition; space of collective memory	Žale is fully preserved, protected as a cultural monument of national importance, and continues to shape the city's identity as a place of respect, inclusion, and architectural excellence.
1926–1966	Saint Francis of Assisi Church: modernist church with brick columns and distinctive bell tower	Distinctive landmark, reference for modern sacred architecture	The church is fully preserved, protected as a cultural monument of national importance, and remains an active parish centre and a distinctive landmark in the Šiška neighbourhood, strengthening local identity and serving as a reference point for modern sacred architecture in Ljubljana.
1930–1940	Ljubljanica riverbank: urban design of riverbanks, promenades, terraces, tree-lined avenues	Transformed river into central urban axis, green and lively space	The riverbanks are well preserved, protected as a cultural monument of national importance, and form a central part of Ljubljana's public space. The riverbanks remain a key space for social life, events, and tourism.
1952–1956	Križanke complex: transformation of former monastery into open-air theatre	Major cultural venue, strengthens Ljubljana's festival identity	Križanke is fully preserved, protected as a cultural monument of national importance, and functions as Ljubljana's main open-air cultural venue. Plečnik's transformation of the former monastery into an outdoor theatre created a unique urban space for festivals and public events.

Source: authors.

The square's spatial composition – anchored by twin towers and a central platform – was envisioned as a modern agora, integrating symbolic, functional, and aesthetic dimensions. Through architectural works such as the Cankar Centre (slo. Cankarjev dom), the Museum of Modern Art, and Republic Square, Ravnikar implemented a synthesis of functionalist design and symbolic spatiality, placing particular emphasis on the role of public space in shaping the urban experience. Rather than asserting architectural dominance, Ravnikar integrated new structures into the existing urban fabric with subtlety and precision, demonstrating a nuanced engagement with historical layers and topographical conditions. As an educator and founder of the Ljubljana School of Architecture, he institutionalized a discourse of contemporary architecture in Slovenia that emphasized intellectual responsibility, interdisciplinarity, and continuity with tradition (Vodopivec in Žnidaršič, 2010).

3.2 Sarajevo

The urban fabric of Sarajevo is characterized by a dynamic – and at times ambiguous – relationship between traditional and historical architecture on the one hand, and modernist and contemporary architecture on the other. Sarajevo's architectural heritage – ranging from the Ottoman, through the Austro-Hungarian, royal Yugoslav, and socialist Yugoslav periods, to the present – resembles a multi-layered amalgam,

Table 2: Ravnikar's key projects and their impact on Ljubljana's identity.

Year	Project	Key architectural features	Impact
1939–1951	Museum of Modern Art: first purpose-built modern art museum in Slovenia, modernist stone façade, innovative lighting	Sets national standard for museum architecture, reinforced Ljubljana's cultural role	The museum has been protected as an architectural monument since 1993 and is well preserved after a comprehensive renovation (2008–2009), which respected Ravnikar's original concept. Today it serves as a reference point for museum architecture and urban integration in Ljubljana.
1960–1986	Urban Planning Vision for Ljubljana's City Centre: postwar vision for a new city centre, realized through Republic Square, a monumental public space	Modern urban core, symbol of statehood, central space for public life	The area is protected as a cultural monument of national importance and remains a central space for public life, major events, and civic gatherings, and it continues to shape Ljubljana's contemporary urban image and serves as a model for sustainable urban renewal.
1967–1973	Ferant Garden complex: mixed-use residential and commercial complex, distinctive modernist architecture	Model for urban living, promotes openness and metropolitan character	The complex is well preserved and remains in residential use, with its mixed-use design and distinctive architecture contributing to the metropolitan character of central Ljubljana. The Ferant Garden complex continues to shape the city's identity as an open, diverse, and resilient urban environment.
1963–1966	Faculty of Civil and Geodetic Engineering: university building with innovative structure and clear functional organization	Strengthens university district identity, integrates modernist architectural and urbanistic values	The Faculty of Civil and Geodetic Engineering remains in active academic use, and its presence strengthens the identity of the university district and demonstrates the integration of modernist architectural and urbanistic values into the urban fabric of Ljubljana.
1961–1986	Republic Square: main public square with monumental towers, Maximarket department store, Cankar Centre	Symbol of independence and modern identity, venue for civic life	Republic Square is protected as a cultural monument of national importance and remains the central public space of Ljubljana. Its spatial and symbolic role continues to shape the contemporary image and collective memory of the city.
1971	Maximarket: modern department store, open to the plaza, vibrant commercial activity	Supports multifunctional, accessible city centre, daily urban life	The department store (now Maxi) remains an active commercial and social hub on Republic Square and is part of the protected cultural monument ensemble. Its design supports the multifunctional character of Republic Square and reinforces its role as a vibrant, people-oriented urban core.
1977–1983	Cankar Centre (slo. Cankarjev dom): Slovenia's central cultural and congress centre	Designed as a multifunctional complex with large underground halls, a monumental entrance, and a modernist stone façade	The Cankar Centre is protected as part of the Republic Square cultural monument ensemble and remains Slovenia's central venue for cultural events, congresses, and national ceremonies. The building is well maintained and continues to reinforce Ljubljana's status as a cultural capital, and it is a symbol of national culture and public life.
1992–1993	National Gallery extension: modern exhibition wing, integrated with the historic National Gallery	Enhances the role of the National Gallery, connects tradition and contemporary art	The extension to the National Gallery, completed in 1993, is functionally and visually integrated with the historic building and is protected as part of national cultural heritage. The extension strengthens the role of the National Gallery as a central cultural institution and contributes to Ljubljana's identity as a city that values both tradition and contemporary art.

Source: authors.

which has evolved into a stimulating and unique urban context. Within this setting, it is particularly interesting to examine the dawn of architectural modernism in Sarajevo during the 1920s, when the first generations of architects educated in European academic centres returned to Sarajevo. Among the first avant-garde architects were graduates of the Prague Faculty of Architecture, including Dušan Smiljanić, Helen Baldasar, the brothers Reuf and Muhamed Kadić, Emanuel

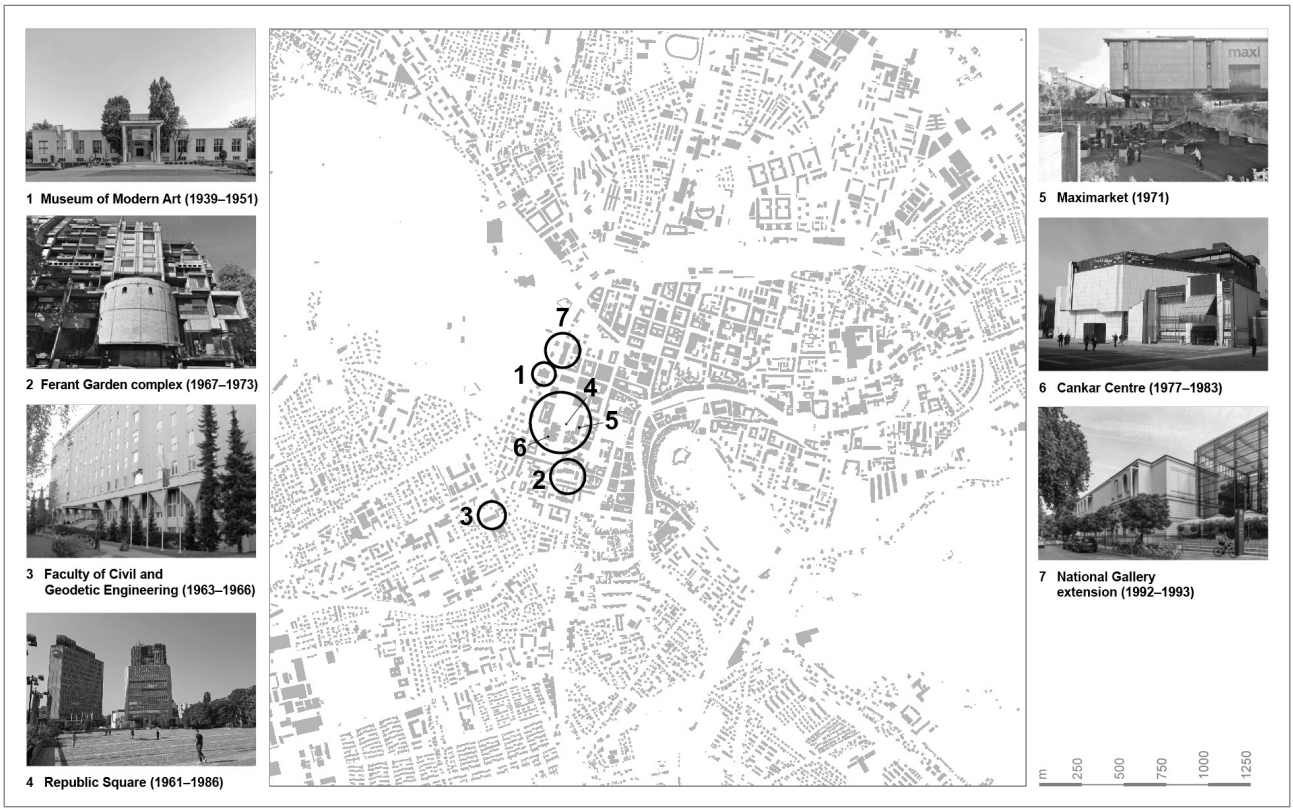

Figure 2: Ravnikar's prominent works mapped in Ljubljana's city centre (source: authors; photos: Wikimedia Commons, Flickr Creative Commons, culture.si, and B. Zupančič).

Šamanek, Leon Kabiljo, and Jahiel Finci, followed by graduates of the Vienna Faculty of Architecture, such as Mate Baylon and Juraj Neidhart (Čelić, 1988). A large part of architectural production in Sarajevo during the 1920s and 1930s primarily consisted of individual interventions such as infills in Austro-Hungarian urban blocks or reconstructions of existing structures. The prevailing architectural typologies included schools, large family residences, banks, savings institutions, and public agencies, as well as mixed-use residential-commercial buildings and rental housing blocks. A significant influx of architects, distinguished by their clear advocacy for pure and simplified volumetric forms, guided Sarajevo onto a trajectory toward the international stage of modernist architecture. Gradually, the work of the first generations of modernist architects in Sarajevo branched into two distinct directions: one was a pure functionalist stream, rooted in strict adherence to modernist principles and largely detached from the local context; the other was a contextually sensitive approach, in which each architect responded to the local urban, cultural, and political environment (Kahrović Handžić, 2023).

Representing the latter line of thought, the architects Dušan Grabrijan and Juraj Neidhardt recognized the compatibility of traditional Bosnian houses and the local context with the universal values of modern architecture, demonstrating their vision in theoretical discourse and practice. Both architects were from elsewhere in Yugoslavia and settled in Sarajevo, bringing with them international educational and professional experience. Grabrijan was renowned for his educational background in the theory and history of architecture from Ljubljana and Paris, and Neidhardt's international experience from Zagreb, Berlin, and Paris combined with sensitivity to vernacular traditions enriched the modernist paradigm. Their theoretical and practical work is one of the earliest exemplars of critical regionalism, predating the formal articulation of its theories by Tzonis and Lefaivre (1981) and Frampton (1983) by approximately four decades. Their extensive correspondence fostered both a deep friendship and the theoretical foundations of a context-sensitive approach.

The Slovenian architect, urban planner, and architectural theorist Dušan Grabrijan (1899–1952) had a profound impact on the development of architectural thought in Bosnia and Herzegovina during the first half of the twentieth century. Grabrijan was educated in Ljubljana and Paris, where he encountered modernist ideas and the work of Le Corbusier (Čelić, 1970). Although shaped by a central European cultural milieu, Grabrijan devoted the greater part of his professional career and theoretical work to Sarajevo, where he taught at the Secondary Technical School (Abadžić-Hodžić, 2021). He was particularly distinguished by his advocacy of the idea that architecture embodies the spirit of place – encompass-

Table 3: Grabrijan's key works and their impact on Sarajevo's identity.

Year	Project	Key features	Impact
1942	*Sarajevo i njegovi trabanti: Arhitektonsko-urbanistička razmatranja uoči nacrta za regulacije grada Sarajeva* (Sarajevo and its Satellites: Architectural and Urbanistic Considerations Prior to Drafting the City's Regulatory Plan): an urban study coauthored with Neidhardt exploring the relationship between Sarajevo and smaller surrounding settlements	The publication combines theory with urban design proposals, an important source for understanding the cultural heritage of Sarajevo, while advocating for a modern approach to urbanization of the city	Although part of Grabrijan's theoretical work was published posthumously, its impact on contemporary research in architecture schools in the former Yugoslavia was through publications and exhibitions. *Architecture of Bosnia and the Way toward Modernity* gained international recognition by being featured at the exhibition *Toward a Concrete Utopia: Architecture in Yugoslavia 1948–1980* at MoMA in 2018 and 2019.
1957	*Arhitektura Bosne i put u suvremeno* (Architecture of Bosnia and the Way toward Modernity): a theoretical work coauthored with Neidhardt advocating a dialogue between the traditional and modern architectural idioms	A seminal book that blends research with a visionary manifesto of the urban development of Sarajevo	
1984	*Bosanska orijentalna arhitektura u Sarajevu* (Bosnian Oriental Architecture in Sarajevo): a 1940s urban study of Bosnian Muslim vernacular architecture and lifestyle, first published in articles and later issued posthumously as a book	A pioneering study exploring the relationship between sociocultural patterns of the Oriental lifestyle and the spatial and aesthetic qualities of traditional housing in Sarajevo	

Source: authors.

ing its cultural, historical, and functional features. Grabrijan's methodology was rooted in the analysis of lived experience and the tangible realities of the urban context. This approach yielded formal and spatial strategies that anchor site-specific architectural interventions, thus fostering a dialogue between past and present in the process of city-making. His theoretical reflections on the significance of local tradition in shaping modern architectural expression found fertile ground in his collaboration with Neidhardt, with whom he shared a vision of architecture that transcends mere functionality to become a bearer of cultural identity. Grabrijan and Neidhardt believed that the oriental house was the foundation for the kind of modern architecture that Le Corbusier was developing, thus bridging vernacular traditions with avant-garde design principles.

Grabrijan and Neidhardt became acquainted in Maribor during their military service. The two maintained a correspondence during Grabrijan's stay in Sarajevo, where he began teaching at the Secondary Technical School in 1930, while Neidhardt was working in Le Corbusier's studio (Zupančič, 2024). Their common approach culminated in the book *Arhitektura Bosne i put u suvremeno* (Architecture of Bosnia and the Way toward Modernity; Neidhardt & Grabrijan, 1957), articulating design methodologies grounded in contextual sensitivity. Reinterpretation of traditional architecture with integration into historical urban configurations resulted in modern architectural discourse rooted in a critical synthesis of historical paradigms. Grabrijan endeavoured to thoughtfully uphold the principles of modern architecture that he regarded as inherent in Ottoman architecture while adapting them to the distinct characteristics of Bosnia (Korolija, 2024). The archive of over fifteen thousand items generated over the course of Grabrijan's three-decade career – held at the Museum of Architecture and Design (MAO) in Ljubljana (Zupančič, 2024) – bears witness to the remarkable depth and methodological rigor of his scholarly engagement. His extensive body of work offers critical insight into his in-depth study of Bosnian vernacular architecture (Table 3).

Juraj Neidhart (1901–1979) was a pioneer of architectural modernism in Bosnia and Herzegovina. He was renowned for his life-long advocacy of a profound dialogue with the local cultural and architectural heritage. His vision of modern architecture was deeply rooted in the spatial, material, and symbolic logic of local traditional architecture, whose values he recognized, analysed, and reinterpreted through the language of modernism. His most significant contribution lies in the translation of modernist principles into the cultural context of Sarajevo. Neidhardt worked in Le Corbusier's studio between 1933 and 1935 together with seventeen other Yugoslav architects (Zupančič, 2017). Ten were from Slovenia, including Ravnikar, who joined Plečnik's studio in 1939. Although the two never met in the studio, they were later inducted into the Yugoslav Academy of Sciences and Arts in Zagreb. Another student of Plečnik that spent time in Paris, although he did not work in Le Corbusier's studio, was Grabrijan. During his time in Sarajevo, he maintained written correspondence with Neidhardt. Their exchanges centred on Bosnian Oriental architecture and the challenges of integrating it into modernist discourse (Grabrijan, 1984). In 1936, Neidhardt approached Grabrijan with a request to curate his inaugural solo exhibition in Yugoslavia. The exhibition was held in 1936, at the Sarajevo

Figure 3: Neidhardt's prominent works mapped in Sarajevo's city centre (source: authors; photos: Wikimedia Commons, Flickr Creative Commons, and museuminexile.com/index.php/neidhardt).

Town Hall (Karlić Kapetanović, 1990). In 1938, encouraged by Grabrijan, Neidhardt relocated to Sarajevo to undertake a new professional challenge (Karlić Kapetanović, 1990). In the meantime, Grabrijan corresponded with Ravnikar in 1939 during his tenure at Le Corbusier's studio in Paris, reflecting on ongoing projects (Zupančič, 2017).

Among Neidhardt's projects, his urban proposals stand out as competition-winning visions for the development of post-war Sarajevo as the capital city of Bosnia and Herzegovina. Neidhardt's best-known urban proposal is his 1955 competition entry for the Marijin Dvor neighbourhood, a continuation of his vision first presented in his 1936 competition design for the new railway station, addressing the void in Sarajevo's urban fabric. With regard to Sarajevo's east–west development axis (Žuljić et al., 2015), Neidhardt recognized Marijin Dvor (also *Marindvor*) as a link between the old town to the east and newly planned neighbourhoods to the west, redefining it as "a counterweight to the cultural hub of the Republic embodied in Sarajevo's old town (Baščaršija), which would become an administrative, political, social, and cultural centre of the city, as well as the venue for all social events" (Neidhardt & Čelić, 1956: 95–96). In 1976, a new competition was conducted, this time only for the National Assembly Building; Neidhardt won (the competition was his last before his death in 1979), and its construction was finalized in 1982. Alongside the National Assembly Building, the design for the Faculty of Humanities was also part of the 1955 Marijin Dvor proposal and was built by 1959; the nearby Faculty of Natural Sciences and Mathematics followed, and construction finished in 1970 (Figure 3).

Other significant projects by Neidhardt contribute to the urban continuity between Marijin Dvor and Baščaršija. One such project is the Ali Pasha Street residential complex, an urban prototype of a larger redevelopment proposal that aimed to extend the city along the street toward the north. Another such project is the Scouts' Centre in the hillside Mejtaš neighbourhood, a transitional zone between the housing blocks from the Austro-Hungarian times and the Ottoman urban clusters (*mahallahs*), designed as a modern translation of interplay of volumes and composition inspired by traditional oriental Bosnian houses (Table 4).

Although they both originated from foreign cultural contexts, Grabrijan's and Neidhardt's contribution lies in reinventing and translating the universal values of the tangible and intangible layers of Sarajevo's local context into a modern language. Their collaborative theoretical work was passed on through education because both taught in Sarajevo, and it was further developed through Neidhardt's many built and unbuilt projects.

The book *Arhitektura Bosne i put u suvremeno* (Neidhardt & Grabrijan, 1957) is an important theoretical achievement. This

Table 4: Neidhart's key projects and their impact on Sarajevo's identity.

Year	Project	Key architectural features	Impact
1947–1958	Residential complex on Ali Pasha Street: residential buildings located obliquely to topographic lines integrated with green areas	A new model of urban living in the city centre, accompanied by the introduction of a modernist urban fabric	Listed as a national monument of Bosnia and Herzegovina since 2022, lacking comprehensive renovation. Although sporadic refurbishments have altered the facades, the impact of the complex on the context remains unchanged, because it is a landmark residential project.
1952	Mejtaš Scouts' Centre: functional tripartite system (cinema, administration, and restaurant), distinguished by paraboloid concrete shells.	Interpretation of traditional architecture in a modern architectural idiom, resulting in an original architectural expression	The building has been used as a primary school since the early 2000s; only sporadic partial refurbishments have been carried out. Due to its disputed legal status, the future of the building remains contested.
1955–1959	Faculty of Humanities: public educational facility with a modernist design, responding to its context	Modernist architecture that incorporates elements reminiscent of traditional architecture, in close dialogue with green areas	The building underwent postwar reconstruction and today continues to serve its original function as a university building. Both its exterior and interior are well preserved, remaining a notable example of modernist architecture to this day.
1970	Faculty of Natural Sciences and Mathematics: public educational facility with a modernist design, an urban landmark in western Sarajevo	Modernist building in Sarajevo incorporating traditional elements, featuring a unique form and serving as an urban landmark	Following postwar renovation, the building has retained its original function. However, installation of a commercial sign atop the tower compromised its original character. Furthermore, the recently proposed regulation plan threatens the open public spaces within the faculty's compound.
1979–1982	National Assembly Building: a key public building and modernist landmark in the administrative centre of Sarajevo	Iconic urban landmark, prominent example of modernist architecture	The building has retained its original function and was comprehensively renovated by 2009, although not entirely authentically. Today, the parliament building, together with its square, is a key landmark and iconic image of modern Sarajevo. In 2022, a petition was submitted to designate the building as national monument of Bosnia and Herzegovina

Source: authors.

work articulates a path toward contemporary architecture that does not reject tradition but instead embraces it as the foundation for a new, authentic modernity. The universal message that is conveyed through the work is further strengthened by Neidhardt's own words:

However, what worries me is that we have largely lost our architectural individuality, which was once so present in the Balkan Peninsula. This is especially noticed by foreigners. Alienation and monotony are gradually replacing true architectural values. The physiognomy that emerged from a single spatial idea, the playfulness of local architecture, the dualism of the cube and corner, and so on, must not be lost even in contemporary times. Thus, we must not draw such sharp boundaries between the past and the present in the spiritual realm of architecture that we end up like the traveller that, crossing the Atlantic Ocean, searches for the equator. (Karlić Kapetanović, 1990)

The joint theoretical work of Grabrijan and Neidhardt remains highly influential and relevant, not only in Bosnia and Herzegovina and the wider region, but also internationally, with recognition from institutions such as New York's Museum of Modern Art and Docomomo. Neidhardt's built work in Sarajevo is primarily associated with the Marijin Dvor area. The original master plans were never fully realized, and both the war and postwar reconstruction further delayed the discussion of its future development. This development continues to be occasionally threatened by new construction and proposed urban regulation plans, which are frequently contested and blocked. The original designs of the two university buildings and the National Assembly in Marijin Dvor remain largely preserved, and they continue to serve as landmarks despite political and social shifts. However, their impact on the surrounding context, urban identity, and future development remains uncertain and will only become clear after the new plans are approved. The modernist residential complex is particularly vulnerable – even though it is listed as a national monument – because refurbishment and maintenance are entirely left to the residents. This underscores the importance of a strategic approach to the active preservation of modernist heritage, which should serve as a reference point for the evolving urban fabric.

Table 5: Comparison of architecture and urban identity of Ljubljana and Sarajevo.

Architect	Impact on urban form	Contribution to city identity	Relevance
Jože Plečnik: architect and professor in Prague and Ljubljana, influenced by Gottfried Semper and Otto Wagner during his time in Vienna	Reorganized Ljubljana's city centre into a symbolic and ceremonial space; emphasized axiality, monumentality, and civic symbolism	Created a distinctive architectural language that became synonymous with Ljubljana's urban identity	Plečnik's work is a model for integrating heritage into contemporary urban life; it inspires sustainable, human-centred urban renewal
Edvard Ravnikar: architect and professor in Ljubljana, student of Plečnik, key figure in postwar Slovenian modernism	Introduced modernist zoning and spatial openness; emphasized public squares and integration of civic functions	Defined Ljubljana's socialist-era identity as a modern, forward-looking capital while respecting its historical layers	Ravnikar's civic spaces remain vital; his approach to public space and mixed-use planning is increasingly relevant in contemporary urbanism
Dušan Grabrijan: teacher in Sarajevo and Ljubljana, architect, student of Plečnik, moved to Sarajevo in 1930, returned to Ljubljana in 1945	Advocated for human-scale, courtyard-centred urban forms; emphasized spatial intimacy and cultural continuity	Reinforced Sarajevo's identity as a city of layered traditions and intimate, inward-looking domestic spaces	Grabrijan's ideas support today's interest in culturally sensitive, small-scale, and community-oriented urban design
Juraj Neidhardt: professor in Sarajevo, architect, collaborated with Le Corbusier, worked extensively in Sarajevo	Promoted functionalist urban planning; introduced modernist housing blocks and civic centres while respecting traditional spatial logic	Influenced Sarajevo's identity as a modern city rooted in tradition and natural context	Neidhardt's vision of contextual modernism is increasingly relevant for post-conflict and transitional cities seeking identity through design

Source: authors.

4 Results

Two cities, Ljubljana and Sarajevo, were juxtaposed to analyse the contributions of key architectural figures to the creation of urban identity during their twentieth-century development and modernization. The comparison is framed through Kevin Lynch's concept of the image of the city, focusing on identity, structure, and meaning. The analysis was conducted in three stages: first, the work of each architect was individually examined; next, the two architects from each city were compared; and, finally, all four were analysed collectively in relation to their urban contexts (Table 5, Figure 4). All four architects had an international educational and professional background: Plečnik trained in Vienna and Prague, Ravnikar in Paris and Helsinki, Grabrijan in Ljubljana and Paris, and Neidhardt in Berlin, Paris, and Zagreb. Rather than adopting a typical *tabula rasa* modernist approach, their international experience, mutual encounters and correspondence, friendships and collaborations, and teacher–student relationships enabled them to develop a distinctive methodology. This approach allowed them to translate universal modernist principles into context-sensitive interventions within cities undergoing development.

The analyses presented in this article reveal that key distinctions emerge in the architects' language and aesthetics. In Ljubljana, Plečnik's work is associated with attributes such as eclectic, classical, and symbolic, emphasizing memory, human scale, and human values in both urban and architectural projects. His student, Ravnikar, in contrast, adopted a fully modernist, international style, focusing on civic and cultural expression through architecture and public space, articulated at the urban scale through state representation and structuralist principles. In Sarajevo, Grabrijan dedicated himself to theory, exploring tradition and vernacular forms while advocating intimate and domestic spaces grounded in a human scale. His colleague Neidhardt, building upon their collaborative research, combined tradition with progressive, functionalist, and intuitive design, simultaneously addressing human- and urban-scale projects and integrating state representation in dialogue with local tradition.

Therefore, a key insight of this study is that these architects combined avant-garde, international modernist ideals with a profound sensitivity to local culture, history, and urban conditions, despite variations in their aesthetic expressions and architectural tools (Table 5). The underlying common thread among all four is a context-sensitive, site-specific methodology that actively reads, reinvents, and reinforces urban identity. Their work demonstrates continuity across time and space, linking past, present, and future through both built projects and educational influence, leaving a lasting legacy that shaped subsequent generations of architects. In effect, they were "star-architects" before the concept was coined and, of course, unrelated to the contemporary exploitation of the term for city branding. Their contribution to the urban identity of their cit-

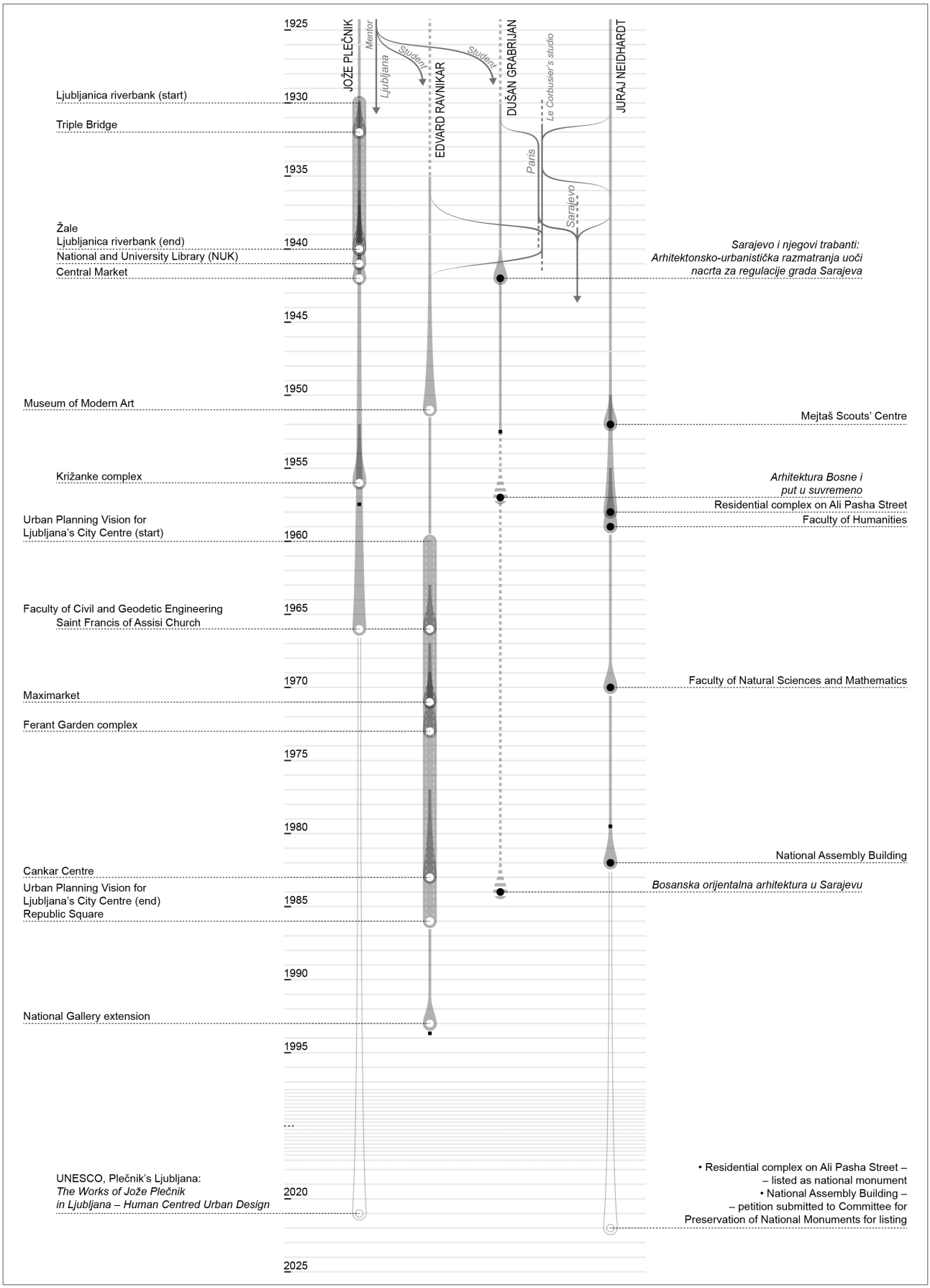

Figure 4: Timeline of key modernist architectural legacy in Ljubljana and Sarajevo; white dots: works by Plečnik and Ravnikar in Ljubljana; black dots: works by Grabrijan and Neidhardt in Sarajevo; black squares: year of architect's death; hollow line: continuous impact of Plečnik's and Neidhardt's work on contemporary architecture and urbanism (source: authors).

ies was derived from the site-specific character and thoughtful integration of architecture into the urban context, rather than from artificially constructed city branding.

5 Conclusion

This comparative study highlights how the modernist architectural legacy – the work of Plečnik and Ravnikar in Ljubljana, and Grabrijan and Neidhardt in Sarajevo – has shaped the urban identities of these two cities, using Kevin Lynch's framework from *The Image of the City*. The analysis shows that Plečnik's work in Ljubljana emphasizes eclecticism, classical references, symbolism, and the human scale, whereas his student Ravnikar pursued a fully modernist, international style that articulated civic and cultural values at the urban scale. In Sarajevo, Grabrijan's theoretical work explored vernacular and traditional forms, advocating intimate, human-scaled spaces, whereas Neidhardt extended these investigations by integrating functionalist and progressive design, working on both human- and urban-scale projects, and merging socialist-modernist state representation with local cultural traditions. All four architects share a contextually sensitive approach, inspired by diverse local settings and expressed in different architectural idioms, while collectively advancing modernism during the key decades of twentieth-century urbanization. Their work emphasizes human-scale interventions in two cities running along waterways by fusing traditional and modernist principles, and inscribing their distinctive signatures into the urban identity of each city. The study also underscores the historical and intellectual connections among these architects – through mentorship, study and professional training in Paris, and collaboration – revealing how ideas traversed cities and influenced urban form.

Despite the differences in their historical and sociopolitical contexts, both Ljubljana and Sarajevo demonstrate how modernist heritage can function as a powerful identity-shaping tool. In Ljubljana, this heritage has become institutionalized and widely recognized, culminating in UNESCO's designation of the city as "Plečnik's Ljubljana", which highlights the enduring influence of modernist principles on the city's urban identity. Sarajevo holds significant unused potential to strengthen its urban identity through the recognition and endorsement of its modernist legacy, which has been challenged due to political and socioeconomic shifts – particularly the Bosnian War and the subsequent uncritical transitional development.

Despite the differences in aesthetic and architectural expressions, all four architects shared a context-sensitive type of *avant-la-lettre* regionalist approach that reinforced urban identity through site-specific interventions. Recognizing and preserving these contributions not only safeguards architectural heritage but also provides critical insights for sustainable, resilient, and culturally meaningful future urban development.

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Development and initial validation of the Urban Restorative Potential Scale: Evidence from the Philippines

Urban environments influence mental well-being, yet most restoration scales have been developed for natural settings. This study developed and initially validated the Urban Restorative Potential Scale (URPS), a design-oriented measure for everyday urban contexts. A set of twenty-five items grounded in attention restoration theory and stress reduction theory was tested with 1,001 residents of Urdaneta, Philippines. Confirmatory factor analysis supported a seventeen-item, four-factor structure (quality, functionality, captivation, and relaxation) under a second-order urban restorative potential (URP) factor, with good fit and reliability. Convergent validity was adequate; subscale correlations were high but consistent with a meaningful higher-order construct. The URP factor strongly predicted overall satisfaction with the scene viewed. Multi-group models indicated context dependence across urban scene types (USTs): quality loaded most strongly on URP in recreational scenes; captivation dominated in housing, institutional, streetscape, and commercial scenes; functionality was most influential in transit scenes; and relaxation was an important but not leading factor for all USTs. The findings are cross-sectional; therefore, causal claims are not warranted. The URPS offers a practical diagnostic profile for design hypotheses, highlighting that what "feels restorative" varies by scene type.

Keywords: restorative environments, urban scene types, psychometric validation, measurement invariance, environmental psychology

1 Introduction

Urban environments often elevate stress, anxiety, and attention fatigue due to noise, crowding, and limited access to psychologically supportive spaces (Bowler et al., 2010; McDonald et al., 2018). However, most tools for assessing "restorativeness" were initially developed for parks and forests, not for streets, housing blocks, or transit stops (Hartig et al., 1997). This gap creates a demand for psychologically supportive everyday environments, not merely green infrastructure. This raises a critical design question: can ordinary urban places, such as plazas, streets, residential blocks, campuses, commercial districts, and transit hubs, offer mental relief?

Traditional restorative environment research highlights settings that support recovery from attention fatigue and stress (Kaplan, 1995; Ulrich et al., 1991). Attention restoration theory (ART) proposes that recovery occurs when environments provide four key qualities: being away (psychological distance from routine demands), fascination (effortless attention, particularly "soft fascination", which gently engages without mental strain), extent (sufficient scope and coherence to feel immersed), and compatibility (support for intended activities and purposes; Kaplan & Kaplan, 1989; Kaplan, 1995). Stress reduction theory (SRT) emphasizes rapid physiological recovery in environments that feel safe, legible, and aesthetically pleasant (Ulrich, 1984; Ulrich et al., 1991).

Although both theories were originally developed in relation to natural settings, subsequent studies have demonstrated that certain urban environments can also foster restoration (San Juan et al., 2017; Lindal & Hartig, 2013; Bornioli & Subiza-Pérez, 2023). Features such as visual interest, legibility, perceived safety, and opportunities to pause or find refuge have been shown to support attentional relief and stress recovery in everyday urban contexts (Peschardt & Stigsdotter, 2013; Lindal & Hartig, 2015; Joye & van den Berg, 2011). In short, restoration is not confined to forests or wilderness; it may also emerge in ordinary urban niches, such as the shaded corner of a transit interchange, when those places feel ordered, comprehensible, and welcoming.

The long-standing "natural versus urban" dichotomy in restoration research is increasingly recognized as a gradient rather than a binary distinction. Although meta-analytic evidence still finds natural settings more restorative on average, the wide variability within and across settings cautions against simple either-or classifications (Menardo et al., 2021). The Perceived Restorativeness Scale (PRS), which operationalizes the four components of ART (being away, fascination, extent, and compatibility), has been the dominant measurement tool since its development and validation in natural settings (Hartig et al., 1997; Pasini et al., 2014). However, the PRS was primarily designed to assess experiences of immersion in nature or escape from urban demands. In everyday urban contexts, many PRS items presume a "retreat" experience (e.g., being away interpreted as physical escape), whereas much real-world urban restoration involves micro-restoration, which is brief moments of relief occurring on-site while navigating daily activities (Joye & Dewitte, 2018).

More fundamentally, the PRS underspecifies design-relevant features that shape urban restoration. Although ART's qualities of fascination and being away capture important psychological mechanisms, they do not directly address the physical environmental qualities that urban users consistently identify as critical to psychological comfort. Research on urban environmental preferences reveals that people value specific tangible features such as cleanliness and maintenance (visual order), functional amenities such as seating and shade (physical comfort), safety and legibility (navigability), and aesthetic appeal (visual engagement) as determinants of whether a space feels supportive or stressful (Nordh et al., 2009; Peschardt & Stigsdotter, 2013; Ríos-Rodríguez et al., 2021; Jennings & Bamkole, 2019). These features align conceptually with ART's extent and compatibility but require more explicit operationalization for urban design contexts. Similarly, SRT's emphasis on safety and positive affect points to the importance of perceived care and environmental quality, aspects largely implicit in nature-based scales. The absence of items directly capturing these built-environment attributes is a significant gap: designers cannot easily translate abstract concepts such as being away or fascination into specific interventions, but they can modify maintenance regimes, add seating, improve wayfinding, or enhance visual interest. Thus, an Urban Restorative Potential Scale (URPS) must bridge the gap between psychological theory and observable, designable features.

This highlights two persistent gaps. First, there is apparently no validated scale that explicitly operationalizes restorative potential using urban design terminology accessible to practitioners yet. Second, few studies have tested whether restorative processes operate equivalently across diverse urban settings, leaving open the question of whether restoration is a universal phenomenon or context dependent. Addressing these gaps requires moving beyond adaptation of nature-centric measures toward purpose-built instruments that treat urban environments as legitimate objects of restoration research.

Urban restoration likely varies by context. Different urban scene types (USTs), such as residential streets, institutional campuses, commercial districts, streetscapes, transit hubs, and recreational parks, exhibit distinct affordances and stressors

that may shape restorative profiles (Karmanov & Hamel, 2008; Wilkie & Clements, 2018). Evidence shows that greenery supports restoration in residential streets (Lindal & Hartig, 2013, 2015; Zhao et al., 2020), institutional courtyards (Cooper Marcus & Sachs, 2014), pedestrian squares (Subiza-Pérez et al., 2020), and parks (Korpela et al., 2010), whereas transit environments often elevate stress unless specific design mitigations (e.g., clear wayfinding, seating, and shelter) are introduced (Evans & Wener, 2007). This heterogeneity raises a methodological question: few studies have tested measurement invariance across scene types, leaving uncertain whether restoration operates through similar mechanisms universally or whether the relative importance of different restorative dimensions shifts with context (Chen, 2007; Milfont & Fischer, 2010; Bornioli & Subiza-Pérez, 2023).

To address these gaps, the URPS was developed, operationalizing ART and SRT through four design-oriented factors. Quality encompasses environmental care, order, and safety (SRT's non-threatening environments, ART's extent). Functionality reflects physical affordances (seating, shade, and wayfinding) that support intended activities (ART's compatibility). Captivation embodies soft fascination through visual interest and architectural engagement (ART's fascination). Relaxation reframes being away as psychological refuge achievable on-site, encompassing calmness within urban settings (ART's being away, SRT's stress reduction). Thus, URPS retains ART's attentional mechanisms while operationalizing built environment attributes underspecified in nature-based scales. URPS was tested across six USTs (recreational, housing, institutional, streetscape, commercial, and transit), given evidence that restorative potential varies by context: wayfinding matters in transit hubs, visual richness in streetscapes, and order in parks (Evans & Wener, 2007; Peschardt & Stigsdotter, 2013; Purcell et al., 2001).

This study pursues three aims: 1) to test the URPS factor structure, model fit, reliability, and selected aspects of validity (convergent, discriminant, and criterion); 2) to examine measurement invariance across USTs using multi-group confirmatory factor analysis, testing whether the URPS operates equivalently or context dependently; and 3) to assess criterion validity by testing whether URPS scores predict overall satisfaction with the environment.

2 Methodology

2.1 Research design and participants

A cross-sectional, between-subjects image-rating study was conducted in Urdaneta, Philippines, in June 2025. Each participant viewed one randomly assigned urban scene photo and rated each scene. This between-subjects design avoids carryover and contrast effects common in within-subjects image ratings (Poulton, 1982; Aguinis & Bradley, 2014), which produces a two-way dataset (person × one scene). It also allows for each participant to provide a focused, unbiased assessment of a single environment. Image-based assessment is appropriate for scale development because it permits systematic control of visual features while maintaining ecological validity (Stamps, 2010).

A total of 1,070 city residents participated, recruited through on-site convenience sampling with quota targets for age groups to ensure a broad demographic mix. Inclusion criteria required that participants currently lived in Urdaneta and could give informed consent. The study excluded individuals with uncorrected visual impairment, those unable to follow task instructions, and those that were visibly intoxicated. After data quality screening, the final analytic sample was comprised of 1,001 participants. The sample was 58.3% female and 40.9% male (0.8% did not specify sex). Age was distributed across four life stages: adolescents and emerging adults (16–19 years, 29.6%), young adults (20–34, 31.7%), middle-aged adults (35–54, 29.1%), and older adults (55+, 9.6%). These age bands reflect developmental stages relevant to environmental perception (Pan American Health Organization, 2020) and ensured balanced representation across the lifespan. Education levels were distributed to no formal schooling (1%), elementary school (10.1%), high school (39.5%), bachelor's degrees (40.6%) and graduate degrees (8.8%). Participants came from rural areas (41.1%), small towns (19.7%), suburban areas (20.6%), and urban centres (18.6%). They were randomly assigned to view one image showing one of the six USTs, with their shares distributed relatively evenly across the UST categories (14.9% to 18.2% of participants per UST).

2.2 Stimuli and procedure

The visual stimuli were drawn from an extensive photo bank assembled specifically for this project. Thousands of candidate photos of urban scenes were taken by a research team during multiple field visits. To maximize generalizability, images were taken across a rural–urban gradient. Figure 1 shows the locations where they were taken. Approximately two-thirds (66.1%) of the photos came from sites within Pangasinan, 17.9% from Metro Manila, 14.2% from the nearby province of Nueva Ecija, and the remaining 1.8% from Tarlac. All photos were taken under comparable conditions to control for lighting and sky conditions. The photos were taken using standard focal lengths (24–50 mm full-frame equivalent) with minimal post-processing (horizon levelling and exposure normalization only) to preserve a natural appearance. Display settings were

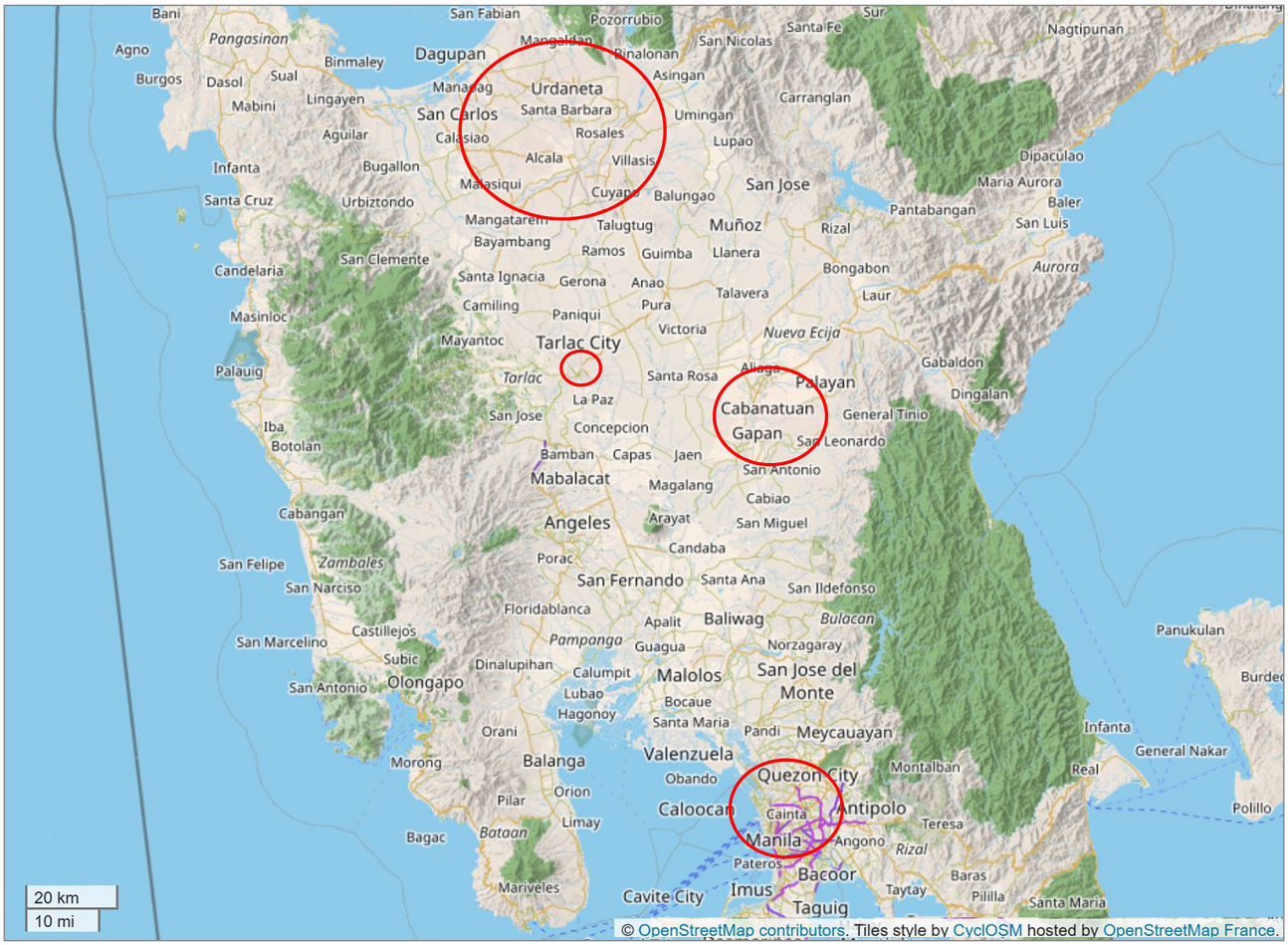

Figure 1: Locations of where the photos were taken and used as stimuli for the study (base map: OpenStreetMap).

standardized across sessions (auto-brightness disabled, screen brightness ≥ 50%).

From this pool, a balanced set of images was selected representing the six USTs of interest: recreational green spaces, residential areas, institutional/campus settings, streetscapes, commercial/business districts, and transit-oriented places. For each urban scene type, nineteen representative images (114 total) were selected through a systematic rating process. Six trained urban design students independently evaluated candidate photos for visible restorativeness indicators (e.g., cleanliness, greenery, seating, and visual order) versus detractors (e.g., litter, clutter, and lack of refuge). This process ensured variability within each UST, including both higher- and lower-restorative exemplars rather than only idealized scenes. Prior to the main study, it was validated that the participants would perceive the images as intended. Thirty independent raters (urban design students) sorted a sample of the photos into UST categories without location information. Inter-rater reliability was substantial (Fleiss's kappa = 0.72, 95% CI [0.68, 0.76]), confirming clear scene type recognition. Figure 2 shows examples of the stimuli, one for each category.

Data collection took place at community halls (barangays) across Urdaneta. To ensure standardized conditions, facilitators completed a pre-session checklist verifying a quiet environment (< 30 dBA ambient noise), glare-free display, appropriate viewing distance (50–70 cm), and adherence to the standardized script.

Upon arrival, participants received information about the study and provided informed consent. Each participant was then randomly assigned one photo from the pool of 114 images, in which participants were relatively evenly distributed across the six USTs. Participants viewed their assigned scene on a laptop screen for sixty seconds while facilitators ensured attention to the image. Immediately following image exposure, participants supplied their demographic information, including age group, sex, highest educational attainment, and current residence location, and then they rated the URPS and overall satisfaction items either on a tablet or on paper, depending on their preference and literacy level. Trained data collectors monitored all sessions to ensure comprehension and protocol adherence.

Figure 2: Example study stimulus per urban scene type: a) recreational scene; b) housing scene; c) institutional scene; d) streetscape scene; e) commercial scene; f) transit scene (photos: author).

The protocol was reviewed and approved by the University Research Ethics Committee in accordance with the National Ethics Guidelines for Health and Social Research (Philippine Health Research Ethics Board, 2022). Written informed consent was obtained from all participants. For participants under eighteen, guardian consent and participant assent were obtained in accordance with ethical guidelines for research involving minors. Responses were anonymized and processed under the Data Privacy Act of 2012 (RA 10173).

2.3 Measures

The URPS was developed as a self-report instrument to assess the perceived restorativeness of urban environments. A theory-driven approach to item generation was adopted, drawing directly on principles from ART and SRT to ensure content validity. Rather than adapting items from existing nature-based scales, twenty-five original items tailored to urban design features were developed while preserving core restorative principles. Each item presented a statement evaluating attributes of the scene's restorative quality, rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

The twenty-five items were organized a priori into four conceptual factors based on the theoretical framework. Quality encompasses aesthetic upkeep and environmental coherence that contribute to perceived safety and order (example item: "The environment appears clean and well maintained"). Functionality covers physical amenities, comfort features, and spatial affordances that support user activities (example item: "This environment provides suitable places for sitting and resting"). Captivation reflects the scene's ability to attract and hold at-

tention effortlessly, linked to the concepts of fascination and visual complexity (example item: "The visual details in this environment are noticeable and appealing"). Relaxation encompasses one's sense of calmness, refuge, and psychological distance, corresponding to the being away dimension of restorative experience (example item: "This environment feels peaceful and calm to me").

Prior to full deployment, a pilot study with fifty university students and staff tested the clarity and comprehensiveness of all twenty-five items. Participants rated eighteen trial images using the draft questionnaire and provided feedback via a debrief form with clarity (five-point) ratings and open comments. Based on this feedback, technical or unusual terms were revised with local translations added in parentheses to improve comprehension, particularly for participants with limited education or English proficiency. All twenty-five items were retained after these linguistic refinements, and the administration script and questionnaire were finalized for the main study. No items were reverse coded.

A single-item criterion measure assessed overall environmental satisfaction: "Overall, I am satisfied with the quality of this environment." Participants rated this item on the same five-point Likert scale. This item served as an external criterion to test whether URPS scores predict general environmental appraisal.

2.4 Data collection and screening

Responses were recorded via Google Forms; paper forms were used when preferred and double entered for accuracy. Google Forms enforced required responses and value validation (Likert items restricted to 1–5). Paper forms were checked at point-of-collection and double entered with an independent second pass; discrepancies were reconciled. Data were exported to MS Excel and screened for quality. The combination of required digital form fields and double-entry verification for paper forms eliminated missing data. Data quality screening focused on identifying inattentive responding patterns. The study screened for inattentive responding (i.e., low-effort or "straight-lining" patterns) by calculating within-person response variability across all URPS items rated for the single scene viewed. Participants whose URPS responses showed extremely low variability (standard deviation ≤ 0.40 on a five-point scale) were excluded as likely inattentive. This threshold corresponds to responses varying by less than half a scale point on average and represents near-uniform responding (e.g., marking all 3s or 4s with minimal variation), consistent with recommended quality-control practices (Huang et al., 2012). This removed approximately 6.5% of the initial cases, yielding a final analytical sample of 1,001.

2.5 Statistical analysis

Analyses were conducted in two phases using IBM SPSS Amos (version 21.0.0). A significance level of $\alpha = 0.05$ was adopted as the criterion for hypothesis testing.

The first phase specified a theory-driven four-factor model (twenty-five items) and estimated it using confirmatory factor analysis (CFA). It used maximum likelihood (ML) estimation, treating five-point Likert items as approximately continuous, consistent with simulation evidence (Rhemtulla et al., 2012; see also Li, 2016; Norman, 2010). Given the sample size and the distribution of responses, ML estimation performed reliably. Model fit was assessed using common criteria ($\chi^2/df \leq 3$, CFI ≥ 0.95, SRMR ≤ 0.08, RMSEA ≤ 0.06–0.08; Gaskin & Lim, 2016; Hu & Bentler, 1999). Modification indices were reviewed to identify items with weak loadings (< 0.50; Hair et al., 2010; Kline, 2016; Byrne, 2016) or redundancy, and items were removed only when the change was theoretically supported. This was followed by a comparison of alternative model structures using overall fit indices (CFI, SRMR, and RMSEA) and parsimony-oriented information criteria (BIC and sample-size-adjusted BIC [SABIC]). Four possible structures were compared: a single-factor model, a correlated four-factor model (quality, functionality, captivation, and relaxation), a second-order model in which the four factors load onto one higher-order factor, and a bifactor model with one general factor plus the four specific factors. The model was judged using BIC and SABIC, in which lower values indicate a better balance of fit and simplicity (Burnham & Anderson, 2002). AIC was also checked and showed the same ranking. For the selected model, reliability (α and composite reliability ≥ 0.70), convergent validity (AVE ≥ 0.50; Fornell & Larcker, 1981), and discriminant validity using HTMT (< 0.85; Henseler et al., 2015) with percentile-bootstrap 95% confidence intervals for the HTMT ratios were examined.

The second phase examined measurement invariance across the six USTs using sequential multi-group CFA of the final structure. It tested configural invariance (same factor structure across groups), followed by metric invariance (equal factor loadings) and structural invariance (equal factor correlations/variances). Scalar invariance was not tested because the focus was on whether the measurement model structure replicates across contexts rather than comparing latent means. Given that chi-square difference tests are sensitive to large samples (Yuan & Bentler, 2004), practical fit changes were emphasized: ΔCFI < 0.01 and ΔRMSEA < 0.015 indicated acceptable invariance (Chen, 2007; Cheung & Rensvold, 2002). When only a subset of parameters could be constrained equally while maintaining acceptable fit, partial invariance was documented and interpretations were adjusted accordingly (Byrne, 2016; Putnick

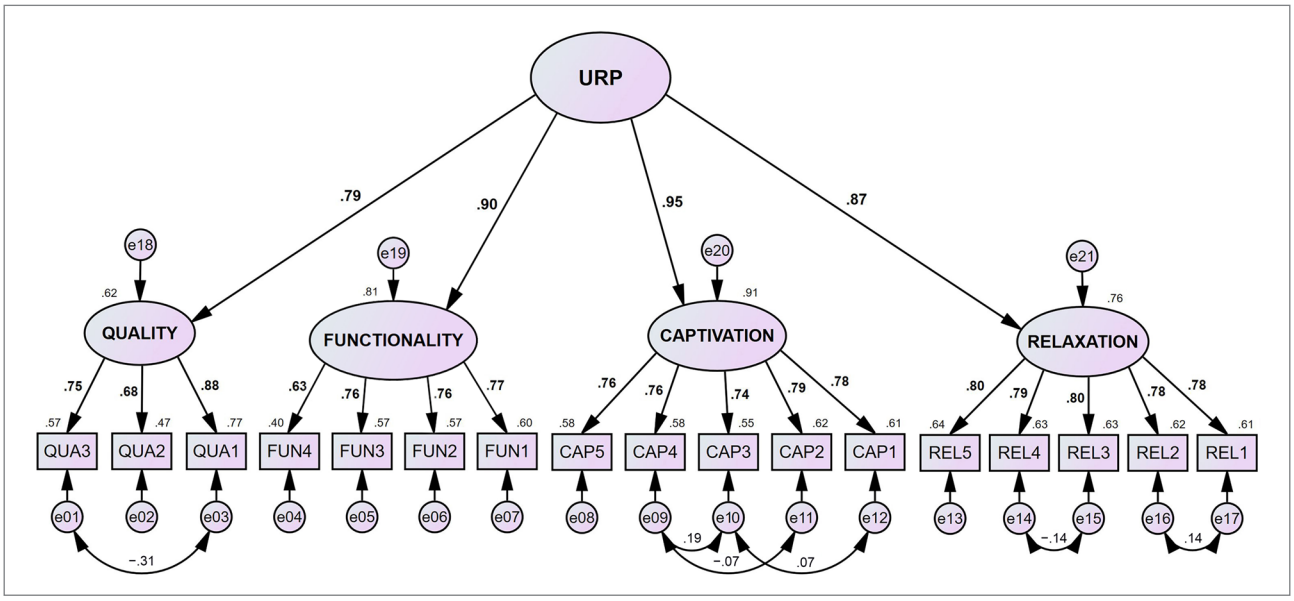

Figure 3: The retained and most optimal second-order URP measurement model solution with standardized estimates (diagram generated in IBM SPSS Amos).

Table 1: Fit indices of rival measurement models.

Model	df	χ^2	χ^2/df	CFI	SRMR	RMSEA	BIC	SABIC
Correlated four-factor	113	356.90	3.158	0.975	0.030	0.046	633.25	506.21
Second-order (URP)	109	307.73	2.823	0.980	0.027	0.043	611.714	471.97
Bifactor	115	358.60	3.119	0.975	0.030	0.046	631.68	500.44
Unidimensional	119	1,309.26	11.002	0.878	0.058	0.100	1,544.16	1,436.17

Note: df = degrees of freedom, χ^2 = chi-squared statistic, χ^2/df = ratio of chi-squared to degrees of freedom, CFI = comparative fit index, SRMR = standard root mean square residual, RMSEA = root mean square error of approximation, BIC = Bayesian information criterion, SABIC = Schwarz's adjusted Bayesian information criterion.

Table 2: Reliability and convergent validity statistics for the URPS subscales.

Factor	α	CR	AVE	MSV	MaxR(H)
Quality	0.793	0.792	0.561	0.575	0.810
Functionality	0.818	0.821	0.535	0.722	0.879
Captivation	0.878	0.878	0.590	0.722	0.829
Relaxation	0.893	0.893	0.626	0.653	0.894

Note: α = coefficient alpha, CR = composite reliability, AVE = average variance extracted, MSV = maximum shared variance, MaxR(H) = maximum reliability (H). Adequate reliability: α and CR ≥ 0.70, convergent validity: AVE ≥ 0.50, discriminant validity: AVE > MSV.

Table 3: Discriminant validity: heterotrait–monotrait (HTMT) ratios.

	Quality	Functionality	Captivation	Relaxation
Quality	—			
Functionality	0.730	—		
Captivation	0.738	0.836	—	
Relaxation	0.687	0.771	0.807	—

Note: HTMT < 0.85 suggests adequate discriminant validity. All values meet this criterion, indicating that the four factors are empirically distinguishable despite their theoretical interrelatedness within the higher-order URP construct.

& Bornstein, 2016). To characterize context-specific patterns, first- and second-order factor loadings were estimated separately for each UST. This allowed examination of which factors and items show stronger or weaker relationships to overall restorativeness across different urban contexts.

3 Results

3.1 Model refinement and fit

The initial twenty-five–item CFA showed acceptable model fit (χ^2 = 1014.114, df = 241, χ^2/df = 4.208, CFI = 0.951, SRMR = 0.034; RMSEA = 0.057). Based on modification indices and theoretical considerations, eight items were removed due to weak factor loadings (< 0.50), high cross-loadings, or content redundancy. For example, multiple items addressing visual variety were consolidated to eliminate overlap, and items with double-barrelled phrasing were deleted to improve clarity. This yielded a seventeen-item solution comprising three quality items, four functionality items, five captivation items, and five relaxation items. All retained indicators loaded strongly on their intended latent factors (0.630–0.878; all $p < 0.001$). The four first-order factors were substantially intercorrelated, supporting the presence of a higher-order construct representing the URP (Figure 3). The RMSEA close-fit test was non-significant (PClose = 0.984), indicating close fit (RMSEA ≤ 0.05).

The study compared four rival measurement models (Table 1). The unidimensional model showed poor fit, confirming that URP cannot be treated as a single undifferentiated construct. Three multidimensional alternatives (a correlated four-factor model, a bifactor model, and a second-order hierarchical model) all demonstrated good fit. Information criteria favoured different models: AIC was lowest for the bifactor model, whereas BIC and SABIC were lowest for the second-order model. The second-order model was retained as the final structure based on three considerations: a) marginally superior absolute fit indices (CFI, SRMR, and RMSEA), b) stronger performance on parsimony-adjusted criteria (BIC and SABIC), and c) theoretical interpretability as a general URP construct manifested through four conceptually distinct factors.

3.2 Reliability and validity

All four URPS subscales showed strong internal consistency (Table 2), with coefficient alpha and composite reliability ranging from 0.793 to 0.893. Convergent validity was supported: AVE exceeded 0.50 for all factors, meaning that each latent factor explains more than half of the variance in its indicators (Fornell & Larcker, 1981).

Discriminant validity evidence supported the factor structure while also justifying the second-order model (Table 3). All HTMT ratios fell below 0.85 (range: 0.687–0.836), indicating adequate discriminability among the four factors. However, the Fornell–Larcker criterion (AVE > MSV) was not satisfied for all factors, indicating substantial shared variance among subscales. This pattern is theoretically consistent with a higher-order factor structure: the factors are conceptually distinct yet strongly intercorrelated because they all reflect aspects of the broader URP construct.

Table 4 presents the final seventeen-item URPS, organized by factor, with item codes and shortened descriptions used in analyses and subsequent reporting.

3.2.1 Criterion validity

To assess whether URPS scores predict overall environmental satisfaction, the satisfaction criterion item was regressed on the second-order URP factor. The relationship was strong and significant ($\beta = 0.888$, $p < 0.001$, $R^2 = 0.788$), indicating that URP accounts for approximately 79% of variance in overall satisfaction. This provides evidence that the URPS captures aspects of environmental quality that meaningfully predict global environmental appraisal.

3.2.2 Common method bias

Given that all variables were self-reported in a single session, potential common method bias was assessed using two approaches. Harman's single-factor test revealed that the first unrotated factor accounted for only 32% of variance, well below the 50% threshold indicating problematic bias. In addition, adding an unmeasured latent method factor to the CFA did not improve model fit or substantively alter factor loadings, suggesting that common method variance did not drive the observed factor structure.

3.3 Measurement invariance test

Measurement invariance was tested to determine whether the URPS structure and factor loadings operate equivalently across the six USTs. Multi-group CFA results are presented in Table 5.

The lack of metric and structural invariance indicates that the URPS operates differently across urban contexts. Specifically, factor loadings and the relative importance of the four factors in defining overall URP vary significantly by scene type. This context dependency is illustrated in Tables 6 and 7, which show how different restorative factors dominate in different urban settings.

Table 4: Final seventeen-item URPS with factor assignment and item wording.

Factor	Code	Short description	Questionnaire item
Quality	QUA1	Appears clean and maintained	The environment appears clean and well-maintained.
	QUA2	Layout is logical and orderly	The arrangement and layout of this space seem logical and orderly.
	QUA3	Visually appealing	I find this environment visually appealing.
Functionality	FUN1	Provides places to sit and rest	This environment provides suitable places for sitting and resting.
	FUN2	Amenities are functional and well kept	Amenities such as benches, signs, and lighting fixtures look well kept and functional.
	FUN3	Offers appealing leisure activities	There are appealing leisure opportunities available here.
	FUN4	Provides shelter or shade	This environment offers sufficient shelter or shade.
Captivation	CAP1	Features diverse spatial elements	This environment has diverse spatial features.
	CAP2	Visually rich with distinct elements	There is a high level of visual interest due to many distinct elements in this scene.
	CAP3	Appealing visual details stand out	The visual details in this environment are noticeable and appealing.
	CAP4	Unique details hold my attention	Unique elements or surprising details in this environment hold my attention easily.
	CAP5	Colour variety is stimulating	The colour variety in this environment is visually stimulating.
Relaxation	REL1	Feels peaceful and calm	This environment feels peaceful and calm to me.
	REL2	Greenery creates a relaxing atmosphere	The greenery or natural elements I see here create a relaxing atmosphere.
	REL3	Openness and views feel calming	The openness and views in this environment make me feel at ease.
	REL4	Lighting and colours are soothing	The lighting and colour scheme in this environment soothe my eyes and mind.
	REL5	Has comfortable retreat spaces	There are spaces here where I would feel comfortable retreating and relaxing.

Note: All items were rated on five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Table 5: Nested model comparison (Δ vs. previous) for invariance across urban scene types.

Model	Δdf	$\Delta\chi^2$	p	ΔCFI vs. prev	ΔRMSEA vs. prev	Interpretation
Configural (baseline)	—	—	—	—	—	Acceptable baseline fit
Metric (equal loadings)	65	149.436	< 0.001	−0.011	+0.001	Not supported
Structural (equal covariances)	15	35.375	< 0.002	−0.020	+0.002	Not supported

Note: Comparison statistics (Δ) are calculated relative to the less constrained model at each step. Decision criteria: ΔCFI ≤ 0.010 and ΔRMSEA ≤ 0.015 indicate acceptable invariance. Configural invariance was supported (CFI = 0.934, RMSEA = 0.030), indicating that the four-factor structure fit adequately across all six USTs. However, metric invariance was not supported: constraining factor loadings to equality across USTs resulted in significant fit deterioration ($\Delta\chi^2$ (65) = 149.436, $p < 0.001$, ΔCFI = −0.011). Similarly, structural invariance was not achieved ($\Delta\chi^2$ (15) = 35.375, $p = 0.002$, ΔCFI = −0.020).

Table 6: Factor importance varies by urban scene type: standardized loadings on second-order URP factor.

Urban scene type	Quality (β)	Functionality (β)	Captivation (β)	Relaxation (β)
Recreational	**0.908**	0.858	0.815	0.872
Housing	0.847	0.867	**0.979**	0.901
Institutional	0.819	0.761	**0.875**	0.810
Streetscape	0.841	0.914	**0.954**	0.764
Commercial	0.783	0.972	**0.999**	0.912
Transit	0.683	**0.971**	0.908	0.881

Note: Values are standardized regression weights of first-order factors on the second-order URP factor. Bold values indicate the most salient factor for each scene type.

Table 7: Standardized loadings (β) of items on first-order factors across urban scene types.

Item (shortened)	Urban scene types					
	Recreational	Housing	Institutional	Streetscape	Commercial	Transit
Quality						
Appears clean and maintained	0.724	0.576	0.726	0.731	0.693	0.760
Visually appealing	0.702	**0.834**	**0.852**	**0.811**	**0.868**	**0.836**
Layout is logical and orderly	**0.730**	0.627	0.682	0.799	0.576	0.754
Functionality						
Amenities are functional and well kept	0.612	**0.786**	0.757	0.715	**0.804**	0.699
Provides places to sit and rest	**0.888**	0.732	**0.772**	0.690	0.760	0.760
Offers appealing leisure activities	0.667	0.773	0.620	**0.838**	0.752	0.711
Provides shelter or shade	0.599	0.661	0.603	0.632	0.623	**0.764**
Captivation						
Appealing visual details stand out	0.663	0.775	0.793	0.757	**0.811**	**0.799**
Features diverse spatial elements	0.615	0.752	**0.821**	0.792	0.719	0.798
Visually rich with distinct elements	0.692	0.778	0.744	**0.817**	0.807	0.760
Unique details hold my attention	0.679	0.734	0.793	0.653	0.720	0.760
Colour variety is stimulating	**0.744**	**0.797**	0.735	0.782	0.798	0.798
Relaxation						
Feels peaceful and calm	0.773	0.706	0.762	0.751	0.831	0.788
Greenery creates a relaxing atmosphere	**0.741**	**0.823**	0.854	0.704	0.799	0.703
Openness and views feel calming	0.730	0.800	**0.864**	**0.802**	0.739	0.743
Has comfortable retreat spaces	0.686	0.744	0.705	0.794	**0.845**	**0.880**
Lighting and colours are soothing	0.740	0.738	0.763	0.791	0.829	0.705

Note: Values are standardized regression weights of items on their designated first-order factors.

Table 7 presents item-level loadings by scene type (bolded values indicate the highest within each factor). For example, visually appealing is the strongest quality indicator except in recreational settings, where logical layout dominates.

In summary, whereas the URPS demonstrated strong psychometric properties overall, the lack of measurement invariance across urban scene types indicates that restorative potential manifests differently in different contexts. This finding has important implications for how urban environments should be assessed and designed, as discussed in Section 4.

4 Discussion

Urban environments can support psychological restoration, but existing assessment tools were designed primarily for natural settings. This study developed and initially validated the URPS, a theory-driven instrument tailored to urban design features. Drawing on ART and SRT, it identified four factors of URP: quality (aesthetic care and visual order), functionality (physical amenities and comfort), captivation (visual interest and soft fascination), and relaxation (calmness and psychological refuge). CFA supported this structure, revealing that the four factors are conceptually distinct yet empirically interrelated, a pattern consistent with the notion that restorative urban environments engage multiple psychological pathways simultaneously. These four factors align with established environmental psychology constructs while capturing urban-specific features often overlooked in nature-based scales.

Psychometric analyses demonstrated strong reliability and validity evidence. All four subscales showed high internal consistency, adequate convergent validity, and discriminability. The factors were substantially intercorrelated, supporting a second-order hierarchical model wherein quality, functionality, captivation, and relaxation represent distinct but related facets of a broader urban restorative potential (URP) construct. This hierarchical structure has practical utility: the total URPS score provides an overall assessment of restorative potential, and subscale profiles reveal specific strengths and weaknesses (e.g., "high functionality but low captivation"). The strong correlations among factors suggest that highly restorative urban environments typically excel across multiple factors rather than compensating for deficiencies in one area by excelling in another.

The URPS demonstrated strong criterion validity: the second-order URP factor predicted 79% of variance in overall environmental satisfaction. This substantial relationship indicates that the URPS captures perceptual qualities central to how people evaluate urban environments. Although this cross-sectional association does not establish causality, it provides partial evidence that URPS scores reflect meaningful and preference-relevant aspects of environmental quality.

4.1 The context-dependent nature of urban restorative perceptions

Restorative potential manifests differently across urban contexts. Measurement invariance testing revealed that respondents weighted the four URPS factors differently by scene type. In recreational settings (parks and green spaces), quality (reflecting cleanliness, order, and aesthetic care) was paramount, likely because these spaces serve contemplative and leisure functions, where environmental maintenance signals safety and care. Captivation dominated in housing, institutional, streetscape, and commercial contexts, where visual interest and architectural engagement may compensate for limited natural elements. In transit environments, functionality was most critical, consistent with research showing that basic comfort and wayfinding reduce transit-related stress (Evans & Wener, 2007). Relaxation was valued across all settings, but it never emerged as the sole dominant factor, suggesting it operates as a necessary but insufficient condition for restorative potential.

These findings challenge the notion of a universal formula for restorative urban design. Instead, effective interventions must be tailored to context: enhancing visual order in parks, introducing architectural interest in streetscapes, or improving wayfinding and seating in transit hubs. Although the cross-sectional design in this study limits causal inference, these patterns provide evidence-informed guidance for prioritizing design interventions in different urban settings.

4.2 Theoretical and practical implications

The findings extend restoration theory in three ways. First,

the URPS shows that core restorative factors can be meaningfully represented in people's appraisals of everyday urban environments, not only natural or park settings. The initially validated four-factor structure shows that urban restorativeness involves both ART mechanisms (captivation as soft fascination and relaxation as being away) and built environment qualities absent from nature-based scales (quality as aesthetic care and functionality as physical affordances). Second, the lack of measurement invariance across urban scene types suggests that perceived restorative potential is context dependent rather than universal. This aligns with recent calls to move beyond nature-centric restoration models (Joye & Dewitte, 2018; Bornioli & Subiza-Pérez, 2023) and supports the notion of multiple pathways to restoration (Menardo et al., 2024). Different environments restore through different

mechanisms: parks through maintained order and greenery, transit hubs through legibility and comfort, and commercial streets through visual engagement. Third, the hierarchical factor structure indicates that, within these data, scenes judged as highly restorative tend to score well across multiple attributes rather than a single feature. The strong intercorrelations among factors indicate that highly restorative environments typically excel across factors, challenging single-mechanism explanations (e.g., "just add greenery") common in popular discourse.

The URPS offers a diagnostic tool for urban design practice, identifying specific intervention areas. Rather than applying generic "restorative design" principles uniformly, practitioners can use URPS profiles to target context-specific improvements: 1) recreational settings could perhaps prioritize maintenance, visual order, and legibility (quality); 2) residential, institutional, and commercial areas could enhance architectural interest, art, and visual variety (captivation); 3) transit environments could focus on wayfinding, seating, shelter, and basic comfort (functionality); and 4) in all settings, there is a need to ensure opportunities for psychological refuge and calm (relaxation as baseline).

Importantly, the findings suggest that urban environments need not mimic natural settings to be experienced as restorative. Even high-traffic commercial streets or transit stops can provide psychological relief when designed with attention to context-appropriate features. For example, a transit hub with clear wayfinding, comfortable seating, and adequate shade or shelter may be more restorative than a poorly maintained park.

Because the URPS factors showed non-invariance, caution is advised against using total scores to rank or compare different urban scene types (e.g., "parks score higher than transit stops"). Instead, the scale is best applied within scene types to compare alternative designs or track changes over time. The URPS provides a framework for evidence-informed design decisions while recognizing that restorativeness is not a universal formula, but a context-dependent attribute shaped by setting-specific affordances and user needs.

4.3 Strengths, limitations, and future research

4.3.1 Strengths

This study has several notable strengths. First, the URPS addresses a recognized gap by providing an initially validated restorativeness scale explicitly designed for urban environments rather than adapted from nature-based measures. Second, the large sample and diverse age range provide stable parameter estimates and broad representation. Third, comprehensive psychometric testing, including rival model comparisons, validity checks, and measurement invariance tests, provided strong evidence for the scale's structure and properties. Fourth, the balanced stimulus set (nineteen images × six scene types) and between-subjects design eliminated carryover effects while allowing robust multi-group comparisons. Finally, standardized viewing conditions and attention checks enhanced data quality and internal validity.

4.3.2 Limitations

Several limitations warrant consideration. Regarding sampling and generalizability, participants were recruited via convenience sampling in a single Philippine city, limiting population generalizability. Cross-cultural replication is needed to determine whether the factor structure and context-specific patterns replicate in other cultural contexts. Regarding the measurement approach, the stimuli were static photos, which capture visual features but omit multisensory, temporal, and social dimensions of lived experience. Although this approach maximizes experimental control, field-based validation is needed to confirm whether URPS scores predict restoration outcomes in situ. In addition, single-session self-report data limit conclusions about test–retest reliability and introduce potential for common method bias, although the statistical checks found minimal evidence of such bias.

Regarding scale development, although the four URPS factors are theory grounded and demonstrated good psychometric properties, the scale may not capture all dimensions of urban restorativeness. Some captivation items may read as stronger stimulation in certain contexts; future refinements could soften this language while retaining the validated structure. The lack of measurement invariance across scene types, while theoretically meaningful, means that cross-context mean comparisons are not psychometrically warranted. Finally, this study provides initial evidence of reliability and selected aspects of validity, but external validation against independent restoration measures (e.g., physiological recovery and sustained attention performance) remains a priority for future research.

4.3.3 Future research

Three research priorities would advance the understanding of urban restorativeness. First and most critical, field-based validation should test whether URPS scores predict actual restoration outcomes. Studies using ecological momentary assessment, pre–post intervention designs, or physiological measures (e.g., heart rate variability or cortisol) would establish whether perceptual ratings translate into measurable recovery. Virtual reality methods could bridge the gap between controlled laboratory conditions and real-world complexity. Second, cross-cultural replication is essential to determine

generalizability. Research in diverse cities and cultural contexts would clarify whether the four-factor structure is universal or culture-specific, and whether context-dependent patterns (e.g., quality dominating in parks) reflect universal psychological processes or local norms and expectations. Third, measurement refinement and extension would strengthen the scale's utility. Priorities include establishing test–retest reliability, assessing convergent validity with established restoration scales (e.g., PRS), testing discriminant validity against related constructs (e.g., aesthetic preference and perceived safety), and exploring whether alternative scene classification schemes yield similar patterns. Extensions might include developing short-form versions for rapid assessment or expanded versions capturing setting-specific nuances (e.g., transit-specific wayfinding items).

5 Conclusion

This study developed and validated the Urban Restorative Potential Scale, a theory-driven instrument that assesses restoration potential in everyday urban environments. Psychometric testing with 1,001 participants demonstrated considerable initial reliability, validity, and a four-factor hierarchical structure comprising quality, functionality, captivation, and relaxation. The central finding is that urban restorativeness is context dependent: quality dominates in recreational settings, captivation in housing and commercial areas, and functionality in transit environments. This pattern challenges universal design prescriptions and supports tailored interventions appropriate to each setting type. For practice, the URPS provides a diagnostic tool that identifies specific strengths and weaknesses, making possible evidence-informed design decisions. Theoretically, this work demonstrates that restoration theory extends meaningfully to urban settings when measures capture built environment features alongside natural elements.

By showing that ordinary streets, plazas, and transit hubs can be experienced as more or less restorative depending on their design, this research highlights opportunities to create urban environments that may better support psychological well-being.

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Zhen XU

Public health as an alternative perspective on decoding urban planning

Abstract: Over the past two decades, studies of the impact of urban planning on public health have greatly increased, and many have been translated into policy evaluation and urban design practice. In contrast, research on how urban planning is shaped by public health remains underrepresented. In this regard, examining urban planning history in terms of public health is valuable for unfolding the layers of urban transformation and interpreting the intrinsic nature of cities as human habitats. Through this lens, planning history can provide insight into the longitudinal dimension of public health and a more nuanced view of its physical context, which is critical for translating insights into future urban planning and design.

Keywords: public health, planning history, urban transformation, interpretation

Population health and urbanization have been inseparable twins since the dawn of humankind (Hutchison, 2010: 876–879). Considerations of health were integral to the earliest human settlements, as articulated in Hippocrates's treatise *On Airs, Waters, Places* (400 BC; Schneider & Lilienfeld, 2008: 5–24). Like wars, natural disasters, socioeconomic fluctuations, and technical innovations, public health issues have shaped and reshaped cities' transformations more intrinsically since the nineteenth century.

During the cholera outbreak in London in the 1850s, the work of early urban health reformers helped institutionalize land use zoning, housing codes, drinking water, and the sewer system (Hutchison, 2010: 876–898; Porter, 1999: 403–415). Such efforts spurred the parallel germination of modern public health, urban planning, and sanitary engineering. Since then, pursuing a healthy city has been an antidote, vision, or even pretext of urbanization (Castex & Samuels, 2004; Carr, 2014: 1–8), with the shape of twenty-first-century cities being dictated by health considerations (Hall, 2001; Porter, 1999: 662–667, 710–718).

In the past two decades, studies of the impact of urban planning on public health have greatly increased, and many have been translated into policy evaluation and urban design practice (Hutchison, 2010: 859–862, 876–898; Giles-Corti et al., 2016; Davis, 2022). In contrast, research on how urban planning is shaped by public health remains underrepresented. Compared to the etiological induction of public health outcomes due to urban planning and construction, the counter-inquiry involves sociocultural interpretation and inference (Jackson et al., 2013; Scheer, 2016; Davis, 2022; Hensley et al., 2020) with more complexity and ambiguity. Therefore, uncertain deduction and reconstruction may be the main barrier causing such research lacunae.

A brief review of air-borne epidemics may divulge the complex and layered interconnections between public health and the built environment, which pose a challenge to interdisciplinary inquiries. During the cholera epidemic in London in the 1830s, the prevailing medical knowledge, a legacy of Hippocrates's beliefs about air, attributed the disease to a miasma caused by dampness, darkness, and still air (Porter, 1999: 662–667; Schneider & Lilienfeld, 2008: 403–415). Opening up the urban fabric to let in light and air became one of the recommended cures, along with separation reinforced through community management. The emerging residential square provided a model valued by developers, social reformers, and epidemiologists, and it influenced the development of the large city park and the house-and-garden of suburbia (Lawrence, 1993). In 1854, John Snow, the father of modern epidemiology, established that it was germs rather than miasmas that killed thousands of people by analysing epidemic distribution, wells,

and related street-based human activities. The germ theory of disease has promoted the gradual growing apart of public health and urban planning since then (Hutchison, 2010: 876–879). However, polluted air did kill people in London in the 1870s (Schneider & Lilienfeld, 2008: 282–285), with air pollution still causing deaths in many cities today. Complicatedly, the separation and de-concentration (including suburbanization) measures that were taken a hundred years ago to improve public health are contributing not only to air pollution but also to chronic health problems today. Public health has rejoined urban studies to address social determinants of health, and it has collaborated with urban planning to introduce suitable interventions (Perdue, 2003; Hutchison, 2010: 876–879; Giles-Corti et al., 2016).

Even urban transformation responding directly to public health issues is multifaceted, as exemplified in urban design codes and implementations. The fluctuating legacies of public health are complicated, involving national and local cultures. Therefore, deciphering urban transformation and planning perspectives through the lens of pursuing public health is difficult and time consuming, but it nonetheless provides insights into how cities are built and why, as well as into past design theories on city construction (Moudon, 1997; Davis, 2022).

To understand how urban planning has changed in terms of public health, the 3-i (ideas, interests, and institutions) framework is relevant, in which the forms and dynamism from urban morphology reveal the elements and processes in the built environment (Conzen, 2018; Larkham, 2022; Hensley et al., 2020).

From Antiquity to the Middle Ages, defence was a dominating function of many cities, which prioritized fortification in urban planning. Although the Cloaca Maxima (the great sewer) and relevant sanitary facilities were built in Rome in 500 BC, the modern sewer system in western cities was reborn only after the public health crisis in the mid-nineteenth century (Schneider & Lilienfeld, 2008: 5–24). After that, the sanitary and hygiene system became increasingly important during industrialization, whereas fortification waned. The fixation line effect related to the city wall was superimposed by modern infrastructures, including sanitary and hygiene systems, which underpin the repletion and expansion of cities (De Feo et al., 2014; Rehman, 2022). The formation of fringe belts in the early twentieth century can mainly be attributed to economic and building cycles. The Edwardian fringe belts are characterized by openness, accommodating large land uses, including those related to public health. With their merits as ecological, cultural, and consequently salutary corridors being acknowledged, the openness in the fringe belts will be maintained or reinforced (Whitehand, 1994; Larkham, 2022). At the community and plot scales, pursuing a healthy place and life, mainly related to fresh air, light, and opportunities for physical activity, has been embodied in building and landscape prototypes since the industrial era (Carr, 2014: 1–8).

Public health issues and especially crises are dynamic factors impacting the built environment and planning policy. For example, the damp air and organic waste associated with and even required by industry made Nantes an unsanitary city in the seventeenth century. From the eighteenth century onward, positive measures, such as aligning and widening streets, creating underground sewers, and filling rivers, permanently transformed the fabric and structure of the city (Benzerzour et al., 2011). Cholera, although lately attributed to germ-polluted water rather than air (Porter, 1999: 402–415), substantially resulted in opening up the urban fabric in London, Paris, and other European cities from the nineteenth century onward (Lawrence, 1993). The last decade has witnessed a series of practices and policies, such as the Healthy City initiative pursued by the UN's SDGs, the *Healthy Nation Strategy and the Healthy City Policy of China* (2017), the *Plan for a Healthy Los Angeles*, and *Plan Melbourne* (2017–2050), which may influence the urban form in the near future.

Therefore, public health offers a complementary interpretation of how cities are shaped, although its linkages to urban policy and planning phases may be not as consistent and ubiquitous as economic cycles. Construction and demolition, facilities and infrastructure, legislation, and institutional code provide a descriptive and explanatory perspective on how urban planning was shaped in terms of public health issues, which may be enriched with the perspectives of agents, institutions, and processes, and a relevant comparative examination.

Exploring how urban planning is changing in terms of public health is valuable for unfolding the layers of urban transformation and interpreting the intrinsic nature of cities as human habitats (Moudon, 1997). Such inquiry is also pertinent for teaching urban planning because public health issues have become critical globally and locally. Universities offer joint degree programmes, and courses on health and the built environment have increased dramatically. Simultaneously, increasingly more urban studies programmes emphasize urban morphology, planning history, and city heritage (Moudon, 2015; Gu, 2018; Oliveira, 2018; Hein & van Dooren, 2020). Planning history can provide insight into the longitudinal dimension of public health and a more nuanced view of its physical context, which is critical for translating insights into future urban planning and design. In addition, the public health

perspective may enrich understanding of the sociopolitical visions of cities as witnessed during the Covid-19 pandemic and thus contribute to understanding future urban transformation in a wider sense.

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Biography

Zhen Xu, a Chinese state-certified urban planner, is a professor at the College of Landscape Architecture of the Nanjing Forestry University in China. His field of interests include landscape analytics, urban design, open space, healthy places, urban morphology, landscape history, and historical GIS. This study is based on the findings obtained in two NSFC projects: "Research on the open space morphology of Nanjing using a historical-GIS approach" (no. 52078254) and "Research on physical activity in urban open spaces using an HIA approach" (no. 51208264), for both of which he was the principal investigator.

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