POLITECNICO DI TORINO

Master's Degree in Territorial, Urban, Environmental and Landscape Planning

Assessing the Social Return on Investment Approach for Rehabilitation Projects on Urban Spaces: A Case Study of Six European Cities in the VARCITIES[1] Project

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Academic Year 2023-2024

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Degree:	Master of Science in Territorial, Urban and Landscape Planning. Curriculum Planning for the Global Urban Agenda (LM-48)
Title:	Assessing the Social Return on Investment Approach for Rehabilitation Projects on Urban Spaces: A Case Study of Six European Cities in the VARCITIES Project
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Research period:	June 2023-March 2024
Projects involved:	eurac research, VARCITIES

Acknowledgments

This thesis on the Social Return on Investment (SROI) approach represents the culmination of an extraordinary journey, made possible by the invaluable support and guidance of many individuals and institutions.

First and foremost, I would like to express my deepest gratitude to the Euarc Research Centre and the University of Polytechnic of Turin for providing me with the opportunity and resources to explore and develop this research. Their collaboration has been fundamental to the success of this thesis.

A special thanks goes to my main tutor, Sara Torabi Moghadam, whose expertise, encouragement, and insightful feedback have been crucial in shaping the direction of my research. Her dedication and knowledge have greatly contributed to the depth and quality of this work.

I am immensely grateful to my supervisor, Adriano Bisello, who guided me tirelessly over the past ten months. His involvement in the VARCITIES project provided me with a unique perspective and invaluable experience, enriching my understanding of the SROI approach. His mentorship has been a cornerstone of this journey, and his support has been unwavering.

I would also like to acknowledge my colleague and friend, Vasiliu Elisa-Elena, for her invaluable insights that helped me navigate the complexities of the thesis topics. Her contributions have been instrumental in enhancing the clarity and impact of my research.

My heartfelt thanks extend to all my colleagues and friends I met in Bolzano. They made me feel at home and provided a supportive environment that was essential for my work. In particular, I would like to thank Filippo, Vittorio, Alice, Giuseppe, Fabio, Saba, Gabriella, Cristina, Federico, Nicolas, Irene, Flavia, and Daniele. Their companionship and encouragement have been indispensable, and I could list many more names if space permitted.

To my friends, who have shown me affection and support from afar, I am deeply grateful. Your belief in me has been a source of strength and motivation throughout this journey.

Lastly, my sincerest thanks go to my family. Their unwavering support has been an indispensable source of strength, helping me navigate not only this final adventure but also the preceding years. Their constant presence has truly made all the difference in facing life's trials and triumphs. I am forever indebted to their love and encouragement.

This thesis is a testament to the collective effort, support, and guidance of all these remarkable individuals and institutions. Thank you for being an integral part of this journey.

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Abstract (EN)

In recent years, urban planning has increasingly focused on sustainability and resilience, driven by the need to address the complex social, economic, and environmental challenges facing modern cities. As urban populations grow, there is a pressing demand for innovative solutions that can improve the quality of life for urban residents while mitigating adverse environmental impacts. One such promising approach is the implementation of Nature-based Solutions (NBS), which integrate natural processes and green infrastructure into urban environments. However, a significant challenge remains in quantifying the broad range of benefits provided by NBS, particularly in social terms, which traditional evaluation methods often overlook. This work underscores the emerging necessity of defining impact assessment frameworks capable of capturing the multifaceted value of urban innovative interventions, specifically focusing on the Social Return on Investment (SROI) methodology.

This research is part of the ongoing H2020 VARCITIES project, which aims to resolve well-known local urban issues through "Visionary Nature-Based Solutions" (VS). This concept, coined within the project, combines NBS with SMART City Solutions and Socio-cultural Solutions. However, a consistent barrier to the expansion of these solutions is the lack of easily measurable or quantifiable evidence of benefits generated, given the complexity of ecological systems and their cost-effectiveness compared to traditional alternatives. Visionary Solutions are generating positive effects on multiple levels: environmental and economic, with an increasing recognition of the social sphere's relevance in terms of benefit awareness and active participation in co-creation and monitoring phases.

To illuminate the social component, the Social Return on Investment Analysis (SROI) was selected as the evaluation framework. SROI measures the value of organizations' activities in terms of monetary, social, economic, and environmental value based on changes experienced by key stakeholders. It is presented as an efficient tool for determining and monitoring social impact. While literature provides limited case studies of urban applications, recent publications highlight SROI's potential and recommend its use in built environment interventions.

A proposed cross-comparison with Cost-Benefit Analysis (CBA) is of paramount importance in assessing the impact of VS interventions from multiple aspects. Although deriving from CBA, the SROI framework proposes a tool that assesses the impact on society's welfare from a bottom-up perspective.

The proposed methodology was tested in Gżira, Malta, a VARCITIES project pilot area, which can serve as a model for generalization and application to other European urban contexts. The role of stakeholders in workshops was pivotal, ensuring active participation and validating the hypothesized outcomes. Their involvement was crucial for the co-creation and monitoring phases, leading to a comprehensive understanding of the social impacts. The implementation of NBSs in Gżira resulted in significant improvements in environmental quality, economic benefits, and heightened social engagement. Additionally, a literature review on various case studies provided insights into potential alternatives for the VARCITIES analysis variables, highlighting further merits and barriers of the SROI methodology and offering reflections on coping with some of the framework's limitations when applied to urban planning.

Astratto (ITA)

Negli ultimi anni, la pianificazione urbana si è sempre più concentrata sulla sostenibilità e la resilienza, spinta dalla necessità di affrontare le complesse sfide sociali, economiche e ambientali che affrontano le città moderne. Con la crescita delle popolazioni urbane, vi è una richiesta pressante di soluzioni innovative che possano migliorare la qualità della vita dei residenti urbani mitigando al contempo gli impatti ambientali negativi. Un approccio promettente è l'implementazione delle Soluzioni Basate sulla Natura (NBS), che integrano i processi naturali e le infrastrutture verdi negli ambienti urbani. Tuttavia, rimane una sfida significativa nel quantificare l'ampia gamma di benefici forniti dalle NBS, in particolare in termini sociali, che i metodi di valutazione tradizionali spesso trascurano. Questo lavoro sottolinea la necessità emergente di definire quadri di valutazione dell'impatto capaci di catturare il valore multi-acetico delle innovazioni urbane, concentrandosi specificamente sulla metodologia del Rendimento Sociale dell'Investimento (SROI).

Questa ricerca fa parte del progetto in corso H2020 VARCITIES, che mira a risolvere problemi urbani locali ben noti attraverso le "Soluzioni Visionarie Basate sulla Natura" (VS). Questo concetto, coniato all'interno del progetto, combina NBS con Soluzioni SMART City e Soluzioni Socioculturali. Tuttavia, una barriera costante all'espansione di queste soluzioni è la mancanza di prove facilmente misurabili o quantificabili dei benefici generati, data la complessità dei sistemi ecologici e la loro efficacia in termini di costi rispetto alle alternative tradizionali. Le Soluzioni Visionarie stanno generando effetti positivi su più livelli: ambientale ed economico, con un riconoscimento crescente dell'importanza della sfera sociale in termini di consapevolezza dei benefici e di partecipazione attiva nelle fasi di co-creazione e monitoraggio.

Per illuminare la componente sociale, è stato selezionato il Rendimento Sociale dell'Investimento (SROI) come quadro di valutazione. L'SROI misura il valore delle attività delle organizzazioni in termini monetari, sociali, economici e ambientali basandosi sui cambiamenti sperimentati dai principali stakeholder. È presentato come uno strumento efficiente per determinare e monitorare l'impatto sociale. Sebbene la letteratura fornisca pochi studi di caso sulle applicazioni urbane, pubblicazioni recenti evidenziano il potenziale dell'SROI e ne raccomandano l'uso negli interventi nell'ambiente costruito.

Un confronto incrociato proposto con l'Analisi Costi-Benefici (CBA) è di fondamentale importanza per valutare l'impatto delle VS sotto vari aspetti. Pur derivando dalla CBA, il quadro SROI propone uno strumento che valuta l'impatto sul benessere della società da una prospettiva dal basso verso l'alto.

La metodologia proposta è stata testata a Gżira, Malta, un'area pilota del progetto VARCITIES, che può servire da modello per la generalizzazione e l'applicazione in altri contesti urbani europei. Il ruolo degli stakeholder nei workshop è stato cruciale, garantendo una partecipazione attiva e convalidando gli esiti ipotizzati. Il loro coinvolgimento è stato essenziale per le fasi di co-creazione e monitoraggio, portando a una comprensione completa degli impatti sociali. L'implementazione delle NBS a Gżira ha portato a miglioramenti significativi nella qualità ambientale, benefici economici e maggiore coinvolgimento sociale. Inoltre, una revisione della letteratura su vari studi di caso ha fornito approfondimenti su possibili alternative per le variabili dell'analisi VARCITIES, evidenziando ulteriori meriti e barriere della metodologia SROI e offrendo riflessioni su come affrontare alcune delle limitazioni del quadro quando applicato alla pianificazione urbana.

List of Acronyms

NBS - Nature-Based Solutions

SROI - Social Return on Investment

VARCITIES - Visionary Nature-Based Solutions for Health and Well-being in Cities

GŻIRA - Specific case study city within the VARCITIES project

VS - Visionary Solutions

QALYs - Quality-Adjusted Life Years

CEA - Cost-Effectiveness Analysis

NPV - Net Present Value

IRR - Internal Rate of Return

CV - Contingent Valuation

SIA - Social Impact Assessment

ToC - Theory of Change

STEM - Science, Technology, Engineering, and Mathematics

OECD - Organisation for Economic Co-operation and Development

GIS - Geographic Information Systems

IUCN - International Union for Conservation of Nature

NGOs - Non-Governmental Organizations

Glossary

Inputs: The resources invested in a program or activity, such as money, time, and materials.

Outputs: The direct results of the program or activity, such as services provided, or products delivered.

Outcomes: The changes or benefits that result from the program or activity, which can be social, economic, or environmental.

Impact: The portion of the total outcome that occurred because of the program or activity, minus what would have happened anyway (deadweight), minus the outcomes attributable to other factors (attribution) and adjusted for how long the outcome lasts (duration).

Stakeholders: Individuals or groups that experience change, whether positive or negative, because of the program or activity. Stakeholders can include participants, employees, communities, and other entities affected by the initiative.

Deadweight: The extent to which outcomes would have happened anyway, without the intervention of the program or activity.

Attribution: The extent to which outcomes can be attributed to the program or activity, as opposed to other factors or interventions.

Drop-off: The rate at which outcomes decrease over time after the initial impact has been achieved.

Proxy: A substitute measure used to approximate the value of an outcome that is not directly measurable.

Monetization: The process of assigning a monetary value to outcomes, often using proxies, to calculate the SROI ratio.

SROI Ratio: The ratio of the net present value of benefits to the net present value of inputs. It shows how much social value is created for each unit of investment.

Value Map: A visual representation of the inputs, outputs, outcomes, and impacts of a program or activity, often used in the SROI analysis to map out the value creation process.

Sensitivity Analysis: A process used to test the robustness of the SROI results by varying key assumptions and assessing the impact on the SROI ratio.

Theory of Change: A comprehensive description and illustration of how and why a desired change is expected to happen in a particular context.

Materiality: The principle that determines which stakeholders and outcomes are significant enough to be included in the SROI analysis.

Nature-Based Solutions (NBS): Actions that protect, sustainably manage, and restore natural or modified ecosystems to address societal challenges effectively and adaptively.

Ecosystem Services: Benefits people obtain from ecosystems, such as clean water, air, and pollination.

Green Infrastructure: A network of natural and semi-natural areas designed to address urban and climatic challenges by integrating nature-based solutions into urban planning. It enhances environmental quality, promotes biodiversity, and improves the resilience of urban areas to climate change.

Resilience: The ability of social, economic, and environmental systems to endure and recover from hazardous events or disturbances. It involves preparing for, responding to, and adapting to adverse conditions while maintaining essential functions.

Chapter 1: Introduction

1.1 Background and context

The rapid speed of urbanization requires cities to play a crucial role in achieving global sustainability. However, urban processes currently pose significant environmental threats to both local and global ecosystems. These threats include air pollution, loss of biodiversity, water scarcity, and ocean pollution, which can also adversely impact the physical and mental health of urban dwellers. Therefore, it is crucial to adopt a comprehensive and inclusive approach to urban planning and governance at various scales to achieve a just and environmentally sustainable future. This complexity requires the involvement of multiple actors in finding solutions and implementing transformational policies.(“GEO for Cities - Towards Green and Just Cities,” 2021)

The utilization of Nature-based Solutions (NBS) can enhance urban resilience by effectively managing natural resources in urban areas. NBS can address the food-water-energy-climate nexus, improve environmental sustainability, and contribute to climate and water resilience. The process of NBS co-design, co-implementation, and co-maintenance with stakeholders also promotes social, institutional, and economic resilience. NBS implementation leads to a range of direct and co-benefits that enhance various aspects of urban sustainability and resilience to climate change impacts. The ultimate benefit of NBS is increased urban liveability and intergenerational equity. Standardized assessment criteria are necessary to accurately measure the direct and co-benefits of NBS across various spatial scales in the short- and long-term to maximize benefits(Wendling et al., 2018). To improve urban biodiversity conservation, ecosystem services, and climate change adaptation, it is important to rehabilitate and restore a wide variety of ecosystem types in urban green infrastructure. This rehabilitation and restoration can occur through different levels of intervention, from small-scale eco-systems to larger patches in both historic and novel ecosystems. Even small green spaces like road verges, hedgerows, and traffic islands can be valuable and attractive, while also improving habitat connectivity. Urban planning must protect and enlarge greenbelts and "green fingers" to ensure the production and flow of fresh air, mitigate the negative effects of climate change, and create multifunctional green spaces for biodiversity and recreational activities.(Klaus and Kiehl, 2021)

The handbook for practitioners, "Evaluating the Impact of Nature-Based Solutions," emphasizes the importance of selecting appropriate data collection methods and ensuring the quality of data for successful evaluation of NBS performance and impact. Different sources, including in-situ measurements, laboratory experiments, remote sensing, and citizen science, can provide information for NBS impact evaluation, with baseline assessment being a crucial step. The selection of data collection methods should be based on solid planning, technical expertise, and a wide knowledge of the environment to ensure relevant and accurate data are collected for NBS monitoring and assessment. Modelling can also be used to evaluate current and projected NBS impact. It is important to carefully evaluate all data produced during NBS monitoring activities for possible biases and main error sources to ensure its adequacy and reliability.

1.2 Problem

Increased contact with nature through green exercise can lead to the development of environmental values and attitudes that influence individual and societal behaviours and decisions

with environmental impacts. This connection between nature and individuals can result in long-term changes in attitudes and relationships with the environment. Thus, linking the benefits of environmental actions to individual health and well-being, framing environmental behaviours as health behaviours, and using health and well-being motivations to promote sustainable values and actions can be a promising approach to address sustainability challenges. The shift towards sustainable development requires changes in values and actions, which can be achieved through different paths.(Loureiro and Veloso, 2017)

The Social Return on Investment (SROI) is a new and advanced approach for assessing the diverse value of an investment, which involves analysing the economic, social, and environmental costs and benefits associated with it. To distinguish from traditional cost-effectiveness analyses, social return on investment analyses can capture a broader range of outcomes and produce a simpler outcome measure. However, they also present methodological challenges, particularly in assessing and combining uncertainties in the Benefit Cost Ratio components. Furthermore, future evaluations should aim to consider similar complex interventions from a systems perspective to avoid neglecting significant indirect downstream well-being effects.(Hunter et al., 2022)

The significance of assessing the effects produced by nonprofit organizations and social enterprises is on the rise, though this isn't a recent development. The discussion surrounding performance and outcome measurement has been growing in prominence since the 1960s, particularly within the context of evaluation research (Stufflebeam and Shinkfield, 2007). In recent times, stakeholders within the nonprofit sector have started shifting their approach towards a more market-driven and profit-centric mindset. Social entrepreneurs and venture philanthropists, sometimes with support from foundations, have begun to adopt established concepts of evaluating and measuring outcomes and impacts according to their unique perspectives and criteria.

The aim of this study is to assess presently popular social impact measurement concepts, specifically the SROI (Social Return on Investment) analysis, in comparison to long-established (economic) evaluation concepts. Within this context, we explore the logic model or impact chain, which forms the foundation for evaluation, and its counterpart, the "theory of change," which is gaining importance in the realm of foundations. Ultimately, we scrutinize the SROI analysis, highlighting its advantages and drawbacks, as a distinct approach to measuring social impact, which can also be categorized as a form of cost-benefit analysis within economic evaluation.

1.3 VARCITIES project

VARCITIES, a visionary initiative funded by the esteemed European Union Horizon 2020 Research and Innovation Programme and spanning the years 2020 to 2025, is a groundbreaking project that aspires to surmount the multifaceted challenges confronted by contemporary cities, including population growth, climate change, and urban fragility. With the collaboration of 24 partners and the participation of 7 pilot cities—Castelfranco Veneto in Italy, Chania in Greece, Dundalk in Ireland, Gżira in Malta, Leuven in Belgium, Novo mesto in Slovenia, and Skellefteå in Sweden—the project sets out to manifest innovative, holistic, and sustainable transformations.

At the heart of VARCITIES lies a pioneering and visionary approach termed Visionary Nature-Based Solutions (VS), ingeniously amalgamating Nature-based Solutions, Digital Solutions, and Socio-cultural Solutions. By harmoniously integrating these elements, the project endeavours to metamorphose urban spaces and elevate the well-being and health of citizens to new heights. Notably, the primary focus rests on revitalizing public areas, with an unwavering commitment to engaging stakeholders in the co-design process. This strategic involvement aims to empower communities, fostering a sense of ownership and, in turn, inspiring emulation in other urban settings.

An inherent facet of VARCITIES' methodology is the implementation of innovative monitoring systems, a testament to its commitment to scientific rigor and evidence-based outcomes. Through these systems, the project aims to rigorously evaluate the impact of interventions, elucidating the manifold co-benefits that Visionary Nature-Based Solutions bestow upon citizens. By measuring and quantifying the improvements in well-being and health, VARCITIES seeks to underscore the immense potential of VS as a transformative force within urban environments. Moreover, the project envisions a forward-looking perspective, recognizing the crucial importance of knowledge transfer and replication. As VARCITIES progresses, it endeavours to disseminate and share the invaluable insights garnered from its successful implementation of Visionary Nature-Based Solutions, both within its network of partners and beyond. This far-reaching vision seeks to kindle a ripple effect, inspiring similar nature-based actions in diverse urban contexts, thereby fostering a wider paradigm shift towards resilient, thriving cities that embrace nature's inherent wisdom.(“Varcities – Future Cities,” n.d.)

1.4 Research objectives

To evaluate the SROI approach as a tool for assessing the impact of visionary NBS on urban spaces

To evaluate the SROI approach as a tool for assessing the impact of NBS on urban spaces within the VARCITIES project, several key steps should be undertaken. Firstly, a pilot area must be selected, wherein the NBS intervention will be clearly defined, and relevant stakeholders identified. Subsequently, data should be meticulously collected concerning the costs and benefits of the intervention, encompassing social, environmental, and economic impacts. This data will then be subjected to thorough analysis using the SROI methodology. The resultant findings should be compared with those derived from traditional methods of impact assessment. This rigorous process will not only quantify the impact of the NBS intervention but also provide valuable insights into its overall effectiveness. By leveraging the SROI approach, stakeholders can obtain a comprehensive understanding of the intervention's value, thereby informing future decision-making and resource allocation.

To identify the key social, environmental, and economic outcomes of the rehabilitation projects in the six cities

The VARCITIES project aims for holistic urban renewal by engaging with local governments, residents, and experts. The methodology unfolds in four phases: initially, it conducts a needs assessment to pinpoint each pilot city's unique social, environmental, and economic issues. Following this, a collaborative effort with local stakeholders shapes custom rehabilitation

strategies. These solutions are then executed with the assistance of local entities. Ultimately, the project assesses the interventions' impact through a comprehensive monitoring and evaluation system, aiming for sustainable, equitable urban development.

To examine the challenges and opportunities associated with using the SROI approach in the context of urban renewal projects with nature-based solutions

Translating the intangible outcomes of urban projects into tangible monetary values for stakeholders poses a common challenge, particularly in valuing social impacts, which are often underrepresented. The VARCITIES project addresses this by leveraging the Social Return on Investment (SROI) methodology in its nature-based urban renewal initiatives. This approach involves intricate steps, starting with a detailed needs assessment and followed by stakeholder engagement for co-creating solutions. Although collecting comprehensive data through surveys, interviews, and focus groups to gauge the social and environmental impacts can be complex and resource-intensive, it enables a deeper understanding of the true value of these interventions. The SROI method not only aids in quantifying these benefits but also supports improved decision-making and highlights areas needing enhancement. By applying SROI, VARCITIES showcases the efficacy of nature-based solutions, facilitating sustainable and equitable urban development through a robust framework that contrasts with traditional evaluation metrics like cost-benefit analyses or environmental assessments.

To provide insights for improving the SROI methodology in the context of rehabilitation projects on urban spaces

There are several key insights that can be applied. One approach is to incorporate a system thinking perspective that recognizes the interconnected nature of urban systems, leading to a more comprehensive understanding of the impacts of rehabilitation projects. Additionally, technology can be used to enhance data collection and analysis, providing more accurate and timely information for decision-making processes. It is also important to consider the unique context-specific factors that may impact the outcomes of rehabilitation projects, such as political, cultural, and economic conditions, as well as the specific characteristics of the urban spaces being targeted. By tailoring the SROI methodology to the specific context of each project, it can better account for the complexities and nuances of the urban environment. Furthermore, transparency and inclusivity are critical in ensuring that stakeholders and the public have access to the data and analysis used to inform decision-making processes. This helps to build trust and ensure that the interventions are accountable and responsive to the needs of the community. By incorporating these insights, the SROI methodology can be improved in the context of rehabilitation projects on urban spaces. This can ultimately lead to more sustainable and equitable urban development, with a greater emphasis on the social and environmental impacts of these interventions.

1.5 A Pathway to Thesis Objectives

The primary objective of this thesis is to explore the efficacy of SROI approach in assessing the impacts of interventions in urban spaces, particularly through the lens of NBS. The SROI approach, distinguished from traditional evaluation methods like cost-benefit analysis and environmental impact assessments, offers a comprehensive framework that emphasizes the social and environmental value generated by urban projects. By scrutinizing the principles and components of SROI, this study aims to elucidate how this methodology can be specifically

tailored and applied to evaluate the transformative effects of NBS on urban environments in terms of sustainability and resilience.

An in-depth exploration will delve into the existing evaluation frameworks and methods currently utilized to gauge the effectiveness of NBS interventions, underscoring the unique benefits they offer for urban development. The thesis will investigate various case studies and examples where the SROI approach has been effectively employed to assess NBS impacts, providing insights into its applicability and outcomes. This will include an analysis of the challenges and limitations inherent in applying SROI within the urban NBS context, such as the subjectivity of valuation and the integration of intangible benefits like improved well-being and social cohesion.

Furthermore, the research will explore how stakeholder engagement and participation contribute significantly to the success of the SROI methodology in this context, enhancing the reliability and relevance of the findings. Through this comprehensive examination, the thesis aims to propose practical recommendations and best practices, drawing from previous studies to refine and optimize the use of the SROI approach for evaluating visionary NBS in urban spaces. This includes identifying relevant data collection methods and indicators that are essential for capturing the full spectrum of social and environmental impacts facilitated by NBS projects.

Ultimately, this thesis endeavours to justify the application of the SROI approach as a transformative tool for urban development, advocating for its broader adoption in evaluating the impact of NBS to foster more sustainable, resilient, and equitable urban environments.

1.6 Research structures

The research is divided into a certain number of main parts and chapters. It begins with an introduction to the subject matter, including a review of the literature, and then proceeds to provide a real-life case study example of applying SROI methodology to the rehabilitation of urban areas through NBS. ultimately, the work concludes with reflections on potential future directions for this research.

1. Introduction

This part discusses the importance of cities in achieving global sustainability, but also highlights the negative impact of urbanization on the environment. It proposes the use of Nature-Based Solutions (NBS) to enhance urban resilience, including rehabilitating and restoring ecosystems in urban green infrastructure, protecting green spaces, and using assessment criteria to measure NBS benefits. It also suggests linking environmental actions to individual health and well-being to promote sustainable values and actions and introduces the Social Return on Investment (SROI) approach for assessing the value of investments. The section ends by introducing the VARCITIES project and its research objectives, which focus on implementing Visionary Nature-Based Solutions (VS).

2. Literature review

This literature review emphasizes the significance of using the Social Return on Investment (SROI) framework to assess the impact of Nature-based Solutions (NBS) on urban rehabilitation. The VARCITIES project aims to implement visionary NBS solutions to improve citizens' health and well-being, highlighting the importance of appropriate data collection methods and data

quality for successful impact evaluation. While SROI presents potentialities and merits, it also has limitations and methodological challenges. Nonetheless, the SROI approach can capture a broader range of outcomes and produce a simpler outcome measure, making it a valuable tool for evaluating the impact of NBS on urban sustainability and resilience.

3. Methodological Framework

The methodology integrates a mixed methods design for evaluating NBS through SROI, underpinned by systematic literature review and case studies. It employs diverse data collection strategies, including surveys and stakeholder workshops, and adopts a detailed SROI analysis framework. The approach is multidisciplinary, merging environmental and urban insights to assess tangible and intangible impacts, aimed at enhancing urban sustainability and policymaking in the context of the VARCITIES project.

4. Case study design and selection criteria

This chapter is dedicated to one of the important case studies of VARCITIES, Gżira is a small town in the central region of Malta with a population of over 13.000 people. It is densely populated and largely comprises built–up areas and narrow streets. Due to over development, Gżira presents limited green spaces and serious air and noise pollution.

The pilot site is Rue D'Argens, a relatively long and busy road with various residential and office buildings on both sides and little greenery. VARCITIES will implement a series of co-designed nature-based solutions to be implemented along the road (such as green roofs and balconies) to reduce pollution and improve health, walkability, sense of place and health for citizens.

5. Maximizing Impact: Scope, Map & Value Outcomes in SROI

Adapting SROI for assessing nature-based solutions requires modifying traditional steps to capture their wide-ranging outcomes and distributed impacts more holistically. For the objective of applying SROI to a case study, stakeholders must be comprehensively involved to identify intended and unintended impacts. Composite indicators and physical metrics are then selected to measure outcomes, incorporating intangible benefits. Financial proxies are applied cautiously to value outcomes due to limitations.

For the objective of monitoring and evaluation through SROI, outcomes and targets must be projected and regularly recalculated based on updated evidence to iteratively optimize impact and equity over time. Calculated SROI ratios indicate value creation and areas for improvement. While monetary valuation remains imperfect, adapted SROI Steps can more fully assess nature-based solutions' social impact and returns through the combination of quantitative, qualitative, and distributional lenses.

6. Monetization stage

To refine the Social Return on Investment (SROI) approach, employing questionnaires and real-life citizen engagement as primary methods can enhance the precision of monetising the social, environmental, and economic impacts of projects or initiatives. Utilising questionnaires allows for the direct collection of data from the community, capturing their willingness to pay or accept compensation for non-market goods or services. This method grounds contingent valuation in actual community preferences and experiences.

Furthermore, integrating the real-life experiences of citizen engagement provides invaluable insights into the societal value of outcomes, aligning the standard method more closely with the actual benefits perceived by the community. By combining these approaches, SROI can offer a more detailed and contextually relevant assessment of impacts. This enhancement thereby improves resource allocation and the management of natural resources through informed decision-making, based on genuine community feedback and values. Additionally, conducting sensitivity analysis will provide further clarification and robustness to the results.

7. Conclusions and Recommendations for Enhancing SROI Assessment

In the concluding chapter, the discussion centres around the insights derived from both the research and application phases, particularly highlighting the methodological deficiencies identified. Recommendations for enhancing the SROI framework will be offered, formulated based on experiences from the preliminary experiments documented in various case studies, as well as challenges encountered during the implementation in Gżira. The provided guidance is intended to assist future applications of the SROI methodology within the context of other VARCITIES pilot projects.

These recommendations are drawn from practical experiences and are aimed at refining the approach to ensure greater accuracy and relevance. By addressing the identified deficiencies and implementing the suggested improvements, future SROI applications can be better tailored to capture the true social, environmental, and economic impacts of Nature-Based Solutions in urban spaces. This will ultimately support more informed decision-making and resource allocation, enhancing the overall effectiveness and sustainability of interventions within the VARCITIES framework.

Chapter 2: Literature Review

2.1 Literature Review Process

The thesis review examined relevant literature categorized into thematic areas. Each area provided complementary insights on foundational concepts within their domain. A synthesis of these insights formed a robust base for the original analytical work in the thesis, addressing research gaps across thematic areas. The systematic organization of literature from multiple domains facilitated a holistic exploration of the research problem. The literature review began by exploring foundational concepts of nature-based solutions and how they aim to work with nature to meet human needs, establishing how they are evaluated based on the multiple benefits they provide. The review then examined how social value and social impact fit within frameworks for evaluating nature-based solutions, indicating they are important benefits these solutions aim to create. The Social Return on Investment methodology was then explored as a tool for quantifying the social value of nature-based solutions, considering its application, origins in the social economy, alternative frameworks for comparison, and limitations. The review culminated by examining case studies applying the SROI methodology to nature-based solutions, providing insights into implementing SROI in practice and the associated challenges. Overall, the literature review progressed from general concepts and evaluations of nature-based solutions to analysing social value and impact assessment tools to a focused examination of the SROI framework itself and its practical implementation, with each phase building on the previous ones to provide greater depth of understanding (Bockarjova et al., 2022; Corvo et al., 2022).

While applications of the Social Return on Investment methodology to urban development projects have been limited, recent examples demonstrate a growing interest in SROI. This interest stems from SROI's potential to determine relevant outcomes for end users and to quantify the social value created by interventions. However, studies show that adaptations to the standard SROI methodology are often needed to fully capture the benefits of specific projects. Alternative impact measurement approaches offer complementary insights but come with their own benefits and limitations.

The research prioritized identifying case studies that closely reflect the VARCITIES pilot area in terms of outcomes measured, stakeholders analysed, and activities proposed. Case studies that closely follow the full SROI framework can provide the most instructive examples for applying the methodology's stages, which will be covered in detail in Part II. Comparisons with alternative frameworks reveal opportunities to improve social impact assessment within the pilot area. Ultimately, real-world examples of the complete SROI process may help refine social impact valuation for VARCITIES, though current applications remain limited. With adaptations and complementary techniques, an adapted SROI model could capture the full benefits of the pilot area interventions.

Introduction to Urban Sustainability and Innovation

This section delineates the conceptual and empirical landscape surrounding urban sustainability, emphasizing the emergent integration of Nature-Based Solutions (NBS), digital technologies, and Social Return on Investment (SROI) methodologies. The discourse navigates through the complex interplay between urban ecological enhancement, socio-economic evaluation, and

technological advancement, establishing a nuanced foundation for examining the VARCITIES-H2020 project's multifaceted approach within Gżira, Malta.

Nature-Based Solutions: A Paradigm for Urban Resilience

Theoretical Underpinnings: Delve into the philosophical and theoretical origins of NBS, tracing its evolution from ecological theories and green infrastructure to a comprehensive framework for urban resilience. Reference seminal works and contemporary studies that delineate the principles and operationalization of NBS within urban ecosystems (Li et al., 2021).

Empirical Evidence and Multifaceted Benefits: Explore extensive empirical research demonstrating the diverse benefits of NBS, spanning ecological, psychological, and socio-economic dimensions. Critically analyse studies that quantify the impacts of NBS on urban heat islands, air quality, biodiversity, public health, and community well-being, while highlighting methodological approaches and outcome measurements (Ruangpan et al., 2020).

Barriers to Implementation and Strategic Responses: Investigate the systemic and operational barriers impeding NBS integration in urban planning. Discuss scholarly insights and case studies addressing these challenges, focusing on strategic planning, policy frameworks, and stakeholder engagement mechanisms that facilitate effective NBS implementation.

Social Return on Investment (SROI): Evaluating Urban Interventions

Foundations and Evolution of SROI: Offer an in-depth exploration of the SROI framework, tracing its historical development from financial investment appraisal to a comprehensive tool for assessing social and environmental impacts. Engage with academic debates and theoretical discussions that frame SROI within the broader context of sustainable development and social accounting.

SROI in Urban Environmental Contexts: Present a critical review of literature applying SROI to urban and environmental projects, delineating the methodological variations, valuation techniques, and impact assessments. Highlight the successes and challenges encountered in quantifying and monetizing the social and environmental returns of urban interventions (Corvo et al., 2022).

Critiques, Limitations, and Methodological Refinements: Engage with critical perspectives on SROI, addressing concerns related to subjectivity, monetization of social outcomes, and attribution challenges. Explore scholarly contributions that propose methodological refinements and alternative approaches to enhance the reliability and validity of SROI analyses.

VARCITIES-H2020: A Convergence of NBS, Digital Solutions, and SROI

Comprehensive Overview of VARCITIES Objectives and Strategies: Provide a detailed exposition of the VARCITIES-H2020 project, elucidating its holistic approach to urban health and well-being through the lens of NBS and digital integration. Detail the project's overarching objectives, innovative strategies, and expected outcomes, with a particular focus on its ambition to redefine urban living paradigms (Van Rompaey et al., 2023).

Gżira Case Study: A Microcosm of Urban Innovation: Delve into the specifics of the Gżira case study, outlining the unique urban challenges it presents and the specific NBS and digital interventions employed. Discuss the rationale behind these interventions, the anticipated

outcomes, and the significance of Gżira as a representative urban laboratory for the VARCITIES project.

Application of SROI in Gżira: Examine the methodological approach to applying SROI within the Gżira context, articulating the expected pathways from NBS and digital solutions to quantifiable social and economic outcomes. Critically assess the adaptation of SROI methodologies to capture the comprehensive impacts of integrated urban interventions.

Synthesizing Insights and Identifying Research Gaps:

Integration of Multidisciplinary Perspectives: Synthesize insights from the reviewed literature, emphasizing the innovative intersections between NBS, digital solutions, and SROI in the context of urban sustainability. Highlight how this multidisciplinary approach contributes to a more holistic understanding of urban well-being and resilience (Hölscher et al., 2023).

Research Gaps and Uncharted Territories: Identify lacunae within existing research, particularly in the empirical evaluation of integrated urban interventions and the nuanced application of SROI in assessing NBS and digital solutions. Highlight the need for in-depth case studies, advanced methodological frameworks, and longitudinal impact assessments.

Justification for the Present Study: Articulate the academic and practical significance of the proposed research, underlining its potential to fill identified gaps, provide empirical evidence, and inform future policy and practice in sustainable urban development. Emphasize the unique contribution of the Gżira case study within the VARCITIES project to advancing knowledge in urban sustainability.

Wrap-up

This literature review meticulously constructs a scholarly edifice upon which the present study is based, weaving together theoretical insights, empirical findings, and critical analyses from diverse disciplines. By examining the intersections of NBS, digital solutions, and SROI in the urban context, this review not only contextualizes the VARCITIES-H2020 project and the Gżira case study but also highlights the study's potential to contribute to the evolving discourse on sustainable urban development and well-being.

2.2 Working with Nature to Meet Human Needs, Definition and principles

Nature-based Solutions (NBS) are defined as actions to protect, manage, and restore natural or modified ecosystems to address societal challenges while simultaneously providing human wellbeing and biodiversity benefits. The NBS framework emerged from the Ecosystem Approach, which underpins the Convention on Biological Diversity and considers ecosystem functioning and resilience key to both biodiversity conservation and human wellbeing. The increasing referencing of NBS in scientific and policy literature indicates wide adoption, attributable partly to its simple, logical construct for non-specialists. However, there are risks NBS remains a vague concept lacking operational rigor. Though rapid uptake benefits from broad definitions, clear definitions, parameters, and methodologies underpin enduring concepts. For example, though the Landscape Approach defined principles, diverse definitions and lack of framework adversely

impact implementation. For NBS to effectively reverse degradation trends at scale, coordinated principles and evidence-based guidelines for practitioners are required.(Cohen-Shacham et al., 2019)

A set of NBS principles, to be considered in conjunction with the NBS definition, The eight proposed NBS principles are as follows:

1. embrace nature conservation norms (and principles); 2. can be implemented alone or in an integrated manner with other solutions to societal challenges (e.g., technological and engineering solutions); 3. are determined by site-specific natural and cultural contexts that include traditional, local and scientific knowledge; 4. produce societal benefits in a fair and equitable way, in a manner that promotes transparency and broad participation; 5. maintain biological and cultural diversity and the ability of ecosystems to evolve over time; 6. are applied at a landscape scale; 7. recognise and address the trade-offs between the production of a few immediate economic benefits for development, and future options for the production of the full range of ecosystems services; and 8. are an integral part of the overall design of policies, and measures or actions, to address a specific challenge(*Nature-based solutions to address global societal challenges*, 2016). Understanding how NBS principles relate to and differ from other ecosystem management approaches helps strengthen and optimize frameworks for biodiversity conservation and societal benefits. Growing ecosystem awareness enables improved conditions for both biodiversity and human wellbeing, yet maximizing ecosystem management's benefits for conservation requires sound principles informing best practices. Comparing NBS with related approaches may help refine NBS and practice standards while increasing ecosystem awareness offers opportunities to enhance conservation and wellbeing through strengthened principles applied to best practices.(Cohen-Shacham et al., 2019)

The Importance of Rigorous Evaluation for Nature-Based Solutions

The evaluation of non-market benefits of nature-based solutions (NBS) faces four main gaps:

- Lack of common framing: The absence of a common framework for NBS and their benefits hinders the comparison and generalization of findings across different studies and contexts.
- Lack of replicability and upscaling: The lack of replicable and scalable methods restricts the applicability and transferability of valuation results to other sites and scenarios.
- Inadequate integration of benefits: The insufficient integration of benefits for both people and nature leads to incomplete or biased assessments that fail to account for the diverse and interconnected impacts of NBS.
- Failure to consider environmental justice: The failure to consider environmental justice dimensions overlooks the distributional and procedural aspects of NBS implementation and valuation. (Viti et al., 2022)

Evaluation is important for NBS because it can:

- Support practitioners to understand and document the outcomes of NBS, resulting in improved quality, efficiency, and effectiveness at various stages of NBS implementation.
- Help to build a robust evidence base on the social, economic, and environmental benefits of NBS, as well as their costs, risks, and limitations.

- Enable the comparison and selection of the most suitable NBS for different contexts and challenges, considering the local conditions, stakeholder preferences, policy frameworks and spatial scales.
- Facilitate the communication and dissemination of the value and potential of NBS to diverse audiences, such as policy makers, funders, researchers, practitioners, and citizens.
- Contribute to the development of standards and guidelines for NBS design, implementation, and monitoring, as well as to the advancement of innovation and knowledge on NBS.(Sowińska-Świerkosz and García, 2021)

Challenges to Adopting Nature-Based Solutions

NBS use nature and harness the power of ecosystems to help provide "green infrastructure" alternatives to conventional "Gray" solutions. However, despite the many benefits that nature-based solutions can provide, there are still significant challenges to adopting NBS on a wider scale in policy and practice. While the concept of NBS is gaining more attention, a range of obstacles continues to limit the mainstreaming and implementation of these promising approaches. Some of the key reasons for the challenges to adopting nature-based solutions include:

Lack of Awareness and Understanding:

This study found that a lack of understanding and awareness of NBS was a key barrier limiting their uptake in cities. Efforts are needed to raise awareness of NBS benefits through education, demonstration projects and knowledge transfer.(Leal et al., 2017)

Perceived Higher Costs:

Nature-based solutions are often still perceived as more costly than conventional "Gray" infrastructure, though studies have shown that NBS can be cost competitive when incorporating all benefits. More cost-benefit analyses of NBS projects are needed to convince investors and funders.(Sellberg et al., 2018)

Difficulty Proving Effectiveness:

There is still a lack of robust evidence and impact assessments showing the performance and effectiveness of implemented nature-based solutions. More monitoring and evaluation of NBS projects is needed to build the case study evidence base.(Machiwal et al., 2019)

Inadequate Planning and Policy Frameworks:

Most planning and policy frameworks are still geared toward conventional approaches and do not properly include or incentivize nature-based solutions. New policies and regulations are needed to mainstream NBS.(Lemly, 2019)

Uncertain Long-Term Effectiveness and Risks:

There are still uncertainties about the longevity and stability of benefits provided by NBS, as well as potential unintended consequences and risks. More research is needed on the long-term performance and resilience of implemented nature-based solutions.(Gutiérrez-Noya et al., 2020)

VARCITIES: Embracing Innovation for Sustainable Urban Development

Visionary Solutions are innovative ideas that combine nature-based, digital, and socio-cultural solutions to address urban challenges and improve the health and well-being of citizens. They are proposed by the pilot cities of the VARCITIES project, which is a European initiative that aims to create sustainable and resilient urban models.

Some of the benefits of Visionary Solutions are:

They can enhance the environmental quality and resilience of cities by providing ecosystem services, reducing greenhouse gas emissions, improving water management, and mitigating natural and climate hazards.

They can foster social cohesion and inclusion by involving different stakeholders in participatory processes, promoting social learning and empowerment, supporting social justice and cultural heritage, and creating new economic opportunities and green jobs.

They can leverage digital technologies to improve the efficiency and performance of urban infrastructures and services, such as energy, mobility, housing, and governance.

They can improve the health and well-being of citizens by creating more accessible and attractive green spaces, reducing air pollution and noise, increasing physical activity and recreation, and enhancing the quality of life and subjective well-being.

Visionary Solutions can also contribute to the Sustainable Development Goals (SDGs) and the OECD Well-being Framework, which are two global frameworks that aim to measure and promote human development and well-being. Depending on the type and scope of the Visionary Solutions, they can address different goals and dimensions of these frameworks. For example:

Nature-based Solutions can contribute to SDGs such as Clean Water and Sanitation, Climate Action, Life Below Water, Life on Land, etc., and to OECD Well-being dimensions such as Health, Environmental Quality, Safety, etc.

Digital Solutions can contribute to SDGs such as Affordable and Clean Energy, Industry Innovation and Infrastructure, Sustainable Cities and Communities, etc., and to OECD Well-being dimensions such as Housing, Knowledge and Skills, Work-life Balance, etc.

Socio-cultural Solutions can contribute to SDGs such as Quality Education, Gender Equality, Reduced Inequalities, Peace Justice and Strong Institutions, etc., and to OECD Well-being dimensions such as Social Connections, Civic Engagement, Subjective Well-being, etc.(Samuele Zilio, Alice Borsari, Adriano Bisello, et al., n.d.).

2.3 User Experience Research Methods

User Experience (UX) Research Methods are crucial in understanding how users interact with products or services, and these insights can be instrumental for evaluating SROI which is a framework for measuring the extent to which non-financial outcomes can be attributed to a particular investment or action. By integrating UX research methods into SROI evaluation,

organizations can obtain a deeper understanding of the impacts of their initiatives on stakeholders, leading to more accurate and holistic assessments(Vermeeren et al., 2010) . several UX research methods, along with explanations of how they can be beneficial for SROI evaluation (Krueger et al., 2020; “Measuring Social Value (SSIR),” n.d.; *Quantifying the User Experience*, n.d.):

Surveys and Questionnaires: Surveys and questionnaires were distributed to residents and participants involved in the Gżira project. These tools collected quantitative data on how the NBS interventions, such as green roofs and balconies along Rue D’Argens, affected stakeholders' behaviours, satisfaction levels, and overall perceptions. This data was crucial for translating these impacts into financial values for the SROI evaluation.

Interviews: Interviews were conducted with individual residents and other stakeholders in Gżira. These one-on-one conversations provided qualitative insights into personal experiences, motivations, and feedback regarding the NBS interventions. The interviews revealed deep insights into the social value created or diminished by the project, enhancing the understanding of its impact on residents' lives.

Usability Testing: Usability testing involved observing residents as they interacted with the newly implemented NBS features, such as community gardens and green spaces. This method identified usability issues and areas for improvement, ensuring that the interventions effectively met the needs of the community and were accessible and beneficial.

Ethnographic Field Studies: Researchers conducted ethnographic field studies by observing and interacting with residents in their daily environments. This approach provided rich, contextual insights into how the NBS interventions influenced user behaviours and social dynamics in Gżira, contributing to a more accurate SROI evaluation.

Persona Development: Personas were developed to represent typical users of the NBS interventions in Gżira. These detailed profiles helped stakeholders understand and empathize with the needs and experiences of different community members, guiding the development of initiatives that were more closely aligned with user needs.

Journey Mapping: This involves creating a visual representation of a user's experience with a product or service over time and across different touchpoints. Journey maps can help identify critical moments that significantly impact the user's experience. For SROI, this can highlight intervention points where changes can have the most significant social impact.

Card Sorting: This is a method used to help understand how users perceive and categorize information. In SROI evaluations, card sorting can help understand how different stakeholders perceive the value and impact of services or programs, aiding in the alignment of social initiatives with user expectations and values.

In the Gżira case study within the VARCITIES project, integrating User Experience (UX) Research Methods into the SROI evaluation provided a comprehensive, user-cantered understanding of the impacts of NBS interventions. Various UX methods, including surveys, questionnaires, interviews, usability testing, ethnographic field studies, persona development, journey mapping, and card sorting, offered deep insights into the community's experiences and perceptions. This approach ensured that the valuation of interventions reflected community values and priorities. A significant component was the SROI workshop in Gżira, where residents and participants engaged in co-creating and validating the outcomes of NBS interventions. The workshop facilitated the collection of qualitative and quantitative data essential for SROI analysis,

helping to refine the interventions to better meet the community's needs. Combining UX methods with the SROI workshop led to a holistic understanding of social, environmental, and economic impacts, ensuring that the urban rehabilitation efforts were more responsive to stakeholder experiences and more effective in achieving their intended social impacts.

2.4 Valuing the Invaluable: Assigning a Price to Social Value

We need to monetize social values because it can help social enterprises to achieve financial sustainability and profitability, while still pursuing their social missions. Monetizing social values means creating market revenues with or through the social mission, rather than relying on external funds or donations. (Dohrmann et al., 2015) argues that different types of social business models can be categorized and ordered by the degree to which they monetize social value creation and the level of market revenues they generate more than expenditures.(Retolaza et al., 2019) divide social value into three levels: economic value generation with social impact, socio-economic return, and specific social value. Each level has its own variables and proxies to measure the social contribution of the organization to different stakeholders.

According to a practical example of (Mendizabal Leiñena et al., 2022) within sport clubs case study, Monetizing social value is important because it allows professional sport clubs to measure and communicate the social and environmental effects of their activities to their stakeholders and society at large. By using a social accounting model that integrates both market and non-market value dimensions, clubs can show that they create value not only for their shareholders, but also for their fans, employees, suppliers, media, communities, sporting associations and public administrations. Monetizing social value can also help clubs to justify their existence beyond their financial results and sporting performance, and to demonstrate their contribution to the well-being of society. Monetizing social value can also enable clubs to attract more sponsors, investors, donors, and supporters who are interested in their social impact.

2.5 Socially Accounting for Value: How SROI Creates a Complete Cost-Benefit Picture

The Social Return on Investment (SROI) framework provides a comprehensive and structured approach for measuring and accounting for the social, environmental, and economic value created by organizations and initiatives. SROI seeks to quantify not just the financial returns generated, but also the wider impacts on stakeholders in non-financial outcomes like health, wellbeing, skills development, environmental benefits, and community impacts. Traditional cost-benefit analyses and financial reporting often only consider easily monetized economic impacts, failing to capture important non-financial benefits that are difficult to assign monetary values to. SROI aims to address this by mapping both monetary and non-monetary impacts and assigning appropriate financial proxies to different stakeholder outcomes wherever possible based on proxies identified through literature reviews and market research. This allows SROI to present a more holistic valuation of an organization's total impact.(Arvidson et al., 2013)

The SROI process starts by identifying and engaging relevant stakeholders to determine the scope of social, environmental, and economic outcomes to measure. Quantitative and qualitative data

are collected to determine an organization's "theory of change" or causal model that illustrates how inputs, activities and outputs lead to specific outcomes. Financial proxies are then identified and applied to valued outcomes based on available data sources and benchmarks. The results are presented as an SROI ratio showing the social, environmental, and economic value generated for every dollar invested. For example(CFA institute and ACCA, n.d.), a project ratio of 1:4 indicates that an investment of 1 USD delivers 4 USD of social value to the direct beneficiaries of the project. By considering outcomes that are traditionally omitted from financial statements and cost-benefit analyses, SROI seeks to provide a more complete picture of an organization's total costs and benefits. Quantifying social value can also inform strategic decisions about how to maximize positive impact (Arvidson et al., 2013). SROI is one of the tools that can be used within the social value measurement framework to capture the value that projects create for society beyond traditional economic measures.

The SROI method can portray the relation between a 'social investment' and its social benefits by translating certain aspects of social value into financial values, which result in an SROI coefficient. This monetary component is complemented by an alternative quantitative and qualitative capturing of softer 'social' returns. SROI thereby considers three important rationales: 1. Monetizable value creation: economic and socio-economic value 2. Non-monetizable value creation: social value 3. Value is primarily created for society, not for the investor.(Morgan, 2012)

The SROI Journey: Principles and stages for Impact Valuation

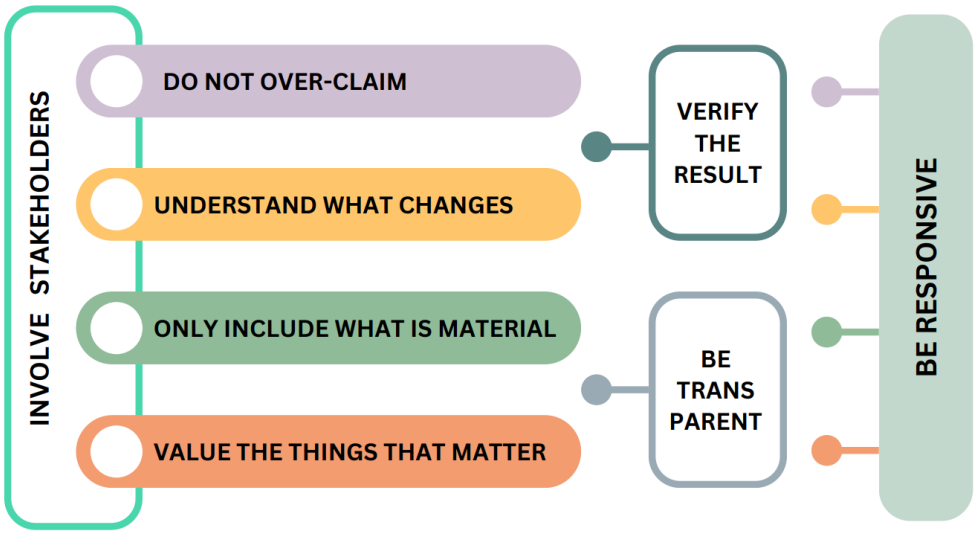

Figure. 1 SROI principles. Investigated by the author, based on (Damtoft et al., 2023)

Based on ("A Guide to Social Return on Investment 2012," n.d.) there are seven principles and six stages for conducting an SROI analysis. The principles are:

Involve stakeholders: Consult with the people or organisations that experience or contribute to the change caused by the activity.

Understand what changes: Identify and evaluate the outcomes that result from the activity, both intended and unintended, positive, and negative.

Value the things that matter: Use financial proxies to represent the value of the outcomes in a common unit.

Only include what is material: Include only the information and evidence that is relevant and significant for the analysis and the stakeholders.

Do not over-claim: Deduct the value of the outcomes that would have happened anyway, or are attributable to other factors or actors, from the total value created.

Be transparent: Explain and document the assumptions, methods, sources, and calculations used in the analysis.

Verify the result: Seek independent assurance or verification of the analysis to ensure its credibility and accuracy.

The stages are:

Establishing scope and identifying stakeholders: Define the purpose, audience, boundaries, and resources of the analysis, and list the stakeholders who will be involved or affected by it.

Mapping outcomes: Develop an impact map or theory of change that shows the relationship between inputs, outputs, and outcomes of the activity.

Evidencing outcomes and giving them a value: Collect data to demonstrate that the outcomes have occurred and assign a monetary value to them using appropriate methods and sources.

Establishing impact: Calculate the net value of the outcomes by removing any deadweight, displacement, attribution, and drop-off effects.

Calculating the SROI: Compare the total value of the outcomes with the total value of the inputs to obtain a ratio of benefits to costs. Test the sensitivity of the results to different assumptions and scenarios.

Reporting, using, and embedding: Share the findings and recommendations of the analysis with stakeholders and respond to their feedback. Use the results to improve performance, inform strategy and communicate impact.

Figure. 2 Overview of the SROI process. Investigated by the author, based on (Congent Ventures, n.d.)

The Appropriateness of the SROI Framework

Appropriateness issues is included comparability, subjectivity, legitimacy, and resource utility(Nielsen et al., 2021):

Comparability:

The comparability of SROI results can be improved by using similar proxies and measurement methods across different organizations or projects. This will help to ensure that the results are more accurate and consistent. In situations where organizations or projects are similar in terms of their goals, activities, and target beneficiaries, SROI should be a top priority when measuring value.(Nielsen et al., 2021)

Subjectivity:

The lack of generally accepted standards for proxies' forces organizations to develop their own proxies based on their specific context and their own subjective perceptions and judgments. This can lead to a lack of comparability between SROI studies, as different organizations may use different proxies to measure the same social value.(Maier et al., 2015; Nielsen et al., 2021)

The subjectivity of SROI studies can be a challenge, as it can make it difficult to compare the results of different studies. However, it is important to remember that subjectivity is not necessarily a bad thing. In fact, it can be helpful in ensuring that SROI studies are tailored to the specific context of the organization or project being evaluated.(Damtoft et al., 2023)

Legitimacy:

Using Social Return on Investment (SROI) and effectively communicating the social value can enhance credibility and gain acceptance from various stakeholder groups. It simplifies information and presents social value in a comprehensible manner, enabling stakeholders to form opinions. Consequently, organizations should focus on establishing legitimacy while implementing SROI. One approach involves supplementing calculations with narratives and stories.(Luke et al., 2013; Nielsen et al., 2021)

Resource Utility:

In the end, it is crucial for individual organizations to carefully weigh the advantages and disadvantages of employing SROI as a metric for assessing the social value generated. Among the considerations are the costs versus the benefits. Developing SROI entails dedicating resources since multiple stakeholders are involved, and gathering pertinent data is necessary. These resources are not solely allocated to the calculations but are also required for effectively communicating and elucidating the measure to stakeholders to gain legitimacy.(Nielsen et al., 2021)

Advantages of SROI

SROI is a versatile and inclusive approach that effectively captures the intricate and diverse impacts of social enterprises. By utilizing SROI, social enterprises can effectively communicate their social value to a wide range of stakeholders, including funders, commissioners, investors, and beneficiaries. Moreover, SROI empowers social enterprises to enhance their performance by identifying their areas of strength and weakness, thus informing their strategic decision-making processes. Additionally, SROI enables social enterprises to demonstrate their accountability and transparency by providing compelling evidence of their outcomes and impacts, further bolstering their credibility and overall impact in the community.(Millar and Hall, 2013)

Advantages of SROI relative to other forms of evaluation: SROI outcomes.

- includes information on the amounts of resources used by the program, in addition to program activities.

- includes information on the value to society of outcomes achieved by the program, in addition to outcomes not expressed in terms of societal value.
- allows different programs to be compared even if their outcomes typically are expressed in different units.
- shows possible net gain in societal resources resulting from program operation.
- can represent program value to society rather than to a specific stakeholder group.
- could motivate multiple stakeholders to participate from the start of an evaluation, because much is at stake. (Yates and Marra, 2017)

Finally, SROI can be used as a communication tool to create organizational legitimacy. This is because SROI measurement can reduce complexity to a single quantitative figure, which can be used to shape stakeholders' opinions and thus their acceptance of the organization.(Luke et al., 2013; Maier et al., 2015)

Valuing the Intangible: Challenges of Applying SROI in the Real World

In addition to its advantages, SROI also has some challenges. One of the most significant challenges is the difficulty of finding proxies for monetizing social value that cannot be directly measured. When these proxies are uncertain, the entire method is called into question.(Yates and Marra, 2017). Unlike financial accounting, where there are generally accepted international reporting principles and standards, there is no such list or criteria for the validity of proxies used to measure social value. As a result, organizations must develop their own proxies based on their own biases, perceptions, and judgments. This can lead to a lack of consistency and comparability between SROI studies. In a nutshell, SROI is a utilitarian concept, in contrast to Kantian ethics, which intrinsically values a life and not because of a monetized value that can be maximized.(Maier et al., 2015)

(Millar and Hall, 2013) suggests some challenges and limitations of using measurement tools for SROI, such as the complexity of social phenomena, the uncertainty of causal relationships, the subjectivity of value judgments, and the costs of data collection and analysis. Therefore, it recommends a pragmatic and participatory approach to SROI measurement, that balances rigor and relevance.

Table 1 summary of disadvantages of SROI analysis. (Damtoft et al., 2023)

1. The nature of the activity sometimes makes it difficult to monetize
2. Finding relevant proxies for the measurement
3. International reporting principles or standards do not exist, making it difficult to validate the result
4. Professional judgment, biases, and personal perceptions might affect the measurement
5. The effect depends on the interest and engagement of stakeholders
6. It can be difficult to establish causal links between activities and outcomes
7. A deadweight factor needs to be deducted, which can be difficult to calculate

2.6 Social impact measurement and the role of SROI

Social impact holds significant importance today for numerous fund providers, nonprofit organization (NPO) leaders, and social entrepreneurs who aim to gain a clearer understanding of

their work, define it more effectively, and communicate their efforts. Methods for measuring social impact endeavour to capture, gauge, and, when possible, evaluate the consequences that arise from actions, initiatives, projects, programs, or policies on the pertinent groups of interest, including clients, stakeholders, and society. These impacts can encompass both negative and positive outcomes, as well as those that are deliberate, unintentional, or a blend of these factors (Mildenberger et al., 2012). In a more general sense, social impact involves depicting a discernible transformation within the target group, which can be linked to a specific intervention. Adhering to the investment perspective, the aim is to provide stronger motivation and rationale for the allocation of funds and financial decisions. In this context, the social impact to be realized is defined as a return on investment.

Conversely, the evaluation of outcomes has been a topic of discussion with a much lengthier history within the realm of evaluation research. Evaluation is a methodical appraisal of situations using predetermined criteria, typically carried out through social scientific research techniques. Broadly, evaluations can be categorized into three primary groups, which encompass program theory evaluation, process evaluation, and additionally, outcome and impact analyses.

Here's how the provided excerpt justifies the usefulness of social impact measurement methods for this research and the Gżira pilot:

Understanding and Defining Work:

Social impact measurement methods, such as SROI, enable fund providers, nonprofit leaders, and social entrepreneurs to gain a clearer understanding of their work. This is crucial for defining and communicating their efforts more effectively.

The thesis emphasizes the need for a comprehensive and inclusive approach to urban planning and governance to achieve sustainability, which aligns with the goals of understanding and defining social impacts.

Evaluating Consequences:

These methods strive to capture, gauge, and evaluate the outcomes of actions, projects, programs, or policies on relevant groups, including clients, stakeholders, and society. This includes both positive and negative, deliberate, and unintentional outcomes.

The thesis discusses the importance of NBS in urban resilience and how their implementation leads to various direct and co-benefits. Measuring these impacts helps in understanding the broad range of benefits provided by NBS, particularly in social terms.

Return on Investment:

From an investment perspective, measuring social impact provides a stronger motivation and rationale for fund allocation and financial decisions. The social impact realized is defined as a return on investment.

The thesis highlights the SROI methodology as a tool to measure the social, environmental, and economic value generated by urban projects. This is crucial for decision-making and resource allocation in the Gżira case study.

Evaluation Research:

Evaluation of outcomes has been a topic of interest in research for a long time. The systematic appraisal of situations using predetermined criteria through social scientific research techniques is essential. The thesis integrates a mixed methods design, including systematic literature reviews

and case studies, to evaluate NBS through SROI. This approach ensures a thorough understanding and measurement of impacts.

Application in Gżira Case Study:

The specific application of the SROI approach in Gżira involves evaluating the impact of nature-based solutions on urban spaces. This includes detailed steps for identifying stakeholders, data collection, and thorough analysis. The Gżira case study, as part of the VARCITIES project, focuses on implementing NBS to address urban challenges and improve health and well-being. The use of SROI in this context provides a comprehensive framework for assessing these impacts.

The logic basis

Over the last decade, the significance of the logic model has notably increased. This can be attributed to a shift towards more outcome-focused management and a rising demand for accountability from nonprofit organizations. Logic models serve as visual representations of program elements and, in their simplest form, aid in identifying the resources, program activities, results, and impacts in each process. They can also be seen as the initial step in establishing a more comprehensive data collection system.(Wilson, 2009)

Figure 3, depicted below, presents a fundamental logic model, with program elements that enable the classification of various evaluation types. While specific models may exhibit considerable variations in their level of intricacy, detail, and visual layout, the fundamental principles underlying them remain consistent. Nonetheless, the model presented here introduces a critical perspective known as "deadweight," particularly important in the context of social impact analyses.

Logic behind the Theory of change

The term "logic model" is frequently interchanged with "theory of change," a popular concept, particularly within foundations, social investment, and social entrepreneurship. This interchangeability reflects the portrayal of the fundamental impact model.

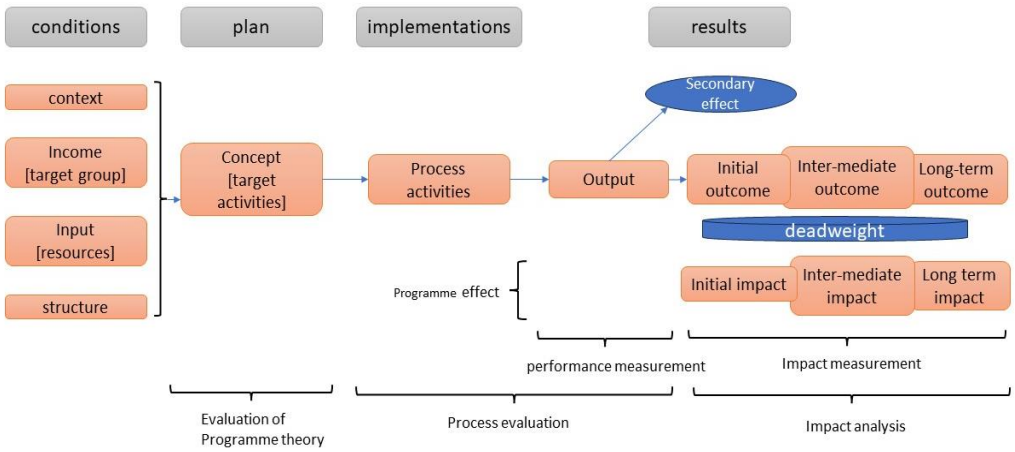

Figure 3 Authors' own diagram based on (Reischmannn, 2005) to describe the logic model

The theory of change can also be seen as a process or methodology applicable to program planning. It's important to note that this doesn't entail the development of a theory in the strict scientific sense. Instead, it involves providing empirical evidence and/or theories to support assumptions and hypotheses about how an intervention or program operates. In essence, while the

logic model outlines the intended outcomes of a program and thus illustrates the logical connections between program elements, the theory of change delves into the specifics of how and under what conditions particular effects are expected to occur (Weiss, 1998). In this context, a theory of change pertains to the empirical evidence upon which any intervention should be grounded. Systematic collection of data, research, and observations concerning the field, or the target group is conducted. From these sources, assumptions are drawn and refined.

When utilizing the theory of change approach as a methodology, it commences with a fundamental query: What alterations within the target group do we aspire to accomplish through our intervention? This involves pinpointing the essential prerequisites needed for achieving these changes. In addition to referencing existing research, it is also possible to independently construct the theory of change by involving stakeholders from the outset. At this early stage of development, relevant stakeholders are taken into consideration. Engaging these pertinent stakeholders' aids in shaping a shared comprehension and consensus regarding the nature and magnitude of the desired transformation. Furthermore, it is imperative to establish well-founded assumptions about the cause-and-effect relationships during the program's development phase. In conjunction with early engagement of decision-makers, this approach ultimately furnishes a more robust informational foundation, delineates responsibilities more distinctly, and thereby simplifies the evaluation and monitoring of the program's success (Carman, 2010; Sullivan and Stewart, 2006).

Economic Evaluation Techniques in the Social Sector

Social impact measurement, social return on investment, and theory of change are key concepts in economic evaluation. Recently, there has been a growing emphasis on assessing the effects of non-profit activities. Social impact measurement, which quantifies initiative outcomes, has gained attention in foundations, social entrepreneurship, and venture philanthropy. This practice, however, has a long history in economic evaluation. Similarly, the theory of change, which examines cause-and-effect relationships, has been widely discussed since the 1980s under the term theory-based evaluation.(Chen and Rossi, 1989)

SROI analysis is a prominent method for assessing impact in the non-profit sector, often requested and widely debated. Though it may seem novel, SROI is essentially a form of cost-benefit analysis, a practice discussed since the 1930s (Yates, 2009). While the concept of social impact startups faces criticism as merely repackaging traditional businesses, it encourages innovative solutions to important issues. Framing social missions as strategic investments fosters an optimistic, opportunity-seeking mindset. Social enterprises leverage market forces for public good, tackling pressing problems through bold ventures. If these ventures prove viable while driving real progress on social and environmental challenges, they may attract greater support for solutions across various sectors. This shift towards investment and strategic philanthropy emphasizes collaboration and tangible results over costs.

Chapter 3: Methodological Framework

3.1 Research Design

This investigation is structured around a mixed-methods research design to assess SROI from NBS and digital solutions within urban rehabilitation efforts, exemplified by the VARCITIES project in Gżira, Malta. This approach enables a comprehensive evaluation of both tangible and intangible impacts, aligning with interdisciplinary approaches that bridge environmental science with urban technology. This design is imperative for dissecting the multifaceted nature of NBS impacts, allowing for a nuanced exploration that aligns with the interdisciplinary approaches recommended by (Creswell, 2017). By integrating quantitative data's empirical rigor with qualitative insights' depth, this design caters to a holistic assessment of SROI, capturing a spectrum of social, economic, and environmental values.

The research framework is constructed around a critical examination of the VARCITIES project's innovative NBS interventions within Gżira, Malta. This examination is guided by a conceptual model that integrates elements of urban sustainability, stakeholder engagement, and economic valuation, inspired by the holistic frameworks advocated by (Bocken et al., 2014) in their sustainable value analysis model. The VARCITIES initiative serves as a pivotal case study, providing a real-world context for applying and scrutinizing the theoretical and practical dimensions of NBS and SROI.

The Gżira pilot is dissected through a multi-dimensional lens, examining the envisioned and actualized outcomes of NBS applications. This detailed exploration is underpinned by a robust theoretical foundation, drawing from the principles of urban ecology and social value creation. The case study's selection is justified by its exemplification of urban challenges and NBS potentials, rendering it an ideal microcosm for investigating the broader implications and effectiveness of such urban interventions.

3.1.1 Data Collection

The data collection strategy is meticulously crafted to ensure comprehensive coverage of the study's objectives:

Documentary Analysis: An exhaustive review of VARCITIES project documentation, scholarly literature, and policy frameworks will be undertaken. This review will contextualize the NBS interventions within current academic discourse and policy debates, providing a solid foundation for subsequent empirical investigation.

Surveys and Questionnaires: Structured instruments will be designed to elicit quantitative data on stakeholders' perceptions and experiences. This approach allows for the systematic gathering of data across a broad respondent base, facilitating statistical analysis that can highlight trends, disparities, and correlations.

Semi-structured Interviews: Key informant interviews will be conducted to gain deeper insights into the qualitative dimensions of NBS impacts. This method enables the exploration of nuanced perspectives, motivations, and experiences, enriching the study's empirical base with detailed narratives and personal accounts.

Workshops and Focus Groups: These participatory platforms will be employed to engage stakeholders actively, fostering a collaborative environment where diverse voices can contribute

to the outcome mapping and valuation processes. This engagement is crucial for ensuring that the SROI analysis is grounded in stakeholders' lived realities and perceptions.

Stakeholder Engagement

The methodology prioritizes profound stakeholder engagement, drawing from (Reed et al., 2009), who emphasize the significance of inclusivity and transparency in environmental research. Stakeholders from various sectors, including residents, educators, policymakers, and VARCITIES project members, will be actively involved in the research process. This engagement strategy ensures that the study's findings are reflective of a broad range of interests and perspectives, thereby enhancing the validity and applicability of the research conclusions.

SROI Analysis Framework

The SROI analysis is anchored in a rigorous framework that systematically captures and evaluates the social value generated by NBS and digital solutions interventions. This comprehensive approach, adapted from the methodology developed by the Social Value International, entails:

Establishing Scope and Identifying Stakeholders: This foundational step involves delineating the SROI study's boundaries and identifying all relevant stakeholder groups, ensuring that the analysis encompasses all significant impacts.

Mapping Outcomes: The development of an outcomes map, informed by stakeholder input and documentary analysis, illustrates the causal pathways linking NBS interventions to their varied impacts.

Evidencing Outcomes and Giving Them Value: This phase involves quantifying the identified outcomes and assigning monetary values, using established valuation techniques and proxies where direct financial values are not applicable.

Establishing Impact: Critical assessment of the extent to which outcomes can be attributed to the nature based digital solutions interventions, accounting for external influences and other contributing factors.

Innovative Monetization Technique - Preference Method:

• Objective: To monetize the outcomes of NBS and digital interventions in a manner that reflects the values and priorities of the Gżira community.

• Approach: Implementation of the preference method involved:

a. Eliciting Stakeholder Preferences: Through workshops and direct engagements, stakeholders were asked to express their preferences and assign value to different project outcomes.

b. Monetization Process: Utilizing the data from stakeholder preferences to assign monetary values to the outcomes, ensuring the SROI analysis accurately reflected community valuation.

Calculating the SROI: The final calculation of the SROI ratio, providing a quantitative measure of the value for money that the pilot’s visionary solutions represent in terms of social, environmental, and economic returns.

3.1.2 Data Analysis

The analysis will employ a triangulated approach to ensure robustness and depth. Quantitative data from surveys will undergo statistical analysis, employing tools and techniques suitable for identifying patterns and testing hypotheses. In contrast, qualitative data from interviews and focus groups will be subjected to thematic analysis, following the structured approach outlined by (Braun and Clarke, 2006), to identify emergent themes and narratives. This combined analysis will illuminate the multifaceted impacts of NBS, providing a comprehensive understanding of their value and effectiveness.

3.1.3 Limitations

The research methodology is designed with an acute awareness of potential limitations, including biases and data interpretation challenges. Strategies such as triangulation, peer review, and iterative data collection are employed to mitigate these issues, ensuring the research's integrity and the findings' applicability.

This methodology sets the stage for a rigorous and insightful exploration of the VARCITIES project’s impacts in Gżira. It aims not only to contribute significant insights into the efficacy and value of integrating NBS and digital solutions in urban rehabilitation but also to inform future urban planning and policymaking. By embracing this detailed and systematic approach, the study aspires to provide valuable contributions to the fields of urban sustainability, public health, and technological innovation, offering a comprehensive blueprint for future urban interventions worldwide.

Chapter 4: Case study design and selection criteria

4.1 VARCITIES: Building a More Sustainable Future for Gżira

Gżira, Malta

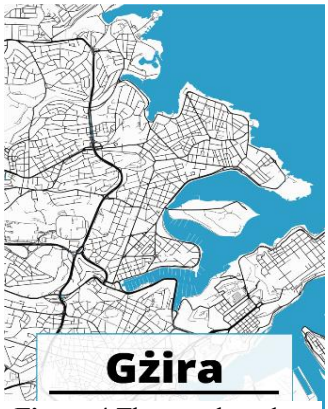

Figure 4 The map based on VARCITIES website elaboration.

Gżira, located in the central region of Malta, is a moderately sized town with a population over 13,000 residents. The town has a high population density due to the abundance of built-up areas and narrow roads crisscrossing the town. Its location between the capital city Valletta and the coastal town of Sliema makes Gżira well connected and accessible. All these factors have contributed to Gżira becoming popular with both locals and immigrants.

The town is known for its lively shopping streets, pleasant restaurants, happening nightlife and beachside attraction, making it especially appealing to tourists and young people. Its proximity to the University of Malta has attracted many students to reside in the town. Over the years, various ethnic shops and restaurants have opened reflecting Gżira 's cultural diversity. However, with the increase in urbanization, the amount of public green spaces in Gżira has diminished. The hustle and bustle of the town has also resulted in high levels of air pollution and noise pollution, posing problems for residents.(Clouet, n.d.)

The pilot: Gżira (Malta) - Regeneration of a high traffic road in the Gżira locality

According to the findings in Work Package 4, Task 4.2, the pilot project is implemented in Gżira, a compact and heavily populated small town located in Malta. This town is characterized by narrow streets and a significant concentration of built-up spaces. The primary objective of this pilot project centres around the VARCITIES initiative, which is aimed at elevating air quality through the implementation of nature-based solutions while simultaneously revitalizing the urban landscape. The chosen intervention site is Rue D'Argens, a bustling road notorious for its heavy traffic flow and limited green areas. To enhance the overall environment of this location, the project will involve the creation of broader pavements, the establishment of community gardens, and the reintroduction of indigenous plants. These measures are envisioned to bring about a positive transformation in the area, promoting a healthier and more sustainable urban environment.

Stakeholder Challenges, Sensitivities, Needs, and Opportunities

The pilot's stakeholder mapping and analysis reveal several challenges and opportunities. Urban green space managers may face bureaucratic obstacles in implementing project interventions. Local businesses might have differing values and interests, making their engagement uncertain. Similarly, local transport companies and drivers may resist the changes to traffic patterns. Additionally, many stakeholders face time constraints, making it essential to accommodate their availability. However, early engagement with key businesses can create allies to support the initiative and counter potential pushback from other businesses.

Pilot-Specific Approaches to Strategic Actions

The pilot project employs specific approaches to achieve its overarching strategic actions. To address time constraints for stakeholders, events are organized efficiently, with alternative activities available for those unable to participate at specific dates and times. The project also emphasizes gaining early approval and engagement from key businesses, ensuring support from the economy sector against potential opposition. These strategic actions contribute to the successful implementation of the nature-based solutions in Rue D'Argens.

NBS for Urban Regeneration: Rue D'Argens

Rue D'Argens, a bustling road in Malta with heavy traffic and limited green spaces, is the focal point of the pilot project. The local council aims to enhance the area by implementing nature-based solutions, particularly focusing on improving air quality and reducing noise pollution. The planned actions include the installation of a natural playscape at St. Clare's primary school, transforming a bus stop into a green space, monitoring air quality, and creating "pop-up" parks to improve the overall environment.

Community Engagement and Visionary Solutions

The local council is committed to actively involving the community in the development process. They adopt co-design and transition management approaches to foster engagement, active citizenship, and participation in implementing the nature-based solutions. Workshops have been conducted with various stakeholders, including school children, teachers, parents, and local citizens, to gather ideas and opinions for the interventions. This participatory approach aims to promote a healthy lifestyle, physical activity, relaxation, and a sense of safety, while providing psychological benefits to the community.

Financing the Solutions

To finance the proposed initiatives, VARCITIES provides support through three visionary solutions. The local council is dedicated to engaging the community actively and ensuring that co-design and transition management approaches are utilized throughout the process. This commitment seeks to foster a sense of ownership and participation among the residents in implementing the nature-based solutions for Rue D'Argens.

Objectives for applied visionary solutions

Utilizing participatory approaches for the implementation of Nature-Based Solutions (NBS) and employing novel methods to measure air pollutants can achieve the following objectives in the Gżira locality of Malta:

1. Enhance the presence of green spaces in Gżira.

2. Minimize both air and noise pollution while improving the neighbourhood’s walkability, as well as the overall health and well-being of its residents.

3. Promote civic engagement, foster social responsibility, and raise awareness about environmental sustainability. This will involve residents in:

- Collaborative processes for creating NBS.
- Citizen-led scientific initiatives and public awareness campaigns that delve into the science behind urban health and well-being in densely populated areas.

4. Develop innovative sensors that can be constructed by community members.

5. Strengthen the community fabric, cultivate a sense of attachment to the area, and counteract the adverse effects of gentrification.

6. Encourage the reduction of car usage and encourage a cultural shift towards eco-friendly transportation options such as walking and cycling for short-distance trips.

7. Promote physical activity and a healthier lifestyle among the local population.

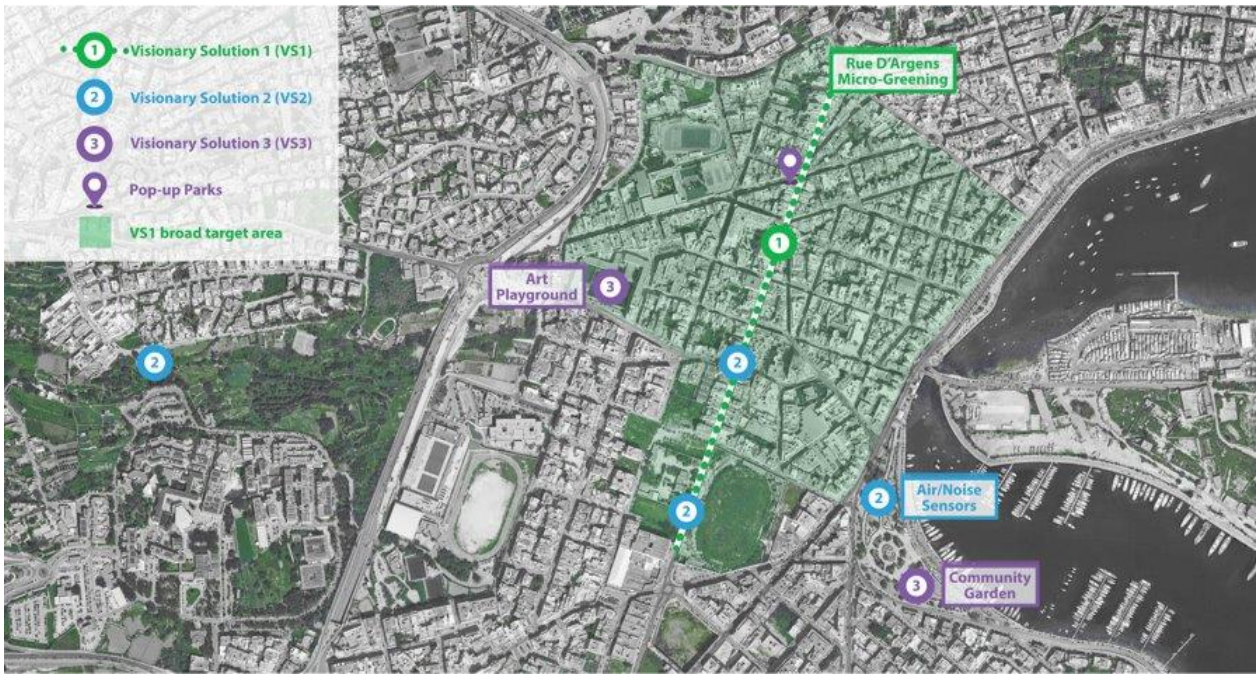

Figure 5 *the map of VARCITIES interventions designed by a team of "citizen engagement event".*

VS1- Rue D' Argens: Micro-greening Interventions through a Participatory Design Process

Figure 6 the location of VS1

The Visionary Solution (VS1) seeks to transform Rue D'Argens into a more environmentally friendly urban area by actively involving residents and businesses in the process of greening their properties and improving the overall streetscape. This participatory approach empowers residents to play a significant role in deciding on micro-greening interventions. These interventions involve enhancing the visual appeal of the area through various means, such as greening balconies, facades, and other external spaces of buildings. Furthermore, temporary community spaces through pop-up greening setups will be created.

VS1's primary objective is to revitalize Rue D'Argens by encouraging property owners and businesses to participate in the VARCITIES project, which focuses on implementing Nature-Based Solutions (NBS) for micro-greening. This involves distributing plant seeds to promote

greenery on balconies, facades, and interior spaces, emphasizing the health and well-being benefits of such practices. Additionally, initiatives may include transforming a bus stop area to increase vegetation, enhancing the streetscape's visual appeal, and attracting biodiversity. Another possibility is greening the roof of a bus stop on Rue D'Argens.

VS1's targeted areas for implementation encompass nature-based solutions, including interventions at both the building and public space scales, as well as ecological and habitat biodiversity enhancements. Additionally, the initiative embraces smart city and digital solutions, employing digital tools to engage citizens effectively.

Figure 7 present state of Rue D'Argens street based on the author observation.

Figure 8 Micro-greening through participatory plan design based on Malta University's proposal.

Pop-up greening setups

VS1 incorporates a modular and mobile green setup that actively engages citizens and local businesses, emphasizing the creation of pop-up parks within designated car zones to promote pedestrian use. These temporary spaces, besides providing seating and potential bike parking, also integrate green elements to encourage interactions between people and nature.

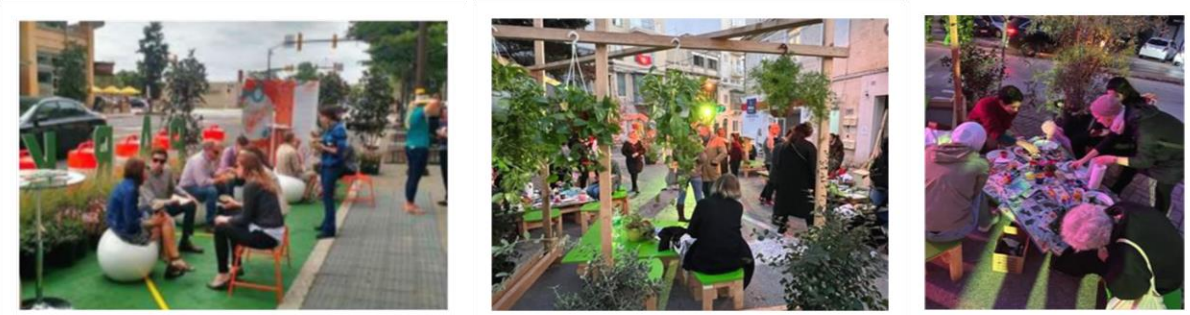

Figure 9 Pop-up Parks in Gżira, Malta

A pivotal aspect of VS1 involves hosting pop-up engagement activities aimed at gathering firsthand insights from the local community and space users. These activities serve to understand community needs and educate them about potential nature-based solutions for enhancing greenery, both inside and outside their properties. The data collected during these engagements will undergo analysis and be shared with the local municipality to explore avenues for further advancing these greening initiatives.

VS2 - Measurement of air quality and noise pollution with citizen science to increase H&WB awareness

Figure 10 the location of VS2

VS2 focuses on enhancing environmental awareness and democratizing knowledge among citizens to improve their health and well-being by increasing their understanding of local air quality. This initiative acknowledges that Malta's basin-type terrain and densely built urban areas, characterized by high-rise buildings, tend to redirect wind patterns and trap air pollutants within street canyons, leading to elevated air pollution levels. Malta's National Air Pollution Control Program-2019 contains the regulatory framework for assessing, monitoring, reporting on air

quality, and understanding air pollution's impact. In this context, VS2 aims to raise awareness of the benefits of green spaces by introducing more greenery into a specific pilot site.

Figure 11
- A modular and mobile green setup engaging citizens and local businesses
- Pop-up parks are created by taking over car designated zones for use by pedestrians.
- Apart from offering seating and possibly bike parking and other amenities, such spaces usually incorporate vegetation to encourage human-nature interaction.

To achieve this objective, a network of sensors will be strategically deployed at various locations, primarily within the Gżira area. These sensors will collect data from different geographical points to identify and quantify various air pollutants, as well as noise levels and air pollution levels in the vicinity. Specifically, monitoring stations will be established at Gżira Gardens, Rue D'Argens, and the University of Malta, serving as a reference point.

Involving citizens in the data collection process, handheld sensors (represented as light blue on the map) will be provided to individuals interested in participating in pollutant measurement activities. This citizen engagement introduces a civic dimension, empowering residents with the means to actively contribute to scientific data collection. Furthermore, the project will explore additional methods of engaging space users, such as barcode scanning via mobile device applications. This approach will provide users with valuable information related to pollution, Nature-Based Solutions (NBS) interventions, and their associated health and well-being benefits, in addition to granting access to the Health and Well-Being (H&WB) platform throughout the project's duration.

Figure 12 Sensors are to be installed at various locations, mostly within Gżira, to collect and compare data at different geographical points to identify the various pollutants Handheld sensors (indicated as light blue on the map) will be provided to citizens who will be interested in participating in the data collection of pollutant measurements.

VS3 - Urban Biodiversity, Education, and Engagement, through a Co-Created Community Garden Project

Figure 13 the location of VS3

The VARCITIES Project has chosen to focus on the Gżira Primary School, a public institution with one of the few open public spaces in the locality. This decision was made as it proved to be more feasible compared to engaging with private landowners, which posed complications. The implementation of Nature-Based Solutions (NBS) in this pilot site serves a dual purpose. Firstly, it provides the local citizens with a greener and more accessible space. Secondly, it offers an opportunity to educate school children about the advantages of such green solutions.

The garden project at the school is intended to be open to the public during non-school hours, addressing the dearth of recreational spaces in the central areas of the locality. The NBS interventions and citizen engagement activities will be rolled out at both the St. Clare Primary School and Gżira Gardens, aiming to infuse a greener perspective into our educational institutions and cultural context. Special attention will be given to the selection of plants that attract birdlife, bringing nature closer to urban environments and fostering ecological awareness among younger generations.

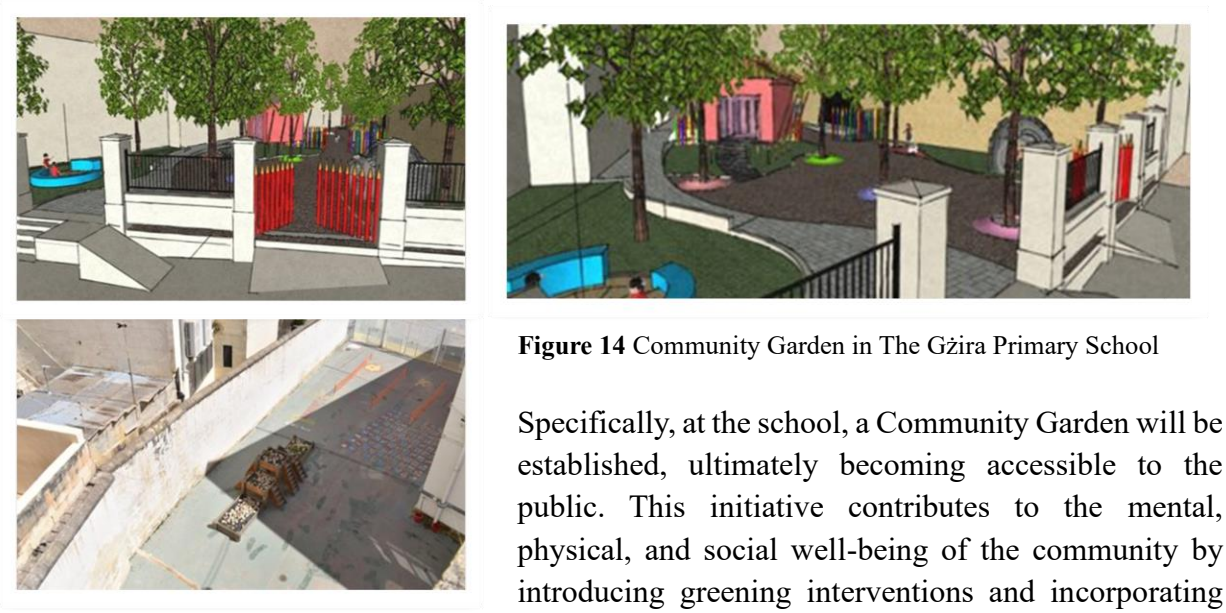

Figure 14 Community Garden in The Gżira Primary School

Specifically, at the school, a Community Garden will be established, ultimately becoming accessible to the public. This initiative contributes to the mental, physical, and social well-being of the community by introducing greening interventions and incorporating the concept of urban gamification into a playscape. The redevelopment of Gżira Gardens will involve outdoor workshops that engage citizens in exploring potential NBS solutions. These ideas will be considered in collaboration with the Gżira municipality and developers to promote a co-creative approach to local planning and development. Complementing these efforts, pop-up engagement events will be held around Gżira.

The VS3 aims to provide a social engagement activity in a green public space earmarked for renovation in Gżira. Additionally, it targets increased biodiversity and environmental education for both school children and the local community, with the goal of improving the health and well-

being of both children and adults through the development of an ecological playscape and community garden. Furthermore, a series of pop-up engagements will be utilized throughout Gżira to create awareness regarding the benefits of Nature-Based Solutions. These initiatives collectively aim to create a green public space in a densely built urban environment.

4.2 Empowering Voices: The Real Impact of Citizen Engagement Activities

The Gżira initiative

To engage personally with the local community and evaluate their opinions on the novel Nature-Based Solutions being introduced in the pilot area, the author and the Eurac team made a significant field trip in September 2023 with three objectives: 1- assist the Gżira Pilot team in promoting VARCITIES at the Science in the City Malta Festival; 2- extend invitations to local stakeholders for upcoming Social Return on Investment (SROI) workshops; and 3- gather feedback about Rue d'Argens in the Gżira neighbourhood, where VARCITIES is facilitating the development of three projects. Additionally, employing Citizen Engagement and Stated Preference Method, both User Experience Research Methods, to evaluate the social and environmental value of such innovative interventions represents a pioneering approach in urban settings. This strategy aims to further integrate the value of nature into economic and decision-making processes, marking a significant shift towards recognizing and leveraging natural assets within urban development and planning.

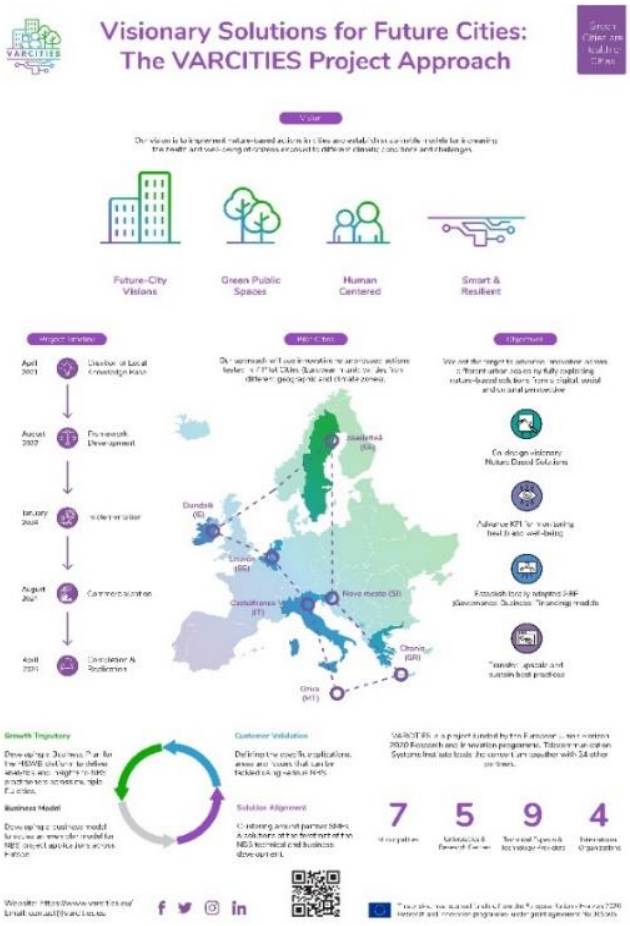

Figure 15 the material for generally introducing VARCITIES project including the main aims of pilots based on VARCITIES team elaboration.

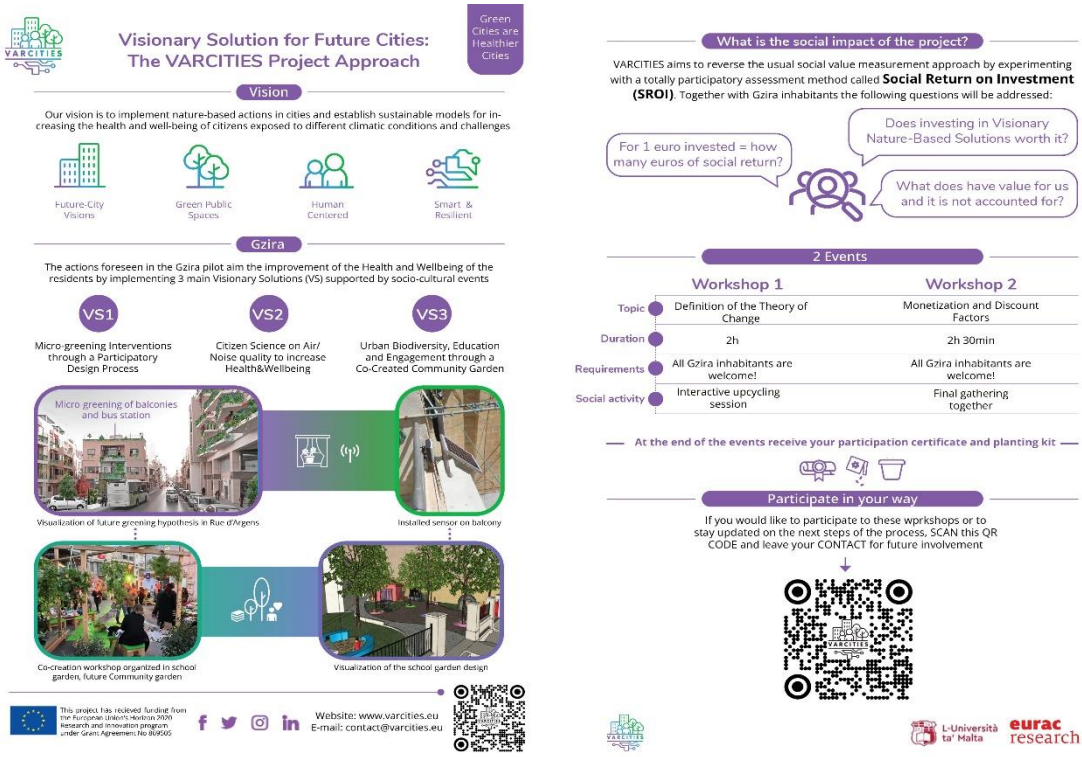

Figure 16 Invitation for citizen engagement in SROI activity workshops in which goals and VSs are briefly explained, and finally there is a QR code to get contact information from STKs.

4.2.1 Objective and Result for Community Engagement activity

The primary goal of this study was to promote innovative strategies planned for the pilot stage of the VARCITIES initiative. It also aimed to familiarize local inhabitants, seen as potential stakeholders, with forward-looking perspectives. The research concentrated on assessing the SROI, requiring the collection of essential data from those interested in attending the workshops. This information was crucial for developing a change theory and tracking the SROI evaluation. Facing challenges in obtaining comprehensive data for the study, the opportunity to use the VARCITIES team's attendance at the Science in The City Festival in Gżira became apparent. This platform offered a unique chance to directly observe the innovative solution sites and interact with the community. The goal was to clarify the project's objectives to the festivalgoers and prompt them to fill out a survey assessing their interests and willingness to engage.

Figure 17 local STKs involvement in validating possible outcomes from VSs.

4.2.2 Enhanced Engagement and Positive Results in VARCITIES Festival Outreach

The author's role in engaging the public during the festival chiefly involved promoting the VARCITIES project and its objectives. The Eurac team was hands-on with festival goers, detailing the project's innovative solutions and advocating for their involvement. They also introduced the concept of becoming a citizen scientist within the pilot project, which served to deepen participant engagement with the scientific activities of the Science in the City Festival.

The results from these citizen engagement activities were exceedingly positive. Throughout the three-day event, the author successfully interacted with and received feedback from over 50 individuals. This engagement surpassed expectations, reflecting significant public interest in the VARCITIES project and validating the effort. Consequently, this success has been greatly encouraging for proceeding to the next phase of organizing the workshop within this pilot for the SROI analysis.

Chapter 5: Maximizing Impact: Scope, Map & Value Outcomes in SROI

5.1 Justify the importance of SROI preliminary steps

To embark on SROI analysis, the structured methodology outlined in "Maximizing Impact: Scope, Map & Value Outcomes in SROI" is indispensable. The first crucial step, establishing the scope and identifying stakeholders, ensures a focused and inclusive approach. As noted by (“Standards and Guidance,” n.d.) , defining the SROI's boundaries and recognizing affected parties guarantees that all relevant voices are integrated into the analysis, enhancing its relevance and accuracy.

Subsequent to scoping, mapping outcomes is imperative. This involves constructing a theory of change, a strategic process highlighted by (“Creating change using a Theory of Change tool,” n.d.) as vital for delineating the sequence from activities to outcomes. Such mapping not only fosters clarity and transparency but also ensures stakeholders can visualize the direct impact of their contributions.

Moreover, evidencing outcomes and attributing value, as advocated by (“A Guide to Social Return on Investment 2012,” n.d.) transitions theoretical impacts into quantifiable financial terms. This concretization of social value is essential for validating the initiative's effectiveness and for communicating its value to current and prospective stakeholders.

Therefore, these structured steps in conducting an SROI analysis are critical for ensuring that the assessment is not only comprehensive and transparent but also effective in communicating the significant social value generated. By following this methodical approach, organizations can provide a compelling narrative of their impact, facilitating better understanding, support, and engagement from stakeholders.

5.2 Establishing scope and identifying stakeholders

The Workshop was a meticulously organized meeting held in Gżira, Malta, on March 15, 2024. This session was part of a collaborative initiative directed by Eurac Research, involving stakeholders from the University of Malta. The primary focus was on the VARCITIES project, a forward-looking endeavour that aims to integrate Nature Based Solutions (NBS) into urban environments to enhance community well-being and environmental sustainability.

Figure 17 workshop with Stakeholders in Gżira

The meeting commenced with introductions, bringing together a diverse group of participants. Among the attendees were seven students enrolled in a Biological Sciences course at the University of Malta, indicating a strong academic interest in the project's environmental themes. Additionally, a local resident participated, representing the community's perspective, and underscoring the project's inclusive approach to stakeholder engagement.

Following introductions, the facilitator provided an extensive overview of the VARCITIES project. This included detailed explanations of three visionary solutions proposed by the project, each at varying stages of completion. These solutions are central to the project's goal of creating sustainable and resilient urban spaces through the implementation of NBS.

The discussion also covered the concept of Social Return on Investment (SROI). This analytical tool is pivotal for quantifying the social and environmental value generated by an intervention like NBS. The facilitator emphasized how SROI can inform policymakers about the perceived value that individuals and communities place on various outcomes derived from implementing NBS. This is particularly important for justifying investment in such projects and shaping policy decisions that reflect the priorities and values of the community.

In explaining the co-creation approach, the facilitator stressed its importance in the VARCITIES project. This method involves collaborative efforts between researchers, local communities, policymakers, and other stakeholders. It is designed to ensure that the solutions developed are not only scientifically sound but also align with the needs and preferences of the local population. This approach is fundamental to enhancing the project’s legitimacy and effectiveness, promoting stakeholder buy-in, and ensuring the sustainability of the outcomes.

Figure 18 workshop with Stakeholders in Gżira

Overall, the workshop served as a foundational step in aligning the project's objectives with stakeholder expectations and establishing a clear scope for future activities. By identifying key stakeholders and discussing strategic approaches such as SROI and co-creation, the session laid the groundwork for a participatory and informed project development process. This approach promises to foster a deeper understanding and appreciation of NBS, ultimately contributing to more sustainable urban environments.

5.3 Theory of Change for Gżira

The Theory of Change (ToC) is a comprehensive methodology used to plan, implement, and evaluate projects to foster social change (Reinholz and Andrews, 2020). Specifically, for Gżira, the ToC addresses the transformation into a sustainable, healthier, and more community-focused urban area. This detailed ToC builds on the initial framework by expanding on the contextual background, identifying strategic interventions, and elaborating on monitoring and evaluation mechanisms.

Gżira, a densely populated urban area, faces significant environmental and social challenges primarily due to its urbanization and demographic density. The city struggles with issues such as traffic congestion, high levels of air and noise pollution, limited green spaces, and consequent social and health-related problems. These challenges hinder the quality of life and sustainable development, necessitating a transformative approach encapsulated in this Theory of Change.

Vision and Long-term Goals

The vision for Gżira is a transformation into a green, vibrant, and inclusive urban environment where sustainable development and community well-being are at the forefront. The specific long-term goals include:

Environmental Sustainability: Enhance air quality, increase green spaces, and promote biodiversity.

Social Cohesion: Improve community engagement, enhance public health, and foster a sense of belonging.

Economic Viability: Encourage sustainable local businesses and improve overall economic stability through environmental and social improvements.

Detailed Strategic Interventions

Nature-Based Solutions (NBS)

Rationale and Benefits: It offers a sustainable approach to addressing environmental challenges while enhancing urban biodiversity and the aesthetic value of the city. Implementing green roofs, vertical gardens, and expanding parks and river pathways are crucial initiatives. These efforts not only absorb CO2 and other pollutants but also provide recreational spaces for residents, thus improving both physical and mental health.

Specific Interventions:

- Green Corridors: Develop green corridors along major urban streets to reduce heat island effects, improve air quality, and provide safe pedestrian pathways.
- Community Gardens: Establish community gardens to encourage local food production, provide educational opportunities, and enhance community interaction.

Community Engagement and Empowerment

Rationale and Benefits: Active community involvement is vital for the success of urban transformation projects. Engaging residents in the planning and implementation process ensures

that interventions are well-received and sustained over time. It also empowers residents, giving them a stake in their environment.

Specific Interventions:

- Workshops and Town Halls: Regular community workshops and town hall meetings to gather input, disseminate information, and foster a collaborative spirit.
- Educational Programs: Launch environmental education programs in schools to raise awareness and cultivate a sense of responsibility towards local and global environmental challenges.

Technological Innovations

Rationale and Benefits: Technology plays a critical role in modern urban management, from monitoring environmental variables to enhancing the efficiency of services. Implementing smart city solutions can help manage resources better, reduce costs, and improve service delivery.

Specific Interventions:

- Air Quality Monitoring: Install a network of air quality sensors throughout the city to provide real-time data and aid in decision-making processes.

5.3.1 Inputs

Resources Required:

The VARCITIES project, a European initiative aimed at promoting sustainable and healthy living in urban environments, has extended its support to this local endeavour through targeted funding. This financial backing from VARCITIES underscores the project's commitment to fostering vibrant and green cityscapes. The collaborative effort encompasses a diverse array of stakeholders, including the local council, a school, a landscape architect, and active citizen participation. This multi-faceted partnership ensures that the project benefits from a wide range of expertise and perspectives, ultimately enhancing the overall quality and effectiveness of the initiatives undertaken. Each partner plays a crucial role, from the council's governance and logistical support to the school's educational integration, the landscape architect's design vision, and the citizens' community engagement.

The project activities are both comprehensive and varied, designed to create immediate and lasting impacts on the local environment and community well-being. Workshops serve as a platform for education and idea exchange, fostering a sense of ownership and involvement among participants. The installation of a canopy and trees aims to enhance green spaces, providing shade and improving air quality, while pop-up parks offer temporary but significant urban retreats. Furthermore, sensors are strategically placed to measure air quality data, contributing to an ongoing assessment of environmental health. This data is crucial for informed decision-making and future planning. The project's visibility and community engagement are further bolstered through exhibitions, town hall events, and a variety of cultural activities, all of which aim to celebrate and promote sustainable urban living. These activities not only raise awareness but also encourage widespread community participation and support, making the project a cornerstone for local environmental and social enhancement.

5.3.2 Activities

Planned Actions:

Planned actions include conducting thorough environmental impact assessments to gauge the potential ecological consequences of proposed projects. This process involves systematically evaluating the environmental effects of planned actions, considering factors such as air and water quality, wildlife habitats, and community health. By identifying and mitigating adverse impacts, these assessments ensure that development activities are sustainable and environmentally responsible. Moreover, this step often involves collaboration with environmental experts and stakeholders to gather comprehensive data and insights, fostering transparency and informed decision-making.

In parallel, the design and construction of green infrastructure will be prioritized to enhance sustainability. Green infrastructure encompasses a variety of practices and structures, such as green roofs, rain gardens, and permeable pavements, which integrate natural systems into urban environments. These designs aim to manage stormwater, reduce urban heat islands, and improve air quality, all while promoting biodiversity. Furthermore, launching community engagement initiatives is essential to cultivate public awareness and participation. Engaging local communities through workshops, consultations, and educational programs fosters a sense of ownership and responsibility towards environmental stewardship. Finally, installing and calibrating advanced technological systems ensures the efficient operation and monitoring of these initiatives, leveraging innovations such as smart sensors and data analytics to optimize performance and address issues proactively.

5.3.3 Outputs

Tangible products:

- **Natural playscape:** A natural playscape refers to playgrounds or recreational areas designed using natural elements such as plants, trees, rocks, and water features. Unlike conventional playgrounds with plastic or metal structures, natural playscapes provide an environment that stimulates children's creativity and encourages imaginative play. These spaces not only offer physical challenges and sensory experiences but also foster a deeper connection with nature. By integrating elements of the natural world into play areas, children learn about the environment, enhance their cognitive and emotional development, and engage in healthier, more active lifestyles.
- **Green bus stop:** Green bus stops are innovative urban fixtures designed to provide multiple benefits to commuters and the urban environment. These bus stops incorporate vegetation, such as green roofs, vertical gardens, or surrounding planted areas, to offer shade and cooling effects, thus mitigating the urban heat island effect. The aesthetic value of green bus stops improves the visual appeal of urban spaces, making them more pleasant and welcoming. Additionally, these structures can contribute to better air quality and biodiversity in the city, creating micro-habitats for various species while promoting sustainable urban design.
- **Pop-up parks:** Pop-up parks are temporary green spaces that can be quickly set up in urban areas to provide recreational and relaxation opportunities. These parks are often created in underutilized or vacant lots, transforming them into vibrant community spaces.

Pop-up parks are versatile and can be adapted to various locations and community needs, offering a respite from the concrete jungle. They foster social interactions, promote physical activity, and enhance the mental well-being of residents. By bringing nature into the heart of cities, pop-up parks also raise awareness about the importance of green spaces in urban planning.

- **Air quality sensors:** Air quality sensors are devices that measure and monitor the levels of pollutants in the air, providing real-time data on environmental conditions. These sensors can be installed in various locations across a city, creating a network that continuously collects data on air quality. The information gathered by these sensors is often displayed on an online dashboard accessible to the public, policymakers, and researchers. This transparency allows for informed decision-making and raises awareness about air pollution's impact on health and the environment. By making air quality data readily available, communities can advocate for cleaner air and implement strategies to reduce pollution.
- **Increased awareness and knowledge:** One of the significant outcomes of implementing these tangible products is the heightened awareness and knowledge among stakeholders and citizens regarding environmental issues and sustainable practices. Educational initiatives, public outreach, and the visible presence of green infrastructure encourage people to learn about and engage with ecological concerns. This increased awareness fosters a culture of sustainability, prompting individuals and organizations to adopt eco-friendly behaviours and support policies that prioritize environmental health.
- **Increased participation and collaboration:** The development and implementation of these projects require collaboration among various actors, including government agencies, private businesses, non-profit organizations, and community groups. This collaborative approach ensures that diverse perspectives and expertise are incorporated into the planning and execution of green initiatives. Increased participation and collaboration lead to more innovative solutions, shared resources, and a stronger sense of community ownership. When different sectors work together towards common goals, the effectiveness and reach of environmental projects are significantly enhanced.
- **Enhanced social capital and trust:** The creation of green spaces and the integration of environmental projects contribute to building social capital and trust within the community. These initiatives provide opportunities for people to come together, share experiences, and work towards a common purpose. By fostering social interactions and collective action, communities can strengthen their social networks and create a sense of belonging. Enhanced social capital and trust are crucial for the long-term success and sustainability of community-driven projects, as they promote resilience and adaptability in the face of challenges.

5.3.4 Outcomes

Short-term outcomes: The introduction of green spaces and environmental initiatives can lead to significant immediate benefits. These include an increase in green cover, which helps to reduce both air and noise pollution, creating a more pleasant and healthier urban environment. Enhanced thermal comfort is achieved through natural cooling provided by vegetation, while the aesthetic appeal of urban areas is improved, fostering a sense of beauty and pride among residents.

Additionally, these initiatives elevate awareness and knowledge about environmental issues, encouraging more sustainable practices. They also contribute to heightened satisfaction and well-being, as people feel more connected to nature and their community. This engagement often translates to increased participation in local activities and projects, further strengthening community bonds.

Long-term outcomes: The cumulative effects of these efforts lead to profound and lasting impacts. Improved health outcomes are observed as cleaner air and a more engaging environment reduce the incidence of respiratory and stress-related illnesses. Quality of life is significantly enhanced, with greener, more attractive urban spaces promoting social cohesion and a sense of belonging. Efforts to increase green cover and reduce pollution also contribute to lower greenhouse gas emissions, playing a crucial role in mitigating climate change. These green initiatives bolster urban resilience and adaptation to climate change by providing natural barriers and cooling effects. Furthermore, the focus on sustainability and green innovation drives urban regeneration, fostering economic growth and spurring further innovative solutions for urban living. Overall, these initiatives not only create immediate improvements but also lay the foundation for a sustainable, healthy, and cohesive urban future.

5.3.5 Impact

Transformative changes:

- **Improved health and well-being of Gżira's population:** Enhancing the health and well-being of Gżira's population entails a multifaceted approach aimed at promoting both physical and mental health. This includes the development of accessible healthcare facilities, the promotion of healthy lifestyles through community programs, and ensuring clean, safe public spaces that encourage outdoor activities. Additionally, mental health support services and educational campaigns can help reduce stigma and improve overall mental well-being. By prioritizing health and wellness, Gżira can foster a more productive and happier community.
- **Improved resilience and sustainability of Gżira's urban environment:** To bolster the resilience and sustainability of Gżira's urban environment, it is crucial to implement strategies that address both immediate and long-term environmental challenges. This involves the adoption of green infrastructure, such as parks and green roofs, which can mitigate urban heat islands and improve air quality. Sustainable urban planning, incorporating energy-efficient buildings and renewable energy sources, will reduce the city's carbon footprint. Furthermore, enhancing resilience involves preparing for climate change impacts through flood defences and emergency preparedness plans, ensuring that the urban environment can withstand and adapt to future challenges.
- **Improved social cohesion and inclusion of Gżira's diverse community:** Fostering social cohesion and inclusion within Gżira's diverse community requires initiatives that bridge gaps between different social, ethnic, and economic groups. Community-building activities, cultural events, and inclusive public spaces can encourage interaction and understanding among residents. Support for marginalized groups through social services, language programs, and equitable access to opportunities is essential for creating a

harmonious community. By celebrating diversity and promoting inclusivity, Gżira can build a stronger, more united community where everyone feels valued and integrated.

- **Improved innovation and competitiveness of Gżira's economy:** To enhance the innovation and competitiveness of Gżira's economy, it is vital to cultivate a dynamic business environment that supports entrepreneurship and attracts investment. This can be achieved by providing incentives for startups, fostering partnerships between businesses and educational institutions, and ensuring access to cutting-edge technology and infrastructure. Workforce development programs that focus on skills training and continuous education will prepare residents for high-demand jobs, driving economic growth. By embracing innovation and fostering a competitive economic landscape, Gżira can position itself as a leading hub of economic activity and technological advancement.
- **Improved governance and democracy of Gżira's local council:** Strengthening the governance and democratic processes of Gżira's local council involves promoting transparency, accountability, and public participation in decision-making. This can be achieved by implementing e-governance tools that facilitate communication between the council and residents, ensuring that community members have a voice in local affairs. Regular public consultations, participatory budgeting, and the establishment of advisory committees can enhance democratic engagement. By fostering a culture of openness and inclusivity in governance, Gżira's local council can better represent and serve the needs of its residents, leading to more effective and responsive leadership.

5.3.6 Assumptions and External Factors

Considerations:

Ensuring the sustained success and evolution of initiatives aimed at addressing environmental challenges hinges on a multifaceted approach that encompasses continued political and financial support, ongoing community interest and participation, and the dynamic interplay of global environmental conditions and technological advancements. Persistent political and financial backing is crucial, as it provides the necessary resources and policy framework that enable long-term projects to thrive. Equally important is the active involvement and enthusiasm of local communities, whose engagement and contributions can drive grassroots momentum and foster a sense of collective ownership. Meanwhile, the ever-changing global environmental landscape necessitates a vigilant adaptation to new challenges and opportunities, further catalysed by cutting-edge technological innovations that can offer novel solutions and improve efficiency. By harmonizing these elements, a robust and resilient framework can be constructed, ensuring that environmental initiatives are not only sustainable but also capable of evolving in response to future demands.

5.3.7 Monitoring and Evaluation

Framework:

Establishing baseline data on environmental and social indicators is essential for understanding the initial conditions and context before implementing any interventions. This foundational step provides a reference point against which all subsequent progress can be measured. Regular assessment of the progress of these interventions against pre-determined benchmarks allows for

a systematic and objective evaluation of their effectiveness. This ongoing monitoring ensures that any deviations from expected outcomes are promptly identified. Furthermore, adapting strategies based on continuous feedback and evolving circumstances is crucial for maintaining relevance and efficacy in the face of dynamic environmental and social landscapes. This adaptive management approach enables the timely refinement of interventions, ensuring they remain responsive to real-world conditions and stakeholder needs, ultimately leading to more sustainable and impactful outcomes.

ToC summary

This expanded Theory of Change for Gżira provides a strategic roadmap for transforming the city into a model of sustainable urban living. By detailing each component of the change process, from vision to impact, this document serves as a foundational guide for policymakers, community leaders, and stakeholders involved in Gżira's development. The success of this transformative approach depends on the collaborative efforts of all parties, underscored by a commitment to continuous evaluation and adaptation.

5.4 Mapping outcomes

This significant activity synthesizes extensive collaborative efforts between VARCITIES project partners and the University of Malta, cantered around the Gżira pilot. It reflects on structured meetings that harnessed direct insights from pilot leaders to assess and refine the impact of proposed VS. This report focuses on the potential outcomes and their implications for SROI evaluations, targeting two main stakeholder groups: Rue d'Argens space users and the School Community, which includes children and educators.

Methodology for Comprehensive Outcomes Report

The methodology for evaluating the outcomes of the visionary solutions entailed a multi-faceted approach:

Stakeholder Engagement: Initial consultations with Rue d'Argens users and the School Community to identify needs and expectations.

Pilot Meetings: Three key meetings were conducted with pilot leaders to discuss and refine the proposed VS based on real-world feedback and pilot experiences.

Outcome Mapping: Each VS was mapped against potential outcomes to predict their impact and feasibility.

SROI Analysis Preparation: The outcomes were then aligned with SROI metrics to quantify both tangible and intangible benefits.

The outcomes for each VS were extensively discussed, with a focus on those with the highest likelihood of positive impact.

5.4.1 Detailed Outcome Analysis

Stakeholder Group 1: Rue d'Argens Space Users

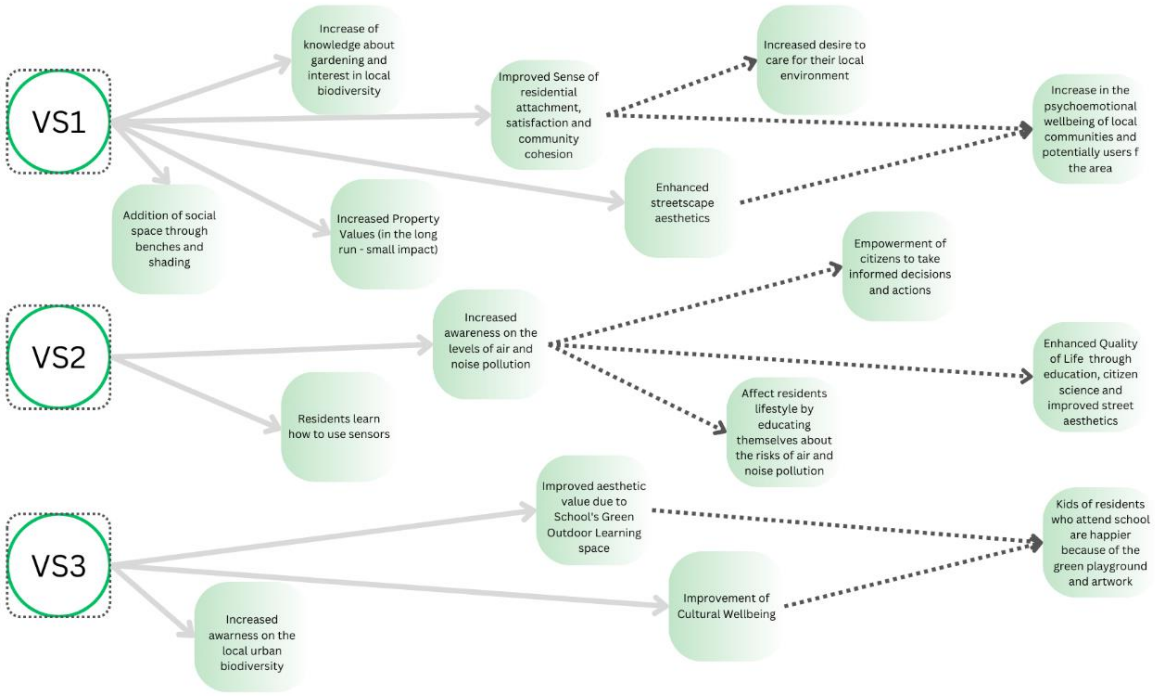

Figure 19 The initial interpreted outcomes before stakeholder's engagement for local users of Rue d'Argens neighbour, elaborated by the Author.

VS1: Micro-greening Interventions through Participatory Design and Bus Stop Greening

Community Cohesion and Urban Aesthetics: This VS empowers residents to take an active role in urban greening, enhancing the communal sense of ownership over public spaces and resulting in a more aesthetically pleasing urban environment. The community's direct involvement is expected to foster a strong sense of local identity and pride, essential for sustainable urban development.

Wellbeing and Socioeconomic Impact: Greened bus stops, and participatory design processes improve residents' daily life quality by providing restful green spaces. These enhancements are likely to stimulate local businesses and elevate property values, showcasing a model for integrating nature into urban planning.

VS2: Citizen Science on Air/Noise Quality

Data-Driven Community Action: Engaging the community in gathering and analysing environmental data empowers them to advocate for necessary changes in local policies. This empowerment is critical for developing targeted interventions that address specific environmental issues identified by the data.

Health Improvements and Policy Influence: Enhanced awareness and understanding of air and noise pollution can lead to healthier lifestyle choices and influence public health policies. By equipping residents with data and knowledge, this VS fosters a proactive approach to health and environmental advocacy.

VS3: Urban Biodiversity, Education, and Engagement through Community Gardens and Art Playgrounds

Biodiversity Conservation and Cultural Enrichment: This VS transforms underutilized spaces into rich biodiversity hubs, coupled with art installations that serve as cultural attractors. These spaces are designed to provide educational platforms and enhance local biodiversity, which in turn supports ecological stability and cultural vibrancy.

Community Learning and Interaction: The creation of community gardens and art playgrounds offers continuous opportunities for learning and social interaction, strengthening community bonds and promoting environmental and cultural education.

Stakeholder Group 2: School Community

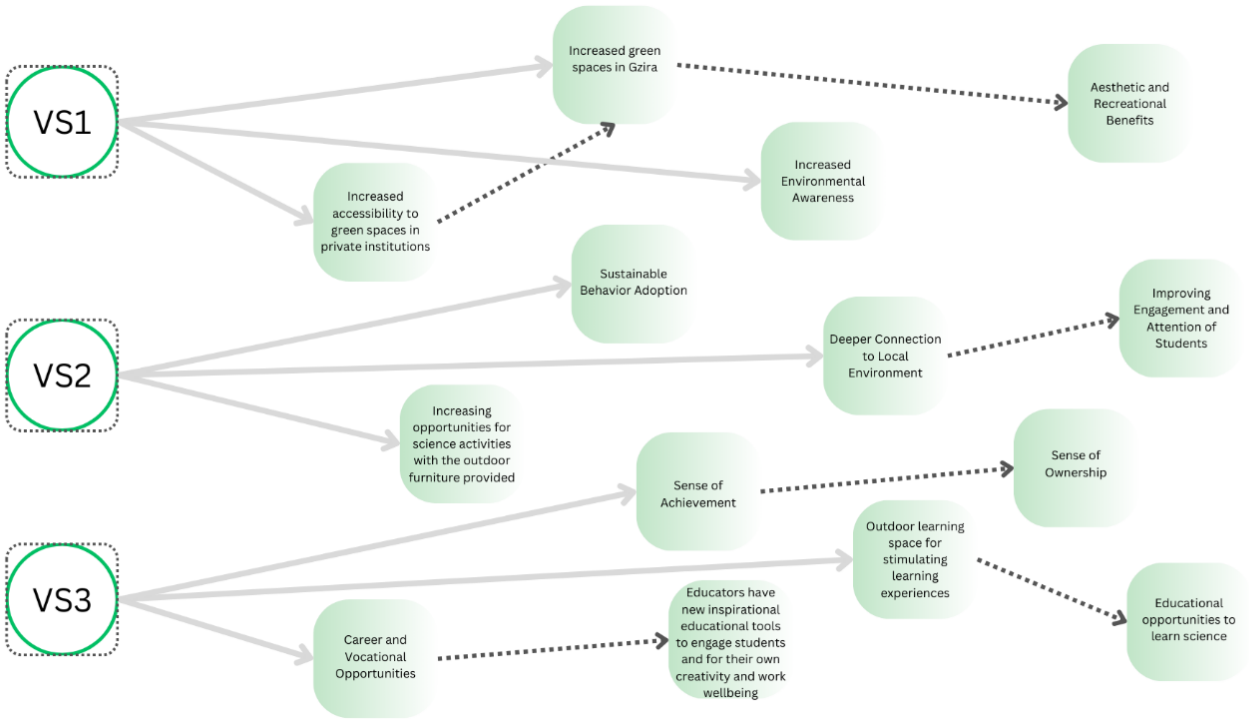

Figure 20 The initial interpreted outcomes before stakeholder's engagement for local users of Rue d'Argens neighbour, elaborated by the Author.

VS1: Enhanced Accessibility to Green Spaces

Educational and Health Benefits: Incorporating green spaces into school environments enhances the educational experience by providing practical learning opportunities in nature, which also contribute to the physical and mental health of students.

Institutional Pride and Community Example: Schools become exemplars of sustainable practices within the community, promoting environmental stewardship among students and staff, and extending these values into the community.

VS2: Citizen Science for Educational Engagement

Enhanced STEM Education and Engagement: Integrating environmental monitoring tools into the curriculum deepens students' understanding of scientific concepts through hands-on activities. This engagement fosters a deeper connection to their environment and a solid foundation in STEM (Science, Technology, Engineering, and Mathematics) disciplines, crucial for future academic and professional success.

VS3: Outdoor Learning for Vocational Growth

Vocational Skills Development and Academic Enrichment: Outdoor learning environments provide unique opportunities for students to explore vocational interests in environmental science and other related fields. These spaces foster practical skills and theoretical knowledge, enhancing students' academic and career prospects.

Takeaways

The VARCITIES project's visionary solutions for Gżira are strategically designed to yield significant social, educational, and environmental benefits. By aligning these outcomes with SROI metrics, the project not only underscores the tangible impacts of urban innovations but also highlights the importance of community-centric approaches in urban development. The outcome mapping results are crucial as they guide the selection of outcomes that will be validated in the subsequent phases of the SROI approach, aiming to reach and quantify the project's goals effectively. This comprehensive outcome analysis provides a robust framework for evaluating the long-term benefits of the implemented visionary solutions, ensuring that the initiatives deliver enduring value to the Gżira community.

5.5 Evaluating Urban Development Initiatives through Stakeholder Engagement and SROI Metrics

In the Social Return on Investment (SROI) workshop previously referred to, the primary focus was on identifying and exploring the values associated with defined outcomes. Due to the unique circumstances of the case study, which did not align perfectly with ideal conditions, the author collaborated with pilot experts to meticulously select the most pertinent outcomes. These outcomes were chosen based on their high likelihood of benefiting the three visionary solutions that were targeted toward the first category of stakeholder groups, considering the technical difficulties encountered during that stage of the project. This questionnaire is designed to utilize

the preference method as the monetization technique for calculating SROI, which is recognized as both an innovative and precise approach.

Aims of the Questionnaire

The questionnaire focuses on three visionary solutions (VS) designed to enhance urban environments in Gżira through micro-greening, citizen science, and biodiversity education. The primary objectives were to understand the public's perception of potential outcomes, their monetary valuation of these outcomes, and the influence of other external factors on the project's perceived value.

Objective Evaluation of Visionary Solutions

The primary goal of this section is to collect and analyse empirical data that mirrors the public's opinions and expectations concerning new urban development plans. This comprehensive survey will be designed to measure various aspects such as perceived benefits, potential disruptions, and overall support for the initiatives. By analysing responses, urban planners and project leaders can better understand whether these proposals are in sync with community aspirations and cultural values. Additionally, this evaluation will help in modifying or reinforcing project strategies based on public feedback, ensuring that the initiatives not only meet technical and environmental standards but also gain social approval.

Economic Valuation of Outcomes

This section focuses on quantifying the economic impact of the urban development projects as perceived by the residents. It involves assessing how much value the community assigns to the expected advantages of the initiatives, such as improved infrastructure, enhanced green spaces, or increased accessibility. This economic valuation is crucial for determining the willingness of the community to financially support these projects, either through taxes, bonds, or other funding mechanisms. Insights gained from this analysis are vital for the strategic budgeting and allocation of resources, making sure that the projects are not only economically viable but also economically beneficial to the community.

Attribution Analysis

The aim here is to dissect and understand the influence of other simultaneous initiatives on the perception and effectiveness of the proposed urban development projects. By incorporating questions that explore the impact of these concurrent projects, the questionnaire will help isolate the specific contributions of the proposed initiatives to the overall urban landscape. This analysis ensures that any positive or negative feedback can be accurately attributed, preventing misinterpretation of data that could lead to skewed decision-making. This rigorous approach aids in clarifying the true impact of the initiatives, accounting for external factors that could otherwise cloud the assessment of their value and effectiveness.

Procedure of the Questionnaire

The questionnaire is meticulously crafted to extract targeted responses that are amenable to both quantitative and qualitative analysis, enhancing the reliability and depth of insights gathered:

Rating Scales

This component involves numerical rating questions where residents evaluate the likelihood of each anticipated outcome from the urban development initiatives on a scale of 1 to 5. A rating of '1' signifies 'very unlikely to happen', while a '5' indicates 'very likely to happen'. This approach not only quantifies residents' optimism and expectations but also provides a standardized way to measure the perceived feasibility and potential impact of the proposed changes. These scales facilitate statistical analysis, allowing planners to easily identify trends and consensus among community responses.

Open-Ended Questions

To complement the quantitative data from the rating scales, open-ended questions are included to capture nuanced opinions and detailed feedback. Respondents can elaborate on their ratings by discussing potential concerns, unforeseen advantages, or specific aspects of the initiatives that resonate with them. This qualitative input is vital for understanding the reasons behind the numerical ratings and for gaining a richer, more contextual understanding of public sentiment towards the urban development proposals.

Financial Proxies

These questions are designed to determine the economic valuation of the proposed outcomes by asking residents to specify the maximum amount they would be willing to pay each month for the realization of the improvements. This direct financial metric serves as a proxy for assessing the tangible value that the community places on the benefits of the projects. Analysing these responses aids in projecting potential funding support and the economic sustainability of the initiatives from a community investment perspective. It is essential to clarify that the "Willingness to Pay" (WTP) reflects the community's perceived value of the initiatives rather than a direct financial contribution. Typically, the local community does not provide direct funding; instead, financial support is secured from the municipality or other institutions, such as the EU Commission. Thus, while WTP indicates the community's perceived benefits and support, the actual economic sustainability of the initiatives is reliant on external funding sources.

Attribution Questions

This section of the questionnaire aims to isolate the effects of the proposed urban development projects from other ongoing initiatives. By asking specific questions about the impact of other projects, the survey ensures that the unique contributions of the new initiatives are clearly understood. These attribution questions help in refining the analysis by filtering out external influences, allowing for a more accurate assessment of the direct benefits and challenges posed by the proposed urban development efforts.

Through this structured design, the questionnaire ensures a comprehensive evaluation of public perception, economic valuation, and the specific impacts of urban development initiatives, facilitating informed decision-making and effective resource allocation.

5.6 Feedback Analysis from VARCITIES Workshop on SROI Questionnaires

As detailed in the SROI workshop outlined in APPENDIX I, feedback from participants yielded both enlightening perspectives and significant challenges. This feedback is crucial as it exposes the hidden angles and real-time sentiments of the participants concerning the VARCITIES initiatives in Gżira.

Positive Feedback

Participants were notably supportive of the VARCITIES project, valuing the opportunity to engage actively through feedback mechanisms. The format of the questionnaire was well-received, allowing participants to choose between independent completion and guided assistance, which facilitated a smoother feedback process. This flexibility contributed to a deeper discussion about local issues and Nature-Based Solutions (NBS), enriching the dialogue around urban improvement and community engagement.

- **Support for Educational and Greening Initiatives:** There was a strong endorsement of initiatives that combine education with environmental conservation, such as greening schools and the co-created community garden project. These initiatives were seen as effective in fostering a sense of community and environmental responsibility. Ideas for more hands-on educational activities, like planting and outdoor learning, were suggested to enhance the practical impact of these initiatives.
- **Appreciation for Open Dialogue:** The open format of the discussions was praised, as it allowed for a comprehensive exchange of ideas, highlighting the community's willingness to engage in shaping their urban environment.
- **Early Completion and Enhanced Discussion:** The clarity of the questionnaire enabled most participants to complete it ahead of time, which allowed for extended discussion periods that were rich in content and suggestions.

Challenges in Understanding and Trust

A significant challenge noted was the abstract nature of Social Return on Investment (SROI) despite prior workshops explaining the concept. This abstraction led to difficulties in gravely gauging the realistic impact of proposed solutions:

- **Need for Detailed Information:** Participants frequently pointed out the lack of specific information regarding implementation and oversight of the proposed solutions. Questions arose about who would be implementing these solutions and how transparency and proper usage of funds would be ensured.
- **Trust Issues with Local Governance:** A recurrent concern was the trustworthiness of local governing bodies. Participants were apprehensive about financial contributions, questioning the allocation and efficient use of their funds toward the sustained maintenance of green projects.

Negative Feedback

Several points of criticism were also noted, which provide valuable insights into areas where the VARCITIES project could improve:

- **Frequency and Promotion of Events:** Participants expressed a desire for more frequent events and better promotion. The need for increased visibility of activities was highlighted to ensure wider community involvement and awareness.
- **Implementation of Feedback:** While the project was generally well-received, there was a sentiment that participant feedback and suggestions from previous engagements were not fully implemented or considered, leading to some dissatisfaction.

Recommendations for Improvement

From the discussions, it became evident that there were several areas where the VARCITIES project could improve to maximize its impact and public acceptance:

- **Increased Frequency and Visibility of Events:** There was a consensus on the need for more frequent events and better publicity to enhance community engagement and awareness. Participants suggested that making events more visible and frequent could help draw more attention and participation from the broader community.
- **Expanding Educational and Outdoor Activities:** Many saw great value in combining educational content with practical environmental activities, especially in educational settings like schools. Suggestions included more outdoor activities, fieldwork, and learning opportunities about ecosystem services, which would provide tangible experiences and benefits from urban greening efforts.
- **Utilizing Expert Knowledge:** Before implementing interventions, participants emphasized the importance of consulting with experts. This approach would not only ensure that the interventions are based on sound knowledge but would also help in building trust with the community by showcasing a well-thought-out plan backed by expertise.

Enhancement of Public Spaces and Awareness

A strong desire was expressed for creating more open green spaces to address issues like pollution and overcrowding in Gżira:

- **Focus on Green Open Spaces:** Participants suggested that more efforts should be directed towards developing green open spaces to alleviate urban congestion and pollution. This could involve transforming underutilized urban areas into vibrant, accessible green spaces that serve the community's needs.
- **Outreach and Communication:** There was a clear recommendation for enhancing outreach and communication strategies to reach a wider range of demographics. Effective communication about the benefits of the project and ongoing initiatives could foster greater community support and participation.

Concluding Remarks

The VARCITIES project has clearly ignited a sense of possibility within the community, with participants actively proposing and supporting enhancements to urban living through NBS. However, for these visionary solutions to be realized, a robust framework for clear communication, educational integration, and transparent governance must be established. By addressing these foundational elements, the VARCITIES project can effectively mobilize community resources and enthusiasm to create a sustainable and vibrant urban future.

Chapter 6: Monetization stage

6.1 Valuating Outcomes

Once the outcomes have been validated by the Stakeholder Taskforce (STK), the project progresses towards the calculation of the Social Return on Investment (SROI) ratio. As previously detailed in our discussion on SROI stages, we are now entering **Stage 3**, which focuses on the crucial steps of defining outcome indicators, determining the appropriate time horizon, and establishing financial proxies for the assessment.

The data collection for these SROI steps can be conducted in various manners, but it is imperative that the STK plays a central role. The expertise of the STK is critical in recommending the most suitable indicators to accurately quantify the outcomes of the intervention. Furthermore, they assist in defining the duration over which the impact of the intervention is expected to last and play a pivotal role in suggesting or validating the financial proxies that will be used in the SROI calculation.

It is important to reiterate that the SROI stages do not always proceed in chronological order. The research process for each stage can be either expedited or delayed depending on several factors. One of the primary determinants of these timelines is the level of stakeholder engagement. The ability to effectively interact with stakeholders can significantly influence the flow of data collection and analysis.

The availability and quality of data are therefore closely linked to how effectively the moments of STK involvement are organized and executed. There is no standard procedure or fixed number of meetings that must be conducted; however, every opportunity for interaction, such as focus groups and workshops, must be fully leveraged. These sessions are invaluable for gathering comprehensive information, often allowing for the collection of data relevant to multiple SROI steps concurrently.

The matters discussed here will be addressed in the case study conducted in Gżira in the following sections.

6.2 Outcome Indicator

Based on the available data from the NSO Malta website and estimated assumptions derived from site visits conducted during the pilot phase, the following indicators have been determined. These indicators are based on the number of individuals estimated to experience a specific change due to, or despite, the interventions implemented.

To validate the hypothesized outcomes, the estimated numbers need to undergo a verification process. The target number of stakeholders for each group of residents affected by visionary solutions has been defined in a straightforward manner, with the figures rounded off for simplicity.

Diagram 1 Here's the diagram by the author for illustrating the target number of stakeholders for each outcome of the visionary solutions. Each bar represents the number of residents impacted by specific outcomes within each visionary solution (VS1, VS2, and VS3). The outcomes are color-coded for clarity and grouped according to their respective visionary solutions.

This approach ensures a clear understanding of the potential impact of the interventions on various stakeholder groups. The data and estimates provided will help in evaluating the effectiveness and reach of the implemented solutions.

6.3 Assign Financial Proxies

To assign financial proxies using the willingness to pay technique, we begin by identifying the most representative outcome from the set delineated in the Theory of Change. This involves gathering stakeholders in a workshop setting where they are asked to assign a monetary value, typically ranging from €1 to €10 to each outcome that directly affects them. Stakeholders consider their perceived benefit or value derived from each outcome, thereby reflecting their willingness to pay. This value assignment is critical as it translates subjective benefits into quantifiable financial terms. Once stakeholders have provided their valuations, the next step is to analyse these responses to determine the average willingness to pay for each outcome. This average is then used as the financial proxy, effectively monetizing the outcome based on collective stakeholder insights. This method ensures that the financial proxies are grounded in the stakeholders' perspectives, enhancing the accuracy and relevance of the valuation in the context of the Theory of Change.

To clarify the connection between stakeholders' willingness to pay for each outcome of the VARCITIES project, the workshop results are utilized in a Python program to display them through various charts.

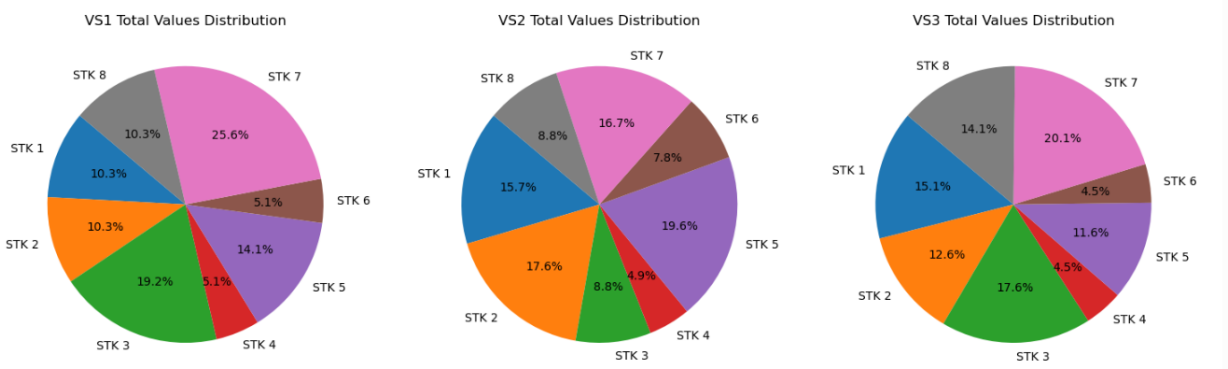

Diagram 2 A pie chart will help in understanding the proportion of the "Total" values among different stakeholders for each VS.

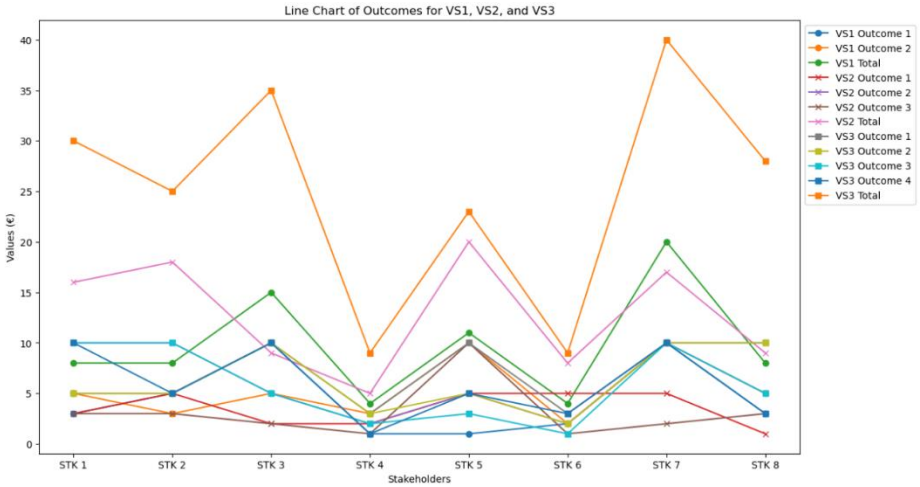

Diagram 3 A line chart is ideal for observing trends across the outcomes for each VS. this is the plot of all outcome values for each stakeholder.

Comparison between outcomes

This comparative analysis highlights the variability and significance of different outcomes across stakeholders and financial proxies, helping in prioritizing areas for financial planning and decision-making.

- Across all VSs, certain outcomes stand out due to their higher values and greater contributions to the total. For example, Outcome 2 in VS1 and VS2, and Outcome 4 in VS3 are critical.
- The significance of outcomes can be seen in the total values; higher total values indicate that certain outcomes (like Outcome 2 in VS1 and VS2) have a major impact.
- Stakeholders with larger shares in the pie charts (such as STK 7 in VS1 and VS3) indicate that outcomes significantly affect these stakeholders more than others.

Table 2 Here's a table summarizing the comparative importance of outcomes.

Solutions	More Important Outcomes	Less Significant Outcomes
VS1	Outcome 2 generally has higher values and more significant contributions across stakeholders compared to Outcome 1.	Outcome 1 has lower values for most stakeholders.
VS2	Outcome 2 and Outcome 3 both show substantial values, indicating their importance.	Outcome 1 shows lower and less variable values, making it less significant.
VS3	Outcome 4 and Outcome 2 tend to have higher and more consistent values, making them critical.	Outcome 1 and Outcome 3 have relatively lower values and less impact on the total.

6.4 Establishing Impact

The stage 4 involves identifying and quantifying the social value generated by the intervention. This step is critical in determining the actual impact compared to what would have happened anyway, adjusting for attribution (how much of the outcome was produced by the contribution of others), displacement (whether the outcome displaced other outcomes), and drop-off (how long the outcomes last).

The core steps in this stage include:

Calculating Deadweight - Estimating what would have happened without the intervention.

Establishing Attribution - Determining how much of the outcome was due to the intervention versus other factors.

Considering Displacement and Drop-off - Assessing whether the impact led to any negative effects elsewhere or decreased over time.

This stage is vital for accurately assessing the effectiveness of social projects, ensuring that the claimed social return is robust and credible (Krlev et al., 2013, pp. 2002–2012).

Deadweight

The deadweight, which is a discount factor that lessens the overall effect by accounting for what would naturally occur without the VARCITIES project, was calculated using national and local data on population behaviours (Appendix II).

$$Deadweight = \frac{Number\ of\ Outcomes\ without\ the\ Project}{Total\ Number\ of\ Outcomes}$$

Displacement

During the meetings with stakeholders, there were no indications or evidence to suggest that any displacement would occur. Therefore, it was decided to set the displacement rate at **0%**. This decision was based on the absence of any signs or concerns raised during the discussions that would imply displacement as a potential issue.

$$Displacement = Percentage\ of\ Outcome\ that\ Displaces\ Another\ Outcome$$

Attribution

Attribution SROI involves isolating and measuring the impacts directly attributable to a specific project by filtering out unrelated changes. This process uses filter coefficients to convert outputs into impacts, although the theoretical framework for this conversion is often ambiguous and challenging in practice.

Attribution Scale

The attribution effect is quantified on a scale from 0% to 100%, indicating the degree to which changes can be attributed to the project versus external factors:

- 0% Attribution: Changes are entirely due to external factors; the project had no impact.
- 20% Attribution: A minimal portion of the change is due to the project, with the majority driven by external factors.
- 40% Attribution: Changes are partially due to the project but significantly influenced by external factors.
- 60% Attribution: A moderate portion of the change is due to the project, though external factors still play a role.
- 80% Attribution: Most of the change is attributed to the project, with some impact from external factors.
- 100% Attribution: Changes are entirely due to the project, with no influence from external factors.

$$Attribution = \frac{Contribution\ of\ the\ Project}{Total\ Contribution\ From\ All\ Sources}$$

The evaluation of how much the results may be attributable to the activities proposed by the project is calculated by subtracting the percentage of effects attributed to other entities or subjects in the area. This approach ensures that the project's unique contributions are clearly defined and acknowledged.

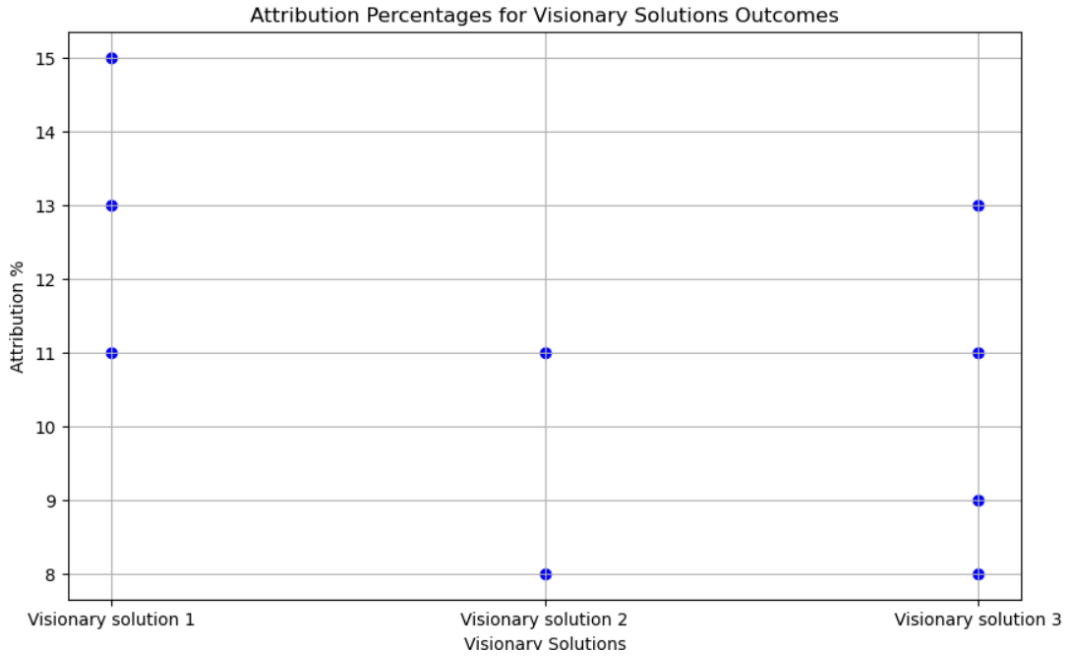

Diagram 4 The result of the attribution.

Drop off

In the context of various measurements and this work study, **%4** is often considered a drop-off point for short periods because it represents a threshold below which the activity, value, or measurement is deemed insignificant or non-contributory.

$$Drop - off = Annual\ Percentage\ Decrease\ In\ Outcome$$

6.5 SROI map

The SROI map (Appendix III) is a tool used to visualize and measure the value created by social, environmental, and economic outcomes generated by an intervention or organization. The map provides a detailed account of the impact, beyond traditional financial metrics, capturing qualitative, quantitative, and narrative evidence of stakeholder impacts. Mapping features of SROI are essential because they facilitate a structured methodology to ensure that all forms of impact are accounted for and visible, which supports transparency and accountability. This ensures that stakeholders can see how their inputs or interactions contribute to wider societal benefits, enhancing strategic planning and policymaking decisions (Arvidson et al., 2013).

6.6 SROI calculation

At this juncture, all components requisite for calculating SROI are prepared. To compute this metric, it is essential first to ascertain either the Total Present Value or the Net Present Value. Subsequently, the derived value should be divided by the total investment costs, which, in the context of SROI, are equivalent to the inputs.

The SROI ratio is calculated using the following steps:

-Calculating Net Impact: It is calculated by adjusting the outcomes for deadweight, displacement, attribution, and drop-off.

Net Impact=Outcome Value×(1−Deadweight−Displacement) ×Attribution×(1−Drop-off)

So, Net Impact is €121,334,35

-Calculate the Net Present Value (NPV) of Benefits: This involves summing the discounted values of benefits over the period of analysis. The discount rate reflects the time value of money and risk.

$$NPV\ of\ Benefits = \sum_{t=1}^{T} \frac{B^t}{(1+r)^t}$$

Where:

B^t= Benefits in year t

r = Discount rate

t = Year

T = Total number of years

So, NPV of Benefits is €1,178,676.42

-Calculate the Net Present Value (NPV) of Investments: This involves summing the discounted values of investments over the period of analysis.

$$NPV\ of\ Investments = \sum_{t=1}^{T} \frac{I^t}{(1+r)^t}$$

Where:

I^t= Investments in year t

So, NPV of Investments is €360,642.24

-Calculate the SROI Ratio:

$$SROI\ Ratio = \frac{NPV\ of\ Benefits}{NPV\ of\ Investments}$$

So, SROI-Ratio is 3.27

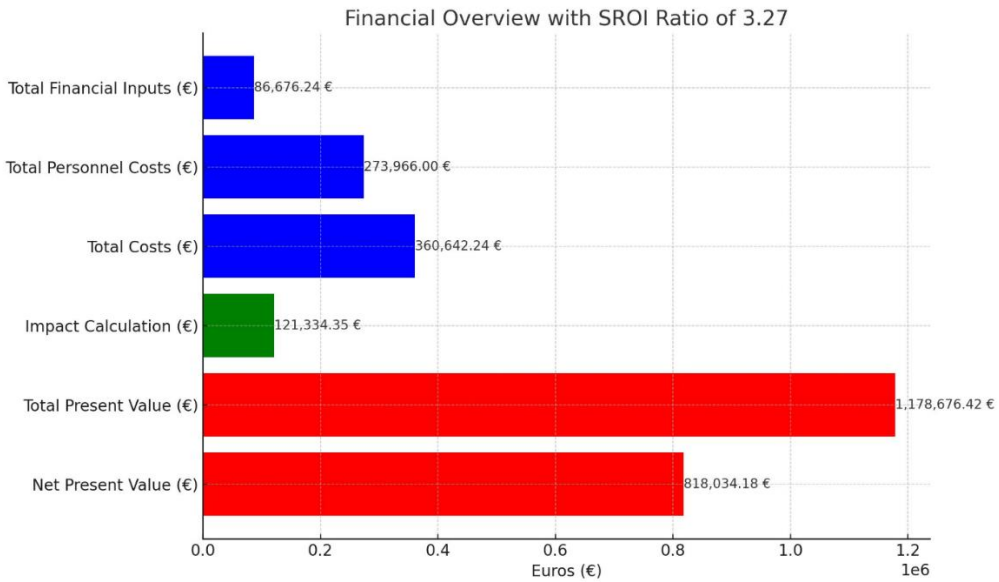

Diagram 5 The horizontal bar chart, result of the whole calculations.

6.7 sensitivity analysis

Sensitivity analysis is a methodological approach used to explore the robustness and reliability of decision-making models, particularly within the context of SROI. It involves systematically varying the inputs of a model to examine how these changes affect the output, providing crucial insights into which variables are most influential and how uncertainty in the data affects the results of the analysis. This process is vital in the SROI approach because it helps stakeholders understand the impact of uncertainties and assumptions on the projected social value or benefits, thus ensuring more reliable and transparent decision-making. For instance, sensitivity analysis can be used to identify key drivers of an SROI model and to test the impact of changes in social value determinants, such as the duration of benefits or the discount rate used in the calculation (Borgonovo and Plischke, 2016).

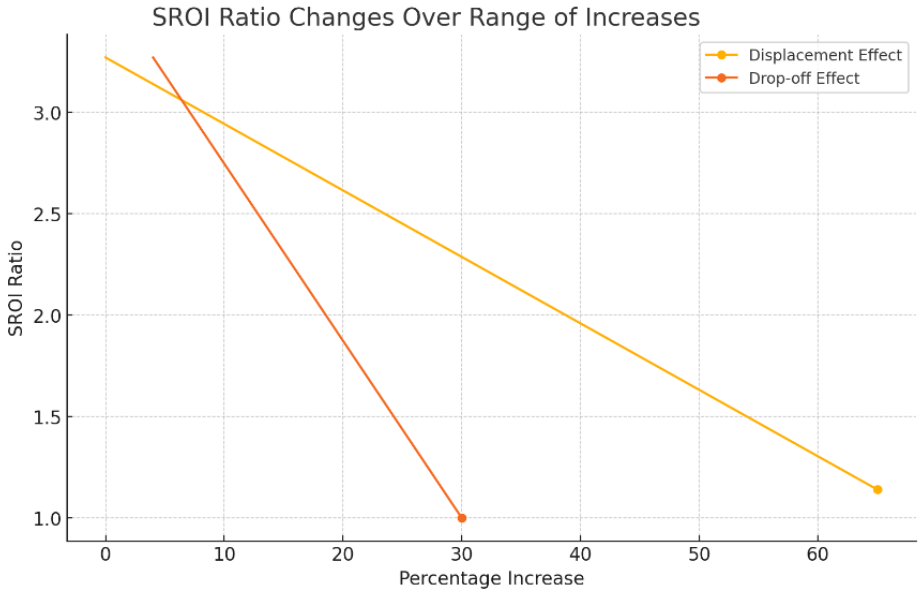

Diagram 7 Here's the detailed line graph showing how the SROI Ratio changes with varying percentage increases in Displacement and Drop-off:

- Displacement Effect: The graph illustrates a decrease in the SROI Ratio as the percentage increase in Displacement moves from 0% to 65%. A specific marker is placed at the 65% increase where the SROI Ratio reaches approximately 1.14.
- Drop-off Effect: Similarly, the SROI Ratio decreases as Drop-off increases from 4% to 30%. A marker is shown at the 30% increase point, where the SROI Ratio drops to around 1.

From a practical standpoint, sensitivity analysis in SROI is indispensable because it enables decision-makers to prioritize interventions based on a robust assessment of potential outcomes under various scenarios. By highlighting which inputs have the most significant impact on the outputs, organizations can make more informed choices about where to allocate resources to maximize social impact. This is particularly important in the SROI framework, which seeks to include the voices of stakeholders often excluded from traditional economic evaluations. The methodological rigor provided by sensitivity analysis supports the credibility of SROI results, helping to ensure that the assumptions underlying social impact assessments are both transparent and testable. The application of sensitivity analysis enhances the decision-making process by

providing a systematic and comprehensive understanding of the impacts of uncertainties, thus directly contributing to more effective and strategic use of resources in social programs (Lilburne and Tarantola, 2009).

This final step aims to determine the threshold values of certain analysis variables. The process involves selecting specific variables—typically, it is advisable to evaluate the discount factors, financial proxies, or the quantity of an outcome. By incrementally adjusting these values and observing the resulting changes in the ratio, the variables most sensitive to fluctuations can be identified.

In this particular case study, the decision was made to vary the displacement and drop-off variables. These variables were chosen because they are supported by less empirical evidence and have a significant impact on the outcomes. Consequently, adjusting these values provides valuable insights into their influence on the overall analysis.

Chapter 7: Recommendation and Conclusion

7.1 The Meaning Behind the Numbers: Interpreting Results

An SROI ratio of 3.27 for the VARCITIES project in Malta signifies that for every euro invested, there is a return of 3.27 euros in social value, showcasing significant positive impacts across economic, social, and environmental dimensions. Economically, this high ratio implies substantial cost savings in healthcare, energy, and infrastructure maintenance, demonstrating efficient use of public funds. However, given the relatively small project scale and since the project is not focused on financial gain, this aspect is less prominent than the social and environmental benefits. These benefits, which were anticipated from the beginning, are more likely to materialize in the future. While it is a well-established fact that the creation of green spaces and NBSs can reduce energy consumption and urban heat, leading to lower cooling costs and increased property values, thus boosting local government revenues, it's important to distinguish these general benefits from the specific outcomes of the study in Gzira. The intervention in Gzira was relatively small and, therefore, the study did not observe significant energy savings or increased property values. Hence, these broader benefits should be understood as potential advantages of NBS in general rather than direct results from the Gzira intervention. Additionally, the project generates employment opportunities, enhancing the local economy and reducing unemployment rates. Socially, the project improves public health and well-being by providing access to green spaces that encourage physical activity and mental relaxation, reducing healthcare costs. It fosters community cohesion through resident engagement in planning and maintenance, creating a sense of ownership and pride. Educational benefits arise from enhanced environments, raising awareness about sustainability and environmental stewardship among residents, especially the younger population. Environmentally, the project contributes to biodiversity by creating habitats for various species and promoting ecological balance. It enhances urban resilience to climate change by improving water management, reducing flood risks, and mitigating heat waves, leading to more sustainable urban areas. Green infrastructure also filters pollutants from the air and water, resulting in a cleaner environment.

In contrast, a scenario with an SROI ratio of zero or negative highlights the profound difference made by the VARCITIES project. Economically, without positive returns, investments yield minimal or no cost savings, potentially burdening public finances and diverting resources from other critical areas. The lack of job creation fails to stimulate the local economy, leading to higher unemployment rates, and property values remain stagnant or decline. Socially, the absence of project success exacerbates health issues, increasing healthcare costs and reducing quality of life. Without community engagement and improvement, social disintegration may occur, leading to increased crime and social unrest, and lost educational opportunities limit public awareness about environmental issues and sustainable practices. Environmentally, ineffective projects fail to protect or enhance biodiversity, leading to habitat loss and decreased ecological resilience. Urban areas remain vulnerable to climate impacts such as flooding and heat waves, resulting in higher recovery costs and disruption, and pollution levels remain high, harming public health and the environment. Scaling and replicability of successful projects across the EU are also hindered by ineffective initiatives, missing opportunities to influence policymaking, attract investments, and provide robust frameworks for integrating NBSs into urban planning. Therefore, the VARCITIES project's high SROI not only validates its approach but also presents a compelling case for expanding similar initiatives across the European Union, aligning with broader sustainability and climate resilience objectives.

Table 3 To compare impacts of the SROI results in different conditions.

Aspect	Positive SROI (3.27)	SROI (0 or Negative)
Economic Impact	Substantial cost savings in healthcare, energy, and infrastructure maintenance. Efficient use of public funds. Increased property values. Boost in local government revenues. Employment opportunities, reducing unemployment.	Minimal or no cost savings, burdening public finances. No job creation, leading to higher unemployment. Stagnant or declining property values.
Social impact	Improved public health and well-being. Reduced healthcare costs. Enhanced community cohesion. Educational benefits, raising environmental awareness.	Increased healthcare costs due to health issues. Social disintegration, leading to increased crime and unrest. Lost educational opportunities, limiting environmental awareness.
Environmental impact	Increased biodiversity and ecological balance. Improved urban resilience to climate change. Better water management, reducing flood risks. Pollution reduction, leading to a cleaner environment.	Habitat loss and decreased ecological resilience. Urban areas vulnerable to climate impacts. High recovery costs and disruption from floods and heat waves. High pollution levels, harming public health.
Overall significance	Demonstrates efficient public investment and substantial positive returns. Validates and supports the expansion of similar initiatives. Aligns with broader EU sustainability and climate resilience objectives.	Ineffective investment, missing opportunities to influence policymaking and attract investments. Hinders the scalability and replicability of successful projects.

7.2 Recommendations and Implications

By focusing on these detailed recommendations and implications, urban planners, policymakers, and stakeholders can enhance the effectiveness and sustainability of Nature-Based Solutions, ensuring that urban development projects deliver meaningful and lasting benefits to communities and the environment.

1.Enhanced Stakeholder Engagement

Continuous Involvement and Feedback Loops

- **Inclusive Planning Processes:** Establishing mechanisms for regular consultations and participatory planning sessions with a broad range of stakeholders ensures diverse perspectives are incorporated into urban projects. This can involve town hall meetings, workshops, and focus groups that invite residents, business owners, local government officials, and community organizations to share their views and collaborate on project planning and implementation.
- **Feedback Mechanisms:** Creating structured feedback loops allows stakeholders to continuously provide input and see how their contributions are integrated into the project. Digital platforms, suggestion boxes, and regular updates on project progress help keep stakeholders informed and engaged. These mechanisms build trust and foster a sense of ownership among community members.
- **Capacity Building:** Providing training and resources empowers stakeholders, particularly marginalized groups, to participate meaningfully. Workshops on environmental education,

urban planning, and the benefits of NBS can enhance community understanding and engagement. Empowering stakeholders with knowledge and skills ensures their active and informed participation in the project.

2. Use of Technology

Data Collection and Analysis Enhancements

- **Advanced Monitoring Tools:** Employing sensors, drones, and remote sensing technologies for real-time monitoring of environmental and social impacts can provide accurate and up-to-date data. These tools can measure air and water quality, biodiversity, and the effectiveness of NBS interventions. Real-time data allows for timely adjustments and ensures that interventions are achieving their intended outcomes.
- **Data Integration Platforms:** Developing integrated data platforms that combine various data sources (e.g., sensor data, survey results, citizen reports) allows for comprehensive analysis and visualization of project impacts. Such platforms can support decision-making by providing a holistic view of the project's effects and identifying areas for improvement.
- **Digital Engagement Tools:** Utilizing mobile apps and online platforms for community engagement can facilitate wider participation and real-time feedback. These tools can conduct virtual town halls, disseminate information, and collect citizen input efficiently. Digital tools make engagement more accessible and inclusive, especially for those who cannot attend physical meetings.

3. Context-Specific Adaptations

Tailoring Interventions to Local Conditions

- **Cultural Sensitivity:** Understanding and integrating local cultural practices, values, and traditions into NBS projects can enhance their acceptance and effectiveness. This might involve using native plant species, designing spaces that reflect local architectural styles, or involving local artists in creating public art installations that resonate with the community's identity.
- **Political and Economic Considerations:** Adapting projects to align with local political and economic contexts ensures better integration and support. This includes working closely with local governments, aligning projects with municipal priorities, and identifying funding opportunities relevant to the local economic landscape. Tailoring projects to fit the local context increases the likelihood of sustained support and successful implementation.
- **Environmental Specificities:** Customizing NBS to address specific environmental challenges unique to the urban area, such as coastal erosion, urban heat islands, or specific pollution sources, can maximize the ecological benefits and resilience of the interventions. This targeted approach ensures that the solutions are relevant and effective in mitigating local environmental issues.

4. Transparency and Inclusivity

Building Trust and Accountability

- **Transparent Reporting:** Regularly publishing detailed reports on project progress, outcomes, and financial expenditures builds trust with stakeholders. These reports should be easily accessible and comprehensible to the public. Transparency in reporting ensures accountability and demonstrates a commitment to openness and honesty.
- **Open Data Policies:** Adopting open data policies where all project-related data is made publicly available allows for independent analysis and verification. This transparency can enhance credibility and encourage community and academic engagement. Open data policies promote a culture of sharing and collaboration.
- **Inclusive Governance Structures:** Establishing governance structures that include representatives from all major stakeholder groups ensures that decision-making processes are democratic and equitable. This might involve creating advisory boards or committees with diverse membership to oversee project implementation and provide ongoing guidance.

5. Implications for Future Urban Development

Informed Decision-Making

- **Policy Integration:** Embedding the principles and practices of SROI into urban policy frameworks can guide investments towards projects that deliver maximum social, environmental, and economic benefits. Policymakers can use these insights to prioritize funding for interventions that have proven value and impact, leading to more sustainable and equitable urban development.
- **Evidence-Based Planning:** Utilizing data-driven insights from SROI analyses supports more strategic and evidence-based urban planning. This approach helps urban planners identify the most effective interventions, allocate resources efficiently, and make informed decisions that enhance urban sustainability and resilience.

6. Policy and Investment

Guiding Sustainable Investments

- **Investment Prioritization:** Policymakers and investors can prioritize funding for projects that demonstrate high SROI ratios, ensuring that resources are directed towards interventions with the greatest potential for positive impact. This prioritization helps maximize the return on investment and supports the development of projects that benefit society.
- **Incentive Structures:** Creating financial incentives for private developers and businesses to invest in NBS can drive broader adoption of sustainable practices. This could include tax breaks, grants, or public-private partnership opportunities that make it more attractive for the private sector to engage in environmentally and socially beneficial projects.

7. Scalability and Replicability

Expanding Successful Models

- **Best Practices Dissemination:** Documenting and sharing best practices and lessons learned from successful NBS implementations can facilitate the replication of effective strategies in other urban areas. This includes developing case studies, guides, and toolkits for urban planners and policymakers to use in their own contexts.
- **Network Building:** Establishing networks and partnerships between cities allows for knowledge exchange and collaboration. Cities can share experiences, strategies, and innovations to collectively enhance urban sustainability and resilience. These networks can foster a community of practice that supports continuous learning and improvement.
- **Pilot Projects and Demonstration Sites:** Creating pilot projects and demonstration sites in different urban contexts can showcase the benefits of NBS and serve as living laboratories for testing and refining interventions before wider implementation. These pilots provide valuable real-world examples of how NBS can be effectively integrated into urban planning and development.

7.3 Challenges of SROI in VARCITIES

The application of the VARCITIES project poses several challenges to the Social Return on Investment (SROI) methodology, requiring a comprehensive response. Firstly, VARCITIES emphasizes the importance of incorporating the measurement of environmental changes. Emission reductions and the creation of green or blue spaces, while considered within the SROI framework, are often assessed indirectly. Traditional SROI methods tend to overlook these environmental benefits, despite their significance in evaluating urban projects thoroughly. To address this gap, it is necessary to integrate SROI with other evaluation tools that can effectively measure and value these environmental impacts. The Gżira case study illustrates this issue, prompting further investigation into combining health economic evaluation tools with SROI. This approach underscores the need for methodologies capable of accounting for health-related outcomes of urban interventions. This integration is especially pertinent in VARCITIES projects, which strive to improve urban living environments through enhancements in health and well-being.

Moreover, the maximum duration of effects considered by SROI is another critical issue. SROI typically focuses on a short-term analysis, often limited to one year of costs and benefits. This approach is incompatible with the life expectancy of many assets proposed in VARCITIES projects, which can have long-lasting impacts. Some case studies have addressed this by extending the timeframe to more than five years, but this often lacks a standardised approach to applying drop-off rates, leading to inconsistencies in the valuation of long-term benefits. Additionally, the monetisation of certain outcomes presents a significant challenge. Many social and cultural impacts of VARCITIES projects are difficult to quantify in monetary terms. This gap highlights the need for further research and methodological development to assign appropriate value to these aspects. Direct engagement with communities and stakeholders is crucial for capturing the socio-cultural impacts accurately. This participatory approach ensures that the social value generated by urban projects is comprehensively assessed and acknowledged. In conclusion, the application within VARCITIES challenges the SROI methodology by highlighting the need for integrated environmental quantification, extended temporal analysis, and improved valuation

of socio-cultural impacts. Addressing these challenges requires a multi-faceted approach, combining SROI with other assessment tools and engaging directly with communities to capture the full spectrum of benefits.

7.4 Bridging the Gap: Practical Solutions for Comprehensive SROI in VARCITIES

To address the challenges presented by the VARCITIES application within the SROI methodology, several practical methods can be employed. Each method is designed to tackle specific challenges:

1. Integration of Environmental Assessment Tools

Challenge Addressed: Quantification of environmental changes such as emission reductions and the addition of green or blue spaces.

Method: Utilise tools like carbon footprint calculators, GIS mapping for green and blue spaces, and ecosystem service valuation frameworks. These tools can quantify the environmental benefits accurately and integrate these values into the SROI framework (Sherrouse et al., 2011).

2. Incorporation of Health Economic Evaluation Tools

Challenge Addressed: Accounting for health-related outcomes of urban interventions.

Method: Adopt health economic tools such as Quality-Adjusted Life Years (QALYs) and Cost-Effectiveness Analysis (CEA). These tools can help evaluate the health benefits of urban projects, translating these outcomes into economic terms that fit within the SROI methodology (Feng et al., 2020).

3. Extension of Temporal Analysis

Challenge Addressed: Incompatibility of SROI's short-term analysis with the long-term impacts of assets.

Method: Implement a longer evaluation period in the SROI analysis, considering the lifespan of the assets involved. Use methods like Net Present Value (NPV) and Internal Rate of Return (IRR) to evaluate long-term benefits and apply consistent drop-off rates to account for the diminishing value over time (Zhang, 2023).

4. Enhanced Monetisation of Social and Cultural Impacts

Challenge Addressed: Difficulty in monetising social and cultural impacts.

Method: Develop comprehensive frameworks for the valuation of social and cultural benefits. Engage in participatory valuation techniques, where stakeholders and community members are involved in determining the value of social impacts. Methods such as Contingent Valuation (CV) and Social Impact Assessment (SIA) can be employed to assign monetary values to these impacts (Batzias and Kopsidas, 2019).

5. Direct Community Engagement

Challenge Addressed: Gaps in capturing socio-cultural impacts.

Method: Foster direct engagement with communities through surveys, focus groups, and public consultations. This participatory approach ensures that the socio-cultural impacts are identified and valued accurately. Community input can provide qualitative data that complements quantitative SROI measures, leading to a more holistic assessment (Mosavel et al., 2005).

7.5 Final thoughts about SROI for Urban Planning

In conclusion, developing standardised methodologies to monitor and evaluate the effects of urban transformation on health and wellbeing is essential for the widespread implementation of solutions addressing the increasing social and environmental challenges in our cities. This thesis proposed the SROI framework to assess the social value generated for key stakeholders by the Visionary NBS intervention. The subsequent discussion will focus on refining the SROI framework based on its application to urban planning projects. The main findings from the research and practical application will be outlined, highlighting the challenges encountered during the SROI analysis in Castelfranco. Notably, certain SROI steps require adjustments to effectively encompass broader employment for public space interventions. Additionally, the thesis underscores the importance of integrating stakeholder perspectives throughout the SROI process to enhance the accuracy and relevance of the findings. This includes engaging with diverse community groups to ensure their needs and experiences are adequately represented. The research also emphasises the need for continuous iteration and feedback to improve the methodology, adapting it to varying urban contexts and project scales. Moreover, the potential for SROI to inform policymaking and investment decisions is significant. By demonstrating the tangible social benefits of NBS, urban planners and policymakers can advocate for more sustainable and equitable urban development practices. Future research should focus on longitudinal studies to capture long-term impacts and refine the framework further. In summary, while the SROI methodology shows promise in evaluating the social value of urban interventions, ongoing refinement and stakeholder engagement are crucial for its broader application and effectiveness in addressing urban challenges.

APPENDICES

APPENDIX I: Questionnaire form

VS1 - Micro-greening Interventions through a Participatory Design Process

Information box

IMPLEMENTATION OF VS1:

- ⇨ Seeds provision to Rue d'Argens for balcony micro-greening
- ⇨ Greening of bus station in Rue d'Argens
- ⇨ Greening of the nearby parking lot
- ⇨ Addition of new benches with embedded planters
- ⇨ Addition of trees
- ⇨ Addition of shading areas

This project has received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement No 869505

OUTCOME 1 - Enhanced knowledge and appreciation of gardening and local biodiversity

Residents of Rue d'Argens would be empowered with **knowledge about biodiversity** and **skills related to gardening** for the co-creation and micro-greening of a central street in Gzira. This way, they can connect more deeply to the environment they live in and feel more able to contribute to public space.

RATING	MOTIVATION	FINACIAL PROXY
Rate the outcome from **1** (very unlikely to happen) to **5** (very likely to happen)	Please provide a comment related to the given rating	Considering the **OUTCOME 1**, what would be your **MAXIMUM willingness to pay** on a monthly basis to have an increase in **knowledge about biodiversity** and **skills related to gardening** due to the bus station and parking greening? No change: ◯ 0,00 € VS1 implemented: ◯ 1,00 € ◯ 5,00 € ◯ 2,00 € ◯ 10,00 € ◯ 3,00 € ◯ other .... €

ATTRIBUTION	ATTRIBUTION VALUE
There might be other green space projects, local associations or initiatives in Gzira that would provide **knowledge about biodiversity** and **skills related to gardening** and potentially **greening solutions.** Can you think of any? If so, how do you feel their impact on you compares to the one of the VARCITIES project? Please name below green space projects, local associations or initiatives in Gzira:	How much impact do these external factors have compared to VARCITIES? Rate from 0 (meaning they are not influential at all) to 10 (completely overlapping with VARCITIES)

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OUTCOME 2 - Improved mental well-being

Rue d'Argens residents and users of the bus station located there will benefit from the added green spaces, and benches added to the planters next to the station. This can have the additional service of providing shaded spaces, enhanced aesthetics and functionality of the space, that possibly results in **relaxation** and, **ultimately, in mental wellbeing**.

RATING	MOTIVATION	FINACIAL PROXY
Rate the outcome from **1** (very unlikely to happen) to **5** (very likely to happen)	Please provide a comment related to the given rating	Considering the **OUTCOME 2**, what would be your **MAXIMUM willingness to pay** on a monthly basis to have an increase of **relaxation and socialisation** resulting in **increased wellbeing** due to the bus station and parking greening? No change: ◯ 0,00 € VS1 implemented: ◯ 1,00 € ◯ 5,00 € ◯ 2,00 € ◯ 10,00 € ◯ 3,00 € ◯ other .... €

ATTRIBUTION	ATTRIBUTION VALUE
There might be other green space projects, local associations or initiatives in Gzira that would give you increased **relaxation and socialisation** resulting in **increased wellbeing for the community.** Can you think of any? If so, how do you feel their impact on you compares to the one of the VARCITIES project? Please name green space below projects, local associations or initiatives in Gzira:	How much impact do these external factors have compared to VARCITIES? Rate from 0 (meaning they are not influential at all) to 10 (completely overlapping with VARCITIES)

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OUTCOME 3 - Increased sense of pride and belonging to the neighborhood

By greening with the active participation of residents, the aesthetics and utility of the bus station in Rue d'Argens would be enhanced. Residents and the users would **develop a higher emotional connection to the area** that can ultimately lead to **sense of pride and belonging to the neighbourhood**.

RATING	MOTIVATION	FINACIAL PROXY
Rate the outcome from **1** (very unlikely to happen) to **5** (very likely to happen)	Please provide a comment related to the given rating	Considering the **OUTCOME 3**, what would be your **MAXIMUM willingness to pay** on a monthly basis to have an increase in your **connection to the area** and **sense of pride and belonging to the neighbourhood** due to the bus station and parking greening? No change: ◯ 0,00 € VS1 implemented: ◯ 1,00 € ◯ 5,00 € ◯ 2,00 € ◯ 10,00 € ◯ 3,00 € ◯ other .... €

ATTRIBUTION	ATTRIBUTION VALUE
There might be other green space projects, local associations or initiatives in Gzira that would help you develop a **higher emotional connection to the area** that can ultimately lead to **sense of pride and belonging to the neighbourhood**. Can you think of any? If so, how do you feel their impact on you compares to the one of the VARCITIES project? Please name below green space projects, local associations or initiatives in Gzira:	How much impact do these external factors have compared to VARCITIES? Rate from 0 (meaning they are not influential at all) to 10 (completely overlapping with VARCITIES)

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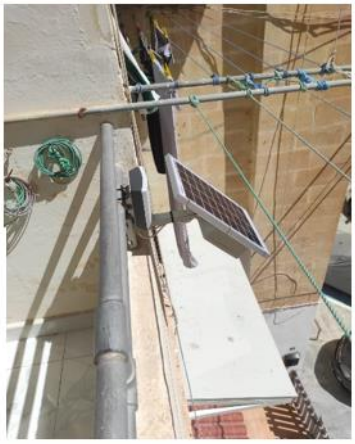
VS2 – Citizen Science on Air and Noise quality to increase Health&Wellbeing

Information box

IMPLEMENTATION OF VS2:

- ⇨ Air quality and noise sensors installed in Rue d'Argens and next to the University of Malta
- ⇨ Air quality and noise sensors installed on 10 residents' balconies.
- ⇨ Citizen science activities
- ⇨ Air and noise pollution data available to residents
- ⇨ Council of Europe gardens event



This project has received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement No 869505

OUTCOME 1 – Enhanced awareness of air and noise pollution levels, and empowerment of citizens

Rue d'Argens residents gain real-time air and noise pollution data from sensors installed in streets and balconies, **boosting awareness and health consciousness**. Citizen science involvement **empowers community action**, encouraging environmental responsibility and sustainable practices.

RATING	MOTIVATION	FINACIAL PROXY
Rate the outcome from **1** (very unlikely to happen) to **5** (very likely to happen)	Please provide a comment related to the given rating	Considering the **OUTCOME 1**, what would be your **MAXIMUM willingness to pay** on a monthly basis to have an increase of **awareness and health consciousness** that **empower community action** due to the sensor data? No change: ◯ 0,00 € VS2 implemented: ◯ 1,00 € ◯ 5,00 € ◯ 2,00 € ◯ 10,00 € ◯ 3,00 € ◯ other .... €

ATTRIBUTION	ATTRIBUTION VALUE
There might be other sensor related projects, local associations or initiatives in Gzira that would **boost awareness on air and noise pollution levels** and **empower community action**. Can you think of any? If so, how do you feel their impact on you compares to the one of the VARCITIES project? Please name below sensor related projects, local associations or initiatives in Gzira:	How much impact do these external factors have compared to VARCITIES? Rate from 0 (meaning they are not influential at all) to 10 (completely overlapping with VARCITIES)

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OUTCOME 3 - Improving residents' lifestyles through education on air and noise pollution risks and self-protection actions

The initiative of disseminating sensor data in pop-up parks influences community behaviour by providing data on air and noise pollution, thereby **encouraging healthier lifestyle choices** such as walking or biking, **reducing personal exposure to pollution**, and **growing community well-being**.

RATING	MOTIVATION	FINACIAL PROXY
Rate the outcome from **1** (very unlikely to happen) to **5** (very likely to happen)	Please provide a comment related to the given rating	Considering the **OUTCOME 2**, what would be your **MAXIMUM willingness to pay** on a monthly basis to have an increase **lifestyle quality through self-protection actions** due to the sensor data? No change: ◯ 0,00 € VS2 implemented: ◯ 1,00 € ◯ 5,00 € ◯ 2,00 € ◯ 10,00 € ◯ 3,00 € ◯ other .... €

ATTRIBUTION	ATTRIBUTION VALUE
There might be other sensor related projects, local associations or initiatives in Gzira that would **encourage you to make healthier life choices**. Can you think of any? If so, how do you feel their impact on you compares to the one of the VARCITIES project? Please name below sensor related projects, local associations or initiatives in Gzira:	How much impact do these external factors have compared to VARCITIES? Rate from 0 (meaning they are not influential at all) to 10 (completely overlapping with VARCITIES)

This project has received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement No 869505

VS3: Urban Biodiversity, Education and Engagement through a Co-Created Community Garden Project

Information box

IMPLEMENTATION OF VS3:

- ⇨ A new community garden in the schoolyard of St. Clare
- ⇨ Co-design activities with residents and school community
- ⇨ Upcycle workshops with residents: pop-up parks
- ⇨ Area for sound exploration, playground structure constructed from reused materials

This project has received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement No 869505

OUTCOME 1 - Enhanced awareness on local urban biodiversity

The community garden and outdoor learning space at St. Clare Primary School would **allow the community to learn about the variety of plants that can thrive in their local environment** and the roles these plants play in supporting urban biodiversity.

RATING	MOTIVATION	FINACIAL PROXY
Rate the outcome from **1** (very unlikely to happen) to **5** (very likely to happen)	Please provide a comment related to the given rating	Considering the **OUTCOME 1**, what would be your **MAXIMUM willingness to pay** on a monthly basis to have an increased **awareness on local urban biodiversity** due to the education engagement and new community garden? No change: ◯ 0,00 € VS3 implemented: ◯ 1,00 € ◯ 5,00 € ◯ 2,00 € ◯ 10,00 € ◯ 3,00 € ◯ other .... €

ATTRIBUTION	ATTRIBUTION VALUE
There might be other public space projects, local associations, or initiatives in Gzira that would **help you learn about local plants.** Can you think of any? If so, how do you feel their impact on you compares to the one of the VARCITIES project? Please name below public space projects, local associations, or initiatives in Gzira:	How much impact do these external factors have compared to VARCITIES? Rate from 0 (meaning they are not influential at all) to 10 (completely overlapping with VARCITIES)

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OUTCOME 2 - Enhanced play area appearance

The community garden/outdoor learning space in St. Clare Primary School, will create an interactive and aesthetically pleasing environments for children and the neighbourhood by including natural elements and creative landscaping, which can result in a stimulating outdoor space for children.

RATING	MOTIVATION	FINACIAL PROXY
Rate the outcome from **1** (very unlikely to happen) to **5** (very likely to happen)	Please provide a comment related to the given rating	Considering the **OUTCOME 2**, what would be your **MAXIMUM willingness to pay** on a monthly basis to have an increase of the **aesthetics of the play area** due to the new community garden? No change: ◯ 0,00 € VS3 implemented: ◯ 1,00 € ◯ 5,00 € ◯ 2,00 € ◯ 10,00 € ◯ 3,00 € ◯ other .... €

ATTRIBUTION	ATTRIBUTION VALUE
There might be other public space projects, local associations or initiatives in Gzira that would **provide interactive and aesthetically pleasing environments for children and the neighbourhood by including natural elements and creative landscaping.** Can you think of any? If so, how do you feel their impact on you compares to the one of the VARCITIES project? Please name below public space projects, local associations or initiatives in Gzira:	How much impact do these external factors have compared to VARCITIES? Rate from 0 (meaning they are not influential at all) to 10 (completely overlapping with VARCITIES)

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OUTCOME 3 - Enhanced mental well-being

The community garden/outdoor learning space in St. Clare Primary School can create places for children, parents, and the broader public who access these spaces, inviting them to relax, and connect with nature.

RATING	MOTIVATION	FINACIAL PROXY
Rate the outcome from **1** (very unlikely to happen) to **5** (very likely to happen)	Please provide a comment related to the given rating	Considering the **OUTCOME 3**, what would be your **MAXIMUM willingness to pay** on a monthly basis to have an increase of **mental well-being** due to the education engagement and new community garden? No change: ◯ 0,00 € VS3 implemented: ◯ 1,00 € ◯ 5,00 € ◯ 2,00 € ◯ 10,00 € ◯ 3,00 € ◯ other .... €

ATTRIBUTION	ATTRIBUTION VALUE
There might be other public space projects, local associations or initiatives in Gzira that would **provide places for children, parents, and the broader public for relaxing and connecting with nature.** Can you think of any? If so, how do you feel their impact on you compares to the one of the VARCITIES project? Please name below public space projects, local associations or initiatives in Gzira:	How much impact do these external factors have compared to VARCITIES? Rate from 0 (meaning they are not influential at all) to 10 (completely overlapping with VARCITIES)

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OUTCOME 4 - Boosted social interaction with a new gathering spot in the school yard for parents or staff

The community garden/outdoor learning space in St. Clare Primary School aims to be a space that provides opportunities for children, parents, staff, and the neighbourhood to meet, engage in activities together and socialize.

RATING	MOTIVATION	FINACIAL PROXY
Rate the outcome from **1** (very unlikely to happen) to **5** (very likely to happen)	Please provide a comment related to the given rating	Considering the **OUTCOME 4**, what would be your **MAXIMUM willingness to pay** on a monthly basis to have an increase of **social interaction** due to the education engagement and new community garden? No change: ◯ 0,00 € VS3 implemented: ◯ 1,00 € ◯ 5,00 € ◯ 2,00 € ◯ 10,00 € ◯ 3,00 € ◯ other .... €

ATTRIBUTION	ATTRIBUTION VALUE
There might be other public space projects, local associations or initiatives in Gzira that would **provide a space for children, parents, staff, and the neighbourhood to meet, engage in activities together and socialize.** Can you think of any? If so, how do you feel their impact on you compares to the one of the VARCITIES project? Please name below public space projects, local associations or initiatives in Gzira:	How much impact do these external factors have compared to VARCITIES? Rate from 0 (meaning they are not influential at all) to 10 (completely overlapping with VARCITIES)

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APPENDIX II:

Visionary Solution	Outcome Description	Justification	Resource	Value Percentage
VS1	Enhanced knowledge and appreciation of gardening and local biodiversity	percentage of people who read news and books in Gżira	Malta survey	*24,30%*
	Improved psycho-emotional well-being	percentage of people in Gżira going in open spaces	Access Green Spaces	*50%*
	Increased sense of pride and belonging to the neighbourhood	percentage of people who feel attached to the Gżira neighbourhood	feel of attachment	*8%*
VS2	Enhanced awareness of air and noise pollution levels, and empowerment of citizens		noise pollution	*26,25%*
	Improving residents' lifestyles through education on air and noise pollution risks and self-protection actions	percentage of people who rely on education as a source of environmental hazards / air and noise pollution risks awareness in Malta	Public perception on the state of air quality in Malta	*6,25%*
VS3	Enhanced awareness of local urban biodiversity	percentage of people in Malta who is informed about the local biodiversity/ percentage of people who read news and books	Digital in Malta: All the Statistics You Need in 2021 — Data Reported – Global Digital Insights	*6%*
	Enhanced play area appearance	intention from the school side to improve the yard's appearance	-	*0%*
	Enhanced mental well-being	percentage of people in Gżira going in open spaces	https://nso.gov.mt/structural-business-statistics-2020-2-2/	*73%*
	Boosted social interaction with a new gathering spot in the school yard for parents or staff	percentage of people in Malta spending time in the company of others	social interaction	*44%*

APPENDIX III:

Outcomes		Discount factor				impact
Description	**Target in number**	**Deadweight**	**Displacement**	**Attribution**	**Drop-off**	**Value €**
Enhanced understanding and appreciation of gardening and local biodiversity	*1.000*	*24%*	*0%*	*13%*	*4%*	*13.230,61*
Improved psycho-emotional well-being	*950*	*50%*	*0%*	*15%*	*4%*	*21.871,54*
Increased sense of pride and belonging to the neighbourhood	*1.150*	*8%*	*0%*	*11%*	*4%*	*18.573,45*
Enhanced awareness of air and noise pollution levels, and empowerment of citizens	*95*	*26%*	*0%*	*8%*	*4%*	*2.307,83*
Understanding sensor usage	*20*	*0%*	*0%*	*0%*	*4%*	*0,00*
Improving residents' lifestyles through education on air and noise pollution risks and self-protection actions	*90*	*6%*	*0%*	*11%*	*4%*	*3.399,52*
Enhanced awareness of local urban biodiversity	*363*	*6%*	*0%*	*8%*	*4%*	*24.550,85*
Enhanced play area appearance	*363*	*0%*	*0%*	*13%*	*4%*	*20.867,96*
Enhanced mental well-being	*363*	*73%*	*0%*	*11%*	*4%*	*5.416,91*
Boosted social interaction with a new gathering spot in the school yard for parents or staff	*363*	*44%*	*0%*	*9%*	*4%*	*11.115,67*

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