STEP-BY-STEP METHOD FOR DISTRICT RENOVATION THROUGH COMMUNITY ENGAGEMENT AND URBAN PLANNING TO FOSTER LOCAL ECONOMIC DEVELOPMENT AND IMPROVE THE QUALITY OF LIFE

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ABSTRACT

Reaching environmental targets set by the European Union (EU) requires, among other intervention areas, the energy renovation of the existing building stock. Current studies show that the renovation rate is more than two times less than what is necessary to reach the targets. Most implemented renovations across the EU reach just a small amount of energy savings. At the same time, their built environment presents habitability and accessibility problems which require regeneration processes at the district scale. In any case, the renovation rates are low to reach EU targets and milestones for 2030, 2040 and 2050. Therefore, an integral renovation process supporting district-level approaches to renovation could help if it addresses the quality of the urban space, the urban accessibility, and the social and economic challenges. Moreover, such processes need to be carried out through a participatory approach to cultivate active engagement and collaboration among community members, thereby enhancing the sustainability of renovation initiatives. This paper proposes an integrated renovation methodology for guaranteeing and fostering an integral renovation approach by providing decision-makers and stakeholders with sound support concerning the identification, selection and prioritisation of the renovation initiatives. The proposed methodology is rooted in well-established step-based methods which contemplate human-centred approaches to technology development with social innovation guaranteeing citizens' participation and engagement. The methodology is demonstrated using a case study in Spain. The main outcomes demonstrate that the characterisation of both the buildings of the neighbourhood (and its physical diagnosis) and the neighbour's profile allows for effectively anticipating the needs of the residents concerning the neighbourhood and buildings. The ultimate purpose is to provide recommendations and lessons learned for its replicability in neighbourhoods with similar characteristics since the method paves a promising basis for assessing district-scale energy renovation alternatives.

Keywords: renovation, integral, community, local economic development, social, co-governance.

1 INTRODUCTION

Initiatives such as the European Union (EU) Renovation Wave, the Urban Agenda 2030, the Covenant of Mayors for Climate and Energy, the European Urban Initiative, the New European Bauhaus, and Driving Urban Transitions for a Sustainable Future among others, emphasise the need to enhance the urban aspect to reach the climate neutrality goals by boosting the renovation rates in the EU by 2030. They all highlight the critical role of urban development in achieving these targets.

Specifically, in terms of energy efficiency renovation evidence supports that approaching the renovation of social housing neighbourhoods at a district scale is more effective than individual building-by-building renovations, particularly when the buildings share a similar typology and form a cohesive group of residential structures [1], [2]. Apart from the benefits related to the energy dimension of the building renovation, the district-scale approach allows for improvement in the quality of the urban space and the urban accessibility, and to face the

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social and economic challenges that need to be tackled to ensure a good quality of life to its inhabitants prioritising citizens' involvement [3], [4].

In recent decades, socio-urban research has debated the effectiveness of urban regeneration policies and sustainable urban development [5], [6]. Since the 1990s, the territorial (area-based) approach has dominated urban policies, successfully mitigating speculative processes of the 1980s and 1990s focused on historic centres. However, unlike people-based models that aim to improve citizens' quality of life comprehensively, the area-based model is top-down, limiting community participation to information and consultation [6].

It becomes then essential to guide and showcase innovations that provide co-benefits for all users, especially the most vulnerable, through a holistic approach to urban regeneration aiming at dealing with socioeconomic and environmental districts' challenges [7]. The neighbourhood scale represents probably the smallest unit to ensure quality of life and covers all its associated characteristics and dimensions: physical wellbeing, material wellbeing, social wellbeing, emotional wellbeing, and development and activity [8].

As Jacobs stated, a city is an ecosystem [9], could then we consider a neighbourhood as a micro-ecosystem where different neighbourhoods in the same city can present different characteristics? These differences can be related to orography, the construction year of the existing buildings or the socioeconomic profile of the population, among others.

The observed variation among neighbourhoods underscores that a one-size-fits-all approach is inadequate for urban regeneration [10]–[12]. Tailored strategies, accounting for the unique characteristics of each community, are essential when designing urban renovation initiatives.

Today, urban regeneration is vital in city policies, environmental protection, quality of life improvement, and sustainable development, although some argue that user needs and sustainable management have been overlooked [13]–[15]. It has evolved from a field of study to a key component of new urban policies. However, urban regeneration strategies are not uniformly successful, often experiencing problems in the sustainability of community engagement [16]. In this sense, Heath et al. suggest that one explanation for this inconsistency is the lack of understanding of what mobilises community engagement within this context [15]. The literature on the role of stakeholders in urban regeneration projects highlights growing concern over the need to increase stakeholder participation, particularly from citizens and residents. Enhancing their involvement is recommended to ensure better community outcomes and avoid negative consequences [17]. Moreover, sustainable urban regeneration offers a promising solution to the challenges of the disconnect between urban design and local community needs, among others [18]. Overall, a paradigm shift is emerging in urban regeneration [14], promoting methodologies that require a multidimensional approach and the involvement of numerous stakeholders, with citizens playing a primary role in contributing to effective intervention or renovation plans.

This paper focuses on neighbourhood-scale district renovation, employing an integrated approach that emphasises social innovation (SI) and local economic development (LED) as two main drivers for effectiveness in urban regeneration interventions. Where SI refers to encompassing initiatives in areas like renovating social housing, fostering social engagement, and promoting participatory processes addressing social needs more effectively. Meanwhile, LED involves community efforts to enhance economic well-being, emphasising cross-sector collaboration and innovative, human-centred business models. This approach ensures active co-creation and participation from all stakeholders, primarily focusing on residents, thereby positively impacting the district's economy and its inhabitants.

SI in urban regeneration processes implies new forms of governance relying on the empowerment of the citizens through their engagement and involvement to ensure the sustainability of the actions taken [19]. The SI is reflected in citizen engagement as it plays a pivotal role in a co-governance (Co-G) model. This model, despite its complexity, is essential for addressing the challenges of urban regeneration. It involves setting the conditions for the collaborative design, execution, and monitoring of urban projects and programs, supported by a variety of urban stakeholders, with citizens being the starting point. The Co-G model necessitates a significant shift as well in the local municipality's approach, requiring them to redefine their exercise of power and enhance the transparency of their operations.

As for LED perspective, in recent times cities have grappled with transforming into adaptable systems that can effectively address new challenges and opportunities in a constantly changing global landscape. This transition involves moving from industrial societies to information, knowledge, and learning societies [20]. LED appears as a relevant factor for urban regeneration as a collaborative process involving the public sector, businesses, and civil society. Its goal is to improve economic conditions, employment prospects, and overall quality of life in a local area [21]. Successful LED emphasises competitiveness, sustainable growth, and inclusivity.

The present paper aims to integrate the multidimensional perspective into the urban regeneration process while the community's participation is involved in renovation interventions at a small scale providing then a tailored methodology implemented into a real urban regeneration experience, with a focus on SI linked to LED.

The methodology proposed is based on established step-by-step approaches that prioritise human-centred technology development and SI. It ensures citizen participation and engagement. The ultimate goal is to offer replicable recommendations and lessons learned for similar neighbourhoods. This method provides a solid foundation for evaluating large-scale energy renovation options at the district level.

In this context, the purpose of this research is two-fold. First, it proposes, in Section 2, a methodology for helping decision-makers in Urban Regeneration actions to transform social housing districts into inclusive smart neighbourhoods (more energy efficient, accessible and liveable) ensuring connectivity across physical, social, and digital domains. The first stage of the methodology is illustrated through a case study in Spain in Section 3. The key findings reveal that analysing both the neighbourhood's building characteristics (including physical diagnosis) and the residents' profiles enables effective anticipation of their needs related to an integral neighbourhood's renovation. A relevant discussion and conclusions are presented in Section 4.

The originality of the research lies in the contribution of the design of a decision-making system, and its corresponding application in a real case study, which considers a more effective collaboration between disciplines in the residential renovation process, thereby demonstrating that, through an effective work method, an effective and more sustainable renovation can be obtained that integrates various actors from its early stage up to the decision-making phase.

2 METHODOLOGY

The integrated renovation methodology (IRM) described in this section aims to transform social housing districts into inclusive smart neighbourhoods (more energy efficient, accessible and liveable), improving the quality of life for all residents by enhancing urban spaces, accessibility, and ensuring connectivity across physical, social, and digital domains.

Built on previous developments [22], [23], the IRM follows a stage-based approach to guide all the stakeholders involved in the regeneration of the neighbourhood: city administration, civil society, local economic ecosystem actors, construction and digital sector actors, research representatives, etc. It is fundamentally driven by a human-centred approach including a Co-G model and LED model, ensuring the active co-creation and participation of all stakeholders, with a primary emphasis on residents, thereby impacting the district's economy and its inhabitants. These two conceptual components have been tested and adapted to the case study's strategic goals.

- The Co-G model provides a co-creation concept perspective, present throughout the IRM, involving the citizens and all other stakeholders to guarantee social agreement and to create enabling conditions for innovation and social cohesion in the long term.
- The LED model aims to enhance the economic capacity of a local area, improving its future and quality of life providing as well specific guidance in all the stages of the IRM development allowing the local government (municipality) to align planning, strategy, and project priorities encouraging community competitiveness.

The IRM is a nine-stage-based approach affecting three development levels of the renovation process (Fig. 1). The strategic level offers a comprehensive strategic planning framework, The design level prioritises the identification of key areas and the implementation of actions for neighbourhood renovation, with a dedicated focus on fostering social progress. The intervention level is dedicated to planning the execution of the projects identified at the strategic level, prioritised and co-designed during the design phase.

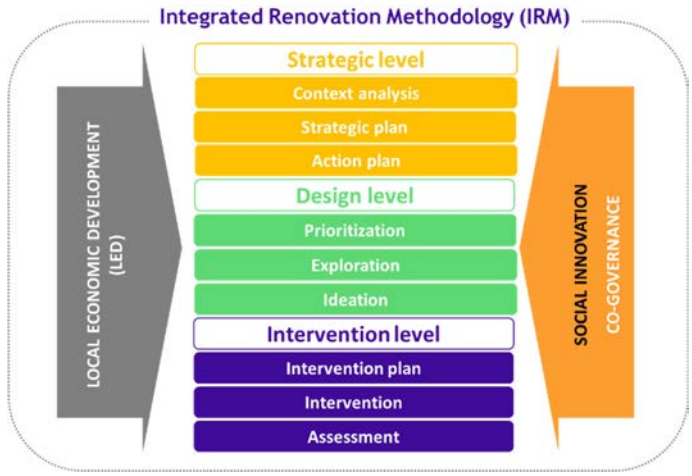


Figure 1: IRM for social housing neighbourhoods scheme. *(Source: Own elaboration.)*

One of the key elements within the Co-G model is the local task force (LTF), a collaborative body composed of various stakeholders from the community, including local government representatives, community leaders, residents, non-profit organisations, and sometimes private sector entities. Its mission is to promote neighbourhood development through the empowerment and support of local initiatives, following principles of cooperation, active participation and transparency. Fig. 2 shows its structure formed by a

Coordination Structure composed of the municipality, an *Executive Commission* consisting of citizen organisations, NGOs and cultural and creative industries and an *Extended Commission*, composed of all the relevant stakeholders and citizens.

Figure 2: LTF. *(Source: drOp project.)*

The Co-G model involves four stages starting with *Engagement*, where a safe, inclusive space for community participation using tools like active listening and collective decision-making are created. The *Co-Creation* stage involves empowering citizens from the engagement phase to design the LTC, establish common urban goals, and create new civic structures. This process allows for shared decision-making and responsibility. In the *Structure Test* stage, these newly formed LTFs and projects are tested to ensure their effectiveness. Finally, *Evaluation* assesses the entire process and individual sessions, providing transparent feedback to refine the model and tools for future cycles or new communities.

In the context of the IRM, the LED model is closely linked to industrial urban symbiosis, emphasising collaboration among key stakeholders involved in constructing and renovating social housing facilities. In this regard, the LED model support the IRM at multiple levels. At the strategic level, it guides local economic growth by identifying drivers and creating an enabling context for innovation (EC4I), considering economic, cultural, creative, and social systems. During the design stage, it provides an ideation pathway to identify business opportunities in energy efficiency, creative and cultural industries, and digitalisation and uses a *Human-Centred Business Model Canvas* to tailor projects. Finally, during implementation, the model offers *capacity-building* support, leveraging existing capacities and providing training in emerging sectors to ensure the success of selected initiatives.

2.1 Strategic level stage

This three-step stage starts with the CONTEXT ANALYSIS. It assesses the strengths and opportunities within the district or the neighbourhood across various domains such as social, cultural, economic, and energy. It involves a multidimensional characterisation and diagnosis, beginning at the city level and then focusing on the neighbourhood level to identify priority intervention areas. Complementarily, an explorative analysis essential for both the

Co-G model and the LED model is developed ensuring their implementation in the neighbourhood. Simultaneously, the Co-G model starts with the identification and characterisation of key actors in the neighbourhood through a survey aiming to identify those agents highly relevant to be involved in the LTF. The citizens' willingness to participate and their potential further engagement with the intervention plans previously identified. This analysis involves surveys, interviews and workshops with technical experts of the city council and external experts in working sessions. Finally, the multidimensional characterisation of the neighbourhood follows the diagnosis and prioritisation methodology [24], focused on identifying relevant indicators and visualising them in a geographic information system (GIS) by analysing statistical data, as well as other available urban and social data.

This stage continues with the STRATEGIC PLAN step identifying a desirable and feasible vision in a collaborative way with the neighbourhood's residents and key stakeholders. It involves a strategic planning process, starting with the collaborative scenarios' development and the creation of a neighbourhood vision. Key stakeholders generate various scenarios for the neighbourhood, exploring ways to regenerate the neighbourhood while promoting LED and are then shared with citizens encouraging a collective discussion to finally be able to reach an agreed city vision. In this step, the Co-G model defines the operative and flexible structure for the implementation of the model in four stages: community engagement, co-creation of each component, testing of the structure and evaluation of the local impact in a rolling process. Simultaneously, the LED model allows for delineating the EC4I. The EC4I represents a comprehensive landscape that encompasses overlapping economic, technological, innovative, environmental, and social systems that interact with and influence cross-sectoral industrial partnerships at the local level. The EC4I includes an assessment mechanism to evaluate the LED baseline at both the local and municipal levels as well as fosters the identification of business models, products, and services specific to the local context. Importantly, the interlink with the Co-G model is crucial, as it facilitates the engagement of local stakeholders from all sectors and key actors across the entire value chain of renovation processes, including residents.

The last step of the strategic level, named ACTION PLAN assists in formulating the Strategic Plan to implement the neighbourhood vision, pinpointing key project areas and securing the commitment of involved stakeholders, along with municipal support. In this step, an integral Action Plan is defined that aligns with the desirable and feasible vision for the neighbourhood. Stakeholders and residents who have participated in the preceding steps contribute to identifying specific actions for the action plan, fostering greater commitment to the processes and the implementation of the identified projects. The Co-G model in this step brings the co-creation regulation and the engagement of key local stakeholders while the LED model offers economic recommendations through a step-based checklist to guide city administrations in defining a Strategic Plan for achieving LED at the neighbourhood level. Those areas of improvement identified will be translated into a programmes and projects list.

This stage yields several key outcomes. A strengths, weaknesses, opportunities, threats (SWOT) analysis informs the development of scenarios and city vision. The strategic plan outlines specific goals, axes, and lines to achieve the neighbourhood vision. The action plan details projects, timelines, stakeholders, and budget allocations. The Co-G model defines the LTF, its stakeholders, and internal structure. Additionally, the LED model provides a guide for strategic planning, focusing on neighbourhood competitiveness, and an action plan with projects to address priority economic areas. These outcomes collectively form a comprehensive approach to neighbourhood regeneration.

2.2 Design level stage

The aim of the design level is the development of key projects identified in the action plan as facilitators for the strategic plan devoted to achieving the neighbourhood vision. It also entails a three-steps-based approach which focuses on: (1) prioritising the projects; (2) framing, and meticulously co-designing the projects; and (3) planning their implementation.

The PRIORISATION step involves a co-creation process entailing those projects identified in the action plan to be brought into discussion with LTF to prioritise them. In this step, the pre-identified actions are firstly analysed with the local authority to identify those that are feasible (funding, regulations, engagement, etc.) and ensure that they are aligned with the municipal efforts and programmes. Furthermore, with the support of the Co-G model, the engagement objectives are translated to the LTF. To do so the principles of co-decision and co-creation are explained to the group of local citizens and the participation workshops are arranged to work together on an additional prioritisation process. Concurrently, the LED model allows the ideation and set up of new business models in favour of the social housing renovation following a human-centred business model canvas [25].

The EXPLORATION step identifies and analyses similar projects in other European neighbourhoods to ensure viability, addressing institutional, legal, and economic aspects. The Co-G and LED models support interventions that fit the neighbourhoods' needs. In the IDEATION step, stakeholders and service/product providers co-define projects with the LTF. After evaluating feasibility, projects are revisited in working sessions, with a dedicated LTF for each project area. The goal is to select suitable solutions and technologies for each district sector, involving stakeholders and citizens in designing new services and products. The Co-G and LED models ensure an integrative approach, evaluating economic viability, social impact, and technical feasibility.

This stage yields three main outcomes. Firstly, it produces lists of prioritised projects, workshops, and business models that engage residents in renovation projects. Secondly, it defines selected projects, creates workshops, and establishes the Co-G model structure, including a baseline assessment of business models. Finally, it generates project proposals, tests the LTF, and identifies projects that promote economic growth at the neighbourhood level.

2.3 Intervention level stage

At this level, selected key projects elaborated at the design level are organised to ensure the transformation of the neighbourhood including the assessment of the performance and impact of interventions, validation of the project and the strategy are carried out.

The INTERVENTION PLAN step is devoted to incorporating the projects formulated in the preceding step into a neighbourhood intervention plan. This plan defines the activities' timeline and a detailed roadmap. The establishment of the LTF in this step contributes to the co-creation of the activities and the LED model focuses on providing the skills to guarantee the success of the projects selected through the development of a capacity-building set. The implementation of these projects occurs in the INTERVENTION step, from the completion phase to operation, ensuring their correct performance. The Co-G model at this step establishes and institutionalises the LTF in the best adaptable way for each context, while the LED model fosters synergies among different economic sectors in the neighbourhood to create new business opportunities. The intervention level concludes with the ASSESSMENT step to evaluate the performance of the whole intervention plan, its projects and its impacts.

The Co-G model and the LED model are also evaluated to understand and guarantee the sustainability of the IRM in the long term.

The primary outcome of this stage is the effective integration of economic, environmental, and social factors, resulting in the successful implementation of projects. This is achieved through the application of the theory of change framework, which evaluates the Co-G model, assesses its implementation, and measures the impact of LED.

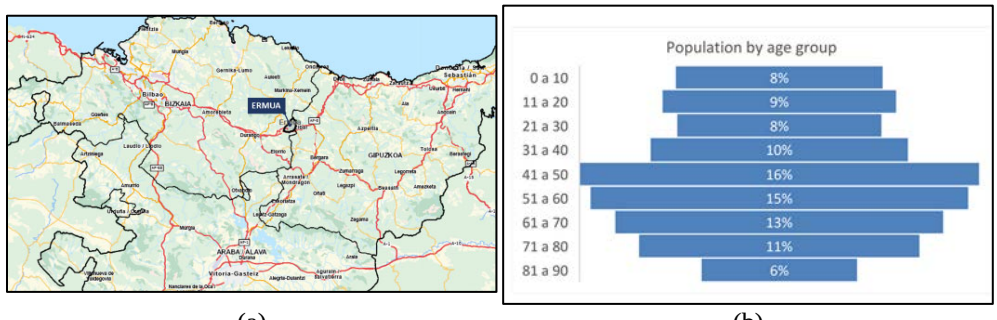
3 CASE STUDY IMPLEMENTATION

Particularly in Spain, the social housing constructed between 1939 and the introduction of thermal standards in 1979, faces issues of constructive obsolescence and the need for social revitalisation. These housing units were influenced by post-Spanish Civil War social changes, including population growth, rural–urban migration, and heightened demand for housing. This typology accounts for 14% of the residential building stock (2,538,170 dwellings) and in the Basque Country, which features one of the oldest housing stocks of Southern Europe, 57% of the residential buildings were built between 1940 and 1980.

In this regard, the drOp project funded by the European Commission under the Horizon Europe program proposes the application of the IRM described earlier to a small-scale neighbourhood in the Basque Country, Spain (Santa Ana neighbourhood, Ermua). Testing the methodology in a pilot case allows for modelling, refinement, and validation of the IRM. At the time of writing this article, the IRM's implementation in the demo is at its first level – the strategic level. The subsequent sections detail the process used to apply this initial level of the IRM and describe the outcomes of its implementation in Santa Ana, Ermua.

3.1 Context of Santa Ana, Ermua

Santa Ana is a residential neighbourhood built in the 1960s in the municipality of Ermua, which is located in the extreme east of the historical territory of Bizkaia, within the Duranguesado region of the Basque Country, northern Spain. The municipality has a surface area of 6.20 km^2 and a population of 15,599 inhabitants (Spanish National Statistical Institute, INE, 2023); therefore, it has a population density well above the average (Fig. 3). Due to the mountainous territory, the urban structure is a mixture of infrastructures and industrial and residential buildings which overlap, occupying the slopes, and the city centre shows a certain continuity with the neighbouring town of Eibar in the province of Gipuzkoa.



(a) (b)

Figure 3: (a) Location of Ermua. *(Source: Mapa GeoEuskadi.)* (b) Population age by group in Ermua. *(Source: Own elaboration with data from Eustat, 2022.)*

In terms of population, 70% of the population lives in the neighbourhoods around the city centre. The largest age group is the one between 40 and 50 years of age. The age group up to 30 years of age accounts for 25% of the population and from 30 to 60 years of age 41%, while the over-aged population accounts for 17%. The older population is a particularly vulnerable group in terms of accessibility and health.

Ermua's population doubled in the 1960s and 1970s due to industrialisation-driven migration [26]. The Santa Ana neighbourhood was built on the town's eastern edge, adapted to the hilly terrain. The area features narrow roads and three to six storey buildings with a uniform typology: open blocks, linear, with two street levels, and small dwellings, mostly without elevators.

Figure 4: Images of Santa Ana in 2000, 2001 and 2005. *(Source: Ayuntamiento de la Villa de Ermua Ermuko Udala.)*

The Santa Ana neighbourhood faces accessibility issues due to steep slopes. The area is defined by the Special Urban Renovation Plan (PERU) (2019), covering five streets with a north–south orientation. It comprises 40 residential buildings, nearly 400 dwellings, and a population of 759 people, with 25.34% aged 65+, exceeding the municipal average.

3.2 Main results of the strategic level implementation

The diagnosis phase involved analysing Ermua's local conditions, specifically in Santa Ana, to identify needs and prioritise interventions. The CONTEXT ANALYSIS characterised the area's building stock, urban mobility, ICT infrastructure, economic and cultural ecosystems, and citizen engagement using relevant indicators and GIS visualisation following the diagnosis and prioritisation methodology [24]. Statistical data from the census section and building scales were complemented by other sources, including urban mobility, solar resources, and economic characterisation. The analysis resulted in a SWOT analysis (Fig. 5), highlighting Santa Ana's strengths and weaknesses, and providing a comprehensive understanding of the area's current situation.

The main results showed that: (a) the main strengths of Santa Ana are the solar potential due to its orientation and demand aggregation potential in terms of electrification and the strong feeling of belonging to the neighbourhood; (b) the weaknesses are related to lack of accessibility and high percentage of old population and low economic activity; (c) the main opportunities include the municipal commitment for innovation; and (d) one of the greater challenges is the resistance to change of the residents.

Starting from the SWOT analysis, different scenarios were co-developed (Fig. 6), and a neighbourhood vision was generated in the STRATEGIC PLAN step.

Figure 5: SWOT analysis for Santa Ana. *(Source: Own elaboration.)*

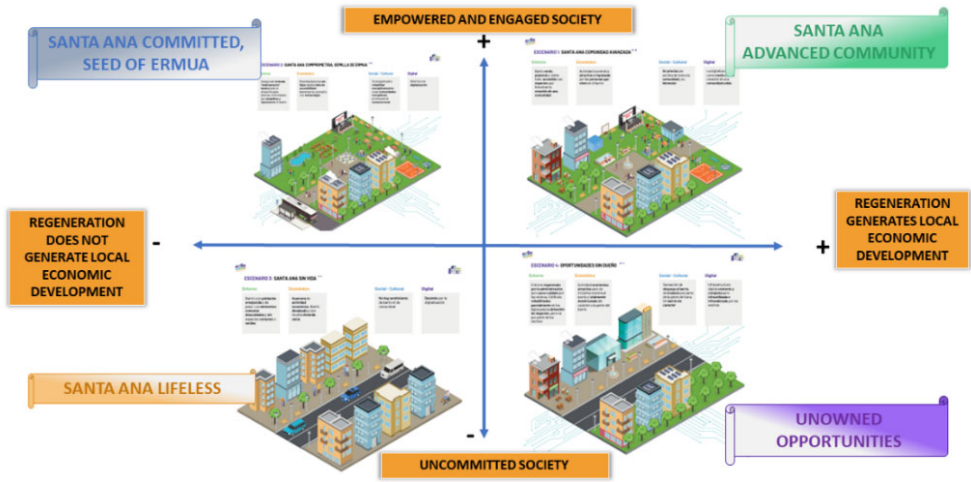


Figure 6: Scenarios for Santa Ana vision 2035. *(Source: Own elaboration.)*

Based on these four scenarios, the master scenario for the strategic vision Santa Ana 2035 was co-defined and the strategic plan was elaborated. This vision of the neighbourhood was taken as inspiration to develop the strategic axes and lines of action in each of the pillars (Fig. 7) (environment, economic, social cultural and digital) in the ACTION PLAN.

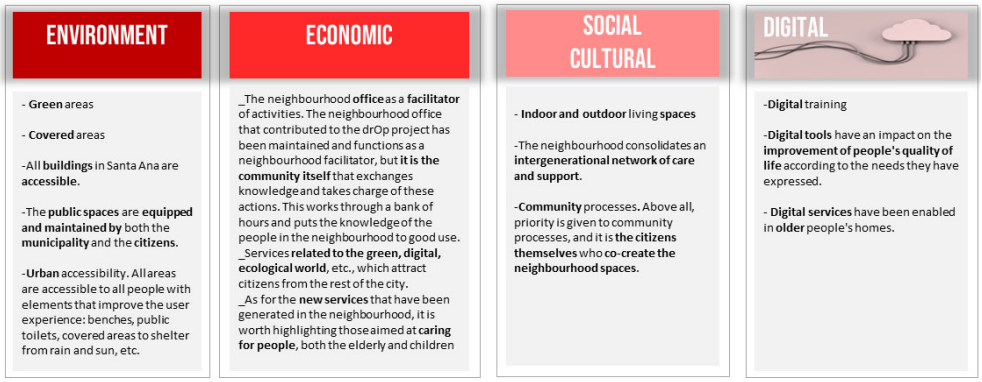


Figure 7: Actions for Santa Ana vision 2035. *(Source: Own elaboration.)*

4 DISCUSSION AND CONCLUSIONS

This method supports the complex process of engaging the residents in the urban regeneration of neighbourhoods. The aim is to show how step by step and through a participatory approach, these processes lead to consensual agreements enhancing the sustainability of renovation initiatives at the district level. The scope and scale of the IRM that focuses not on the city level, but at the neighbourhood level allows a closer iteration with the stakeholders involved, ensuring a cocreated vision and the prioritisation of codesigned projects and actions.

Facilitating citizen engagement can be challenging, especially in the initial stages. Residents may be reluctant to participate, and public administrators and politicians may be hesitant to implement participatory processes. To overcome these barriers – both internal and external – it is advisable to anticipate challenges, maintain flexibility, and be prepared to adapt the process to mitigate risks, such as elections or past negative experiences.

Rather than a broad open call, the focus should be on reaching out to specific groups, including associations, neighbourhood representatives, and other targeted stakeholders, to foster more productive engagement. Identifying individuals with participatory, creative, or specialised knowledge is essential. Collaborating in small groups enhances cooperation. Furthermore, communication should be tailored to suit the audience, especially when discussing technical matters. Lastly, providing timely feedback is vital for transparency and trust.

The implementation of the IRM in Santa Ana is in its early stages, and although definitive results are challenging to demonstrate, the collaborative approach inherent in the process contributes to the long-term sustainability of actions. The development of a Co-G model ensures genuine and effective engagement with neighbours, with the ultimate goal of leveraging the regeneration process to drive economic development in the area. This strategic focus on transformation adds value to the methodology.

Future work will involve implementing the remaining two levels of the methodology in the actual case of Santa Ana. Additionally, research will explore the potential for replicating this methodology by applying it in the cities of Matera (Italy) and Elva (Estonia), both of which are also involved in the drOp project.

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