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AN ANALYSIS OF SOCIAL INNOVATION SYSTEMS IN LIBAN – IMPACT OF NATURE-BASED SOLUSTIONS ON THE QUALITY OF LIFE IN A CITY

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Abstract:
The aim of the article is to examine the possibility of using the Temporary Innovation System (TIS) structure in the analysed projects in Lebanon, as well as to verify to what extent nature-based solutions (NBS) can be understood through the prism of TIS. The article presents several examples of nature-based solutions (NBS) in various locations in Lebanon as ways to improve the climate and relations between residents of smaller cities. The study used a case study methodology in which four nature-based solutions (NBS) projects in two Lebanese cities were analysed and compared with the expected characteristics of TIS.

Keywords: social innovation; nature-based solutions; social innovation system

INTRODUCTION

Lebanon is an Arabic country located in the Middle East. It is bordered to the north and east by Syria and to the south by Israel. It also borders the vast expanse of the Mediterranean Sea, with a coastline stretching almost 225 kilometres. The country's location has influenced Lebanon's extensive culture. The country has been torn by conflicts with Syria and Israel for many years. As a result of the war in Syria, many refugees have chosen to settle in nearby Lebanon. In addition, the results of the 2006 war between Lebanon and Israel can still be seen in many areas. As a result of continuing problems – primarily conflicts with neighbours, strikes and social problems, as well as haunting natural disasters – the country has slowed considerably down in economic terms. Numerous disasters have, in turn, caused damage to property or loss of life. For many years, Lebanon's economy has additionally struggled with massive, ever-increasing inflation [Ammar W. et al. 1998].

Each of the above factors means that the country's politicians today pay practically no attention to environmental issues, which are so important for developed countries. Fortunately, the people of Lebanon recognize the potential of nature-based solutions and, by attracting sponsors, often on their own in consultation with local authorities, are trying to put them into practice. Although Lebanon is still a long way off compared to other countries in this respect, the solutions being applied show that, by design, simple proposals can significantly improve the quality of urban life.

The Lebanese community recognizes that human activity and the constant progress of civilization contribute significantly to climate change [C. Seelos et al. 2012]. Nowadays, not only countries in Europe, but also just in the Middle East, for example, are struggling with smog, urban heat island or climate change – although these phenomena are much less often mentioned in such countries. These changes have a negative

impact not only on the environment, but especially on metropolitan residents, who, as a result, avoid spending time together outdoors, blurring relationships between them [R. Murray et al. 2010, p. 40]. In view of these phenomena, it is necessary to look for comprehensive solutions that could respond to multiple problems simultaneously. Such examples certainly include those from the nature-based solutions (NBS) group. In addition to significantly improving the quality of the environment, they also aim to integrate the residents of the area they cover.

The article discusses and presents the most relevant nature-based solutions proposals in Lebanon, along with their analysis and the opportunities they offer to the country's society. Four projects were selected, which are distinguished by their different ways of conducting and scale. Lebanon's temporary social innovation systems were also analysed, and the research approach was described, along with the rationale for selecting nature-based solutions (NBS) projects as examples of multi-stakeholder social innovation initiatives. After a brief description of the project ideas in which those of nature-based solutions (NBS) were found, the results of the author's research on the presence of urban composition elements in the analysed nature-based projects in Lebanon are presented and discussed. The article concludes with a reflection on the benefits of NBS and preliminary observations on their benefits. It also concludes with preliminary conclusions on the implications of theory and practice, particularly for nature-based solutions.

1. RESARCH GOALS

The purpose of this article is to review and analyse the feasibility of nature-based solutions in Lebanon, and to examine the extent to which NBS can help support such an initiative. It is proposed that NBS provide a framework for multilateral engagement with regard to social and climate problems. The goal is also to examine whether NBS can provide a useful framework for the country's economic development, improve neighbourhood relations, and enable a more informed architectural design in Lebanon.

2. METHODOLOGY AND RESULTS

The research is based on a case study. Four nature-based solutions (NBS) projects were analysed and compared with the expectations of social innovation (TIS). Of the four projects, only one exhibited characteristics identical to TIS. Each, however, was closely related to problems in the city and problems in society. Only one of the examples analysed, on the other hand, was aimed at solving social problems. Conclusions were drawn from this, which relate to the fact that NBS need not exhibit the functions of solving society's problems and climate change, and that TIS may best fit these elements.

2.1. Limitations/ research implication

The article concludes with theoretical insights from the application of the NBS framework in the context of TIS. The following steps in the development of the NBS framework by addressing social innovation and the needs of the Lebanese people are proposed.

2.2. Originality/reliability of the article

This article examines social innovation systems in relation to four nature-based solution projects in Lebanon. The research data was obtained through a site visit and the authors' own opinion on the occurrence of urban composition elements in these projects. The research presented and the data obtained are the authors' and present a topic that has not been subjected to much analysis to date, making it original and unique.

3. SOCIAL INNOVATION FRAMEWORK

Social innovation is a concept and modus operandi that has been operating for many years mainly in European countries. The Middle East, until recently, has not practiced such approaches as public participation or consultation with residents. Fortunately, with the popularization of European standards in Lebanon, more and more attention has begun to be paid to involving the public in the construction and creation of common spaces.

Thus, it is assumed that social innovation focuses primarily on the idea of an established process, which is related to the generation of ideas that, by design, are intended to meet social needs or solve the problems of the population of the cities in question. Over the past few years, researchers at the Trinity Center for Social Innovation (CSI) have been working on researching, engaging and teaching social innovation through the lens of institutional evolution, management practice and complex systems [P. Senge et al. 2015, pp. 27-33]. They have concluded that there is a strong connection between local governments and communities working together to shape shared spaces.

Currently, several types of complex innovation systems are distinguished. Through them, multi-stakeholder innovations can be verified, and the following

article argues for the application of the social innovation systems framework. This article aims to extend the analysis of nature-based solutions and their frameworks to multiple social problems precisely in relation to TIS. The goal is to further verify that TIS and NBS can enable more informed design and facilitate social innovation, which in turn will have a long-lasting impact on the Lebanese community.

Social innovation as a concept (or even a form of action) has been around for a long time, but it is constantly the subject of debate about its meaning and practices [C. Seelos et al. 2012]. A precise definition of the framework of innovation systems has not yet been formulated, but many theories generally centre around the idea of organizing a process [C. Trivedi et al. 2015, pp. 37-62]. It includes meeting social needs or solving social problems. Most often, they also include the creation of new relationships between multiple actors in the process [R. Murray et al. 2010]. Researchers at the Trinity Center of Social Innovation have noted that TIS can largely influence the satisfaction of social needs with appropriate community involvement. Many nature-based solutions (NBS) are excellent examples of multi-stakeholder social initiatives [A. Nicholas et al. 2017]. S. Kuhlmann, on the other hand, believes that a temporary social innovation framework (TIS) is a dynamic process related to managing interdependencies and social contingencies in a prudent (e.g., trial-and-error methods) and preliminary (e.g., time-limited) rather than permanent way [S. Kuhlman et al. 2019, pp. 1091-1097].

One accepted definition of innovation systems defines them as *"new social practices that aim to improve the satisfaction of social needs with respect to existing solutions. They arise from working conditions, education, community development and health, among others. These ideas arise to expand and strengthen community relations"* [TEPISE 2014]. Based on the available definitions of social innovation frameworks, the researchers noted that one of the features of TIS is a "locally defined goal." According to Frenken, the formulation of a clear goal mobilizes existing organizations to collaborate and seek ways to achieve it, through coordination and cooperation with the community [Frenken, 2017, p. +44]. Frenken also notes that people who have been affected by a social problem in the past can greatly facilitate the creation of a set of solutions.

4. CASE STUDY SELECTION AND RESEARCH APPROACH

This paper examines four nature-based solutions projects in Lebanon – Evergreen City, a community park, a vertical farm and a community garden in the Sky Tower. In the early stages of the Evergreen City project, a collaboration between the authorities and residents identified possible links between the developing TIS structure and phenomena known as nature-based solutions (NBS). The latter are defined as "solutions to social challenges that are inspired and supported by nature and bring more natural features to the city." Organizations around the world, including the UN, have noted the importance of such innovations for combating climate and socioeconomic change. For this reason, nature-based solutions (NBS) are considered an important and growing field of social innovation.

Initial ideas for linking NBS and the TIS framework were presented at the 2018 World Social Entrepreneurship Forum in Glasgow [S. McQuaid et al. 2018], but at the time there was limited data available on nature-based solutions (NBS).

Lebanon is seen as a country where not much NBS has been introduced. On the other hand, however, problems can be seen, such as the economic crisis, the migration crisis or the increase in crime, etc. Nowadays, the public is beginning to see the potential of NBS to solve many climate (and other) problems.

The case study was drawn from work undertaken as part of Connecting Nature, a five-year European project that sought to understand and verify the impact of NBS on developing the practices needed to increase urban resilience, innovation and governance using NBS. It was then expanded by the authors of the article by way of their own observations.

The choice of case studies is primarily driven by the original objectives of the project. The case study examples were chosen for analysis to represent social innovation at different stages and in different parts of Lebanon. The projects that form the basis of the article include: Evergreen City, Life Lab vertical gardens and Green Studios.

5. CASE STUDY ANALYSIS RESULTS

This section of the article presents a summary of the results of the case study analysis to determine the presence of TIS elements, consistent with the system described above, as well as the opportunities provided by the implemented NBS. The examined case study was then analysed, highlighting any insights related to the advantages that affected the quality of life in the city. In the description of the case study, attention was paid to the city's outline in which the NBS projects deemed relevant to the case study were located.

5.1. NBS project analysis: evergreen city – – Beirut

Horsh Park, or Beirut's pine forest, has existed since at least the 13th century. This green space, the only one on such a large scale in the city, underwent a re-development in 1992. The initiative was commissioned by the Beirut authorities in consultation and with the support of the Ile-de France region. A team of French and Lebanese architects and urban planners (Jacques Sgard, Trebucq, Ivy Papadakis, Jean-Claude Hardy, Pierre Neema, Frederic Francis) proposed a new layout for this forest that included native tree and shrub species. Unfortunately, the park remained closed and inaccessible to the community despite the revitalization. The city authorities, despite pressure from residents, did not make the park area accessible due, for example, to the area's inadequacy to meet safety requirements.

Lebanon offers few public green spaces [E. Bou-Zied et al. 2002, p. 128]. Evergreen City is a project created by prominent architect Raëd Abillam, who, based on public participation, interviews with residents, and in consultation with the city government, prepared a concept on how to modernize the park to serve as many users as possible. This is a very important project, because for decades Horsh Park was closed, and thus did not serve its function at all.

The architect divided the park into three zones – a green zone for rest and recreation, resembling a classic park with paths and benches. The park was also planned as a zone for culture, public programs and community events, with space for fairs or exhibitions. This would allow residents and tourists to enjoy the space as they see fit. By design, the park was to be bustling all week long – not just at weekends. The design premise was also to create a place that would integrate the residents of the three neighbourhoods that adjoin the park – indigenous Lebanese, Syrian refugees and the so-called slums. Evergreen City was to be a place where the community could practice "urban farming" and socialize together.

Beirut's pine forest is a huge area that covers about 2 hectares and is a unique green space, considered the largest garden in Lebanon. However, it lacked sufficient infrastructure to accommodate a sufficient number of users. The reconstruction plan promoted the development of facilities and services necessary for the park's operation.

The architect divided the park into several basic zones:

- Green zone for residents to meet and spend leisure time. This zone consists of benches for lounging or table games and a small botanical garden. It is covered with permeable gravel on which water does not accumulate, penetrating deep into the soil and irrigating it.
- Fitness and sports activities zone – surfaces made of concrete, a playground with a special rubber surface that increases the safety level of children. The architect also proposed a sand pool in this zone, where sensory activities for children take place. The fitness zone, in turn, is enriched with a climbing wall or a gym. Permeable concrete as a surface, in turn, allows for efficient drainage of water into the ground – even during hot days.
- An area for public events with space for an open stage where scenery can be installed.

As a result, Horsh Park was to be a true cultural, entertainment and social centre 7 days a week. Special types of finishes for the walkways and pedestrian routes not only create an aesthetically pleasing surface, but also allow rainwater to freely irrigate the ground. As a result, it remains circulating in the park at all times.

Unfortunately, the project was not finalized in its entirety due to lack of sufficient funding from the government. However, many residents who have been exposed to the idea of Evergreen City are hopeful that the project will one day be realized.

The first observation regarding the mapping of the nature-based solutions project for Evergreen City to the TIS structure is that, for the most part, the premise has similar characteristics to TIS. It is a public

Tab. 1. Overview of TIS features by NBS case (Evergreen City). In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary coalition	Knowledge exchange	Public consultation
Evergreen City					

Source: by the authors.

utility project that involves the revitalization of a public space – a green area. The project encountered a serious social problem – a lack of relations of Beirut's neighbouring areas and an insufficient amount of green space for common recreation. Therefore a common local goal was defined, which was to create a park that would serve as many users as possible, throughout the week. A temporary coalition was also formed with the government to implement the project. Unfortunately, the cooperation with local governments ended due to insufficient funds that the authorities could offer. In the course of developing the concept, the architects also consulted the public to come up with the best solutions.

5.2. NBS project analysis – community garden in sky tower (New Doha)

with the growing economic crisis that Lebanon is going through, guaranteeing residents access to food has become a priority for many authorities. However, local governments are keen to ensure that this food is produced in a sustainable manner that protects natural resources and enhances biodiversity. The origins of the "environmental health movement" in Lebanon stem from two independent developments that gradually overlapped. The first was a reaction on the part of urban consumers to the poor quality of food that was sold in Lebanon during and after the war period. The second was a reaction from farmers to the chemicals used on farms and in agricultural processing [Tawfic A. 2003].

surrounds the complex. Residents were to gain not only access to healthy food, but also contribute to compost production by segregating their garbage (after being trained by FHF Foundation experts). The project was completed in 2021.

The garden takes the form of a greenhouse, where residents grow vegetables for their own use. The area surrounds the modern New Doha building complex. The garden uses a traditional system of cultivation, which residents take care of themselves – for example, by irrigating them.

The community garden project at the Sky Tower in New Doha has slightly fewer TIS elements than Evergreen City – in contrast, much less community consultation was implemented. The project's top-down assumption was that Lebanese residents lacked access to sustainable food. Hence it did not analyse what exactly New Doha residents wanted access to. As with Evergreen City, the social problem and the local goal were carefully defined with this project as well. The initiative also included a temporary coalition of residents with the authorities and a foundation [Ammar W. et al. 1998].

5.3. NBS project analysis – community agriculture (Beirut)

The Beirut Social Agriculture Project is an initiative of a local group of urban activists – students from St. Joseph's University in Beirut and Patrick Gear, president of the Rotaract Club of Beirut Center. It was intended as a quick response to the food crisis the city

Tab. 2. Overview of TIS features by NBS case (social garden at Sky Tower, New Doha). In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary coalition	Knowledge exchange	Public consultation
Community garden in Sky Tower					

Source: by the authors.

In early June 2020, the Food Heritage Foundation, in cooperation with Real Estate Beirut, initiated work on a sustainable urban agriculture project at the Sky Tower residential complex in New Doha. The project aimed to implement sustainable agriculture in an urban environment and included various aspects of agriculture – fresh fruit and vegetable production, aromatic plants, free-range egg production, etc. The project also included hiking trails in the pine forest that is slowly sinking into. Lebanon is a country with beautiful topography, with 12% of arable land suitable for most crops. Unfortunately, the authorities do not pay that much attention to growing food – Lebanon imports about 80% of its food. The economic crisis, in turn, has revealed a serious problem with access to basic foodstuffs.

The garden uses an ecological pavement in the form of water-permeable gravel. The task of this ma-

terial is to reduce the problems of inadequate irrigation for plants and excess irrigation. As a result, the optimum groundwater level is maintained in the garden area at all times, and the ecological balance is maintained. The paving in the form of water-permeable gravel also helps to maintain the natural circulation of water in nature.

This project contains all the features of TIS and is a textbook example of this premise. The main goal of the Beirut urban garden project was to create access to cheap food – it is cheaper to grow your own vegetables or fruit than buy them from foreign markets. A team of activists distributed boxes of vegetable seedlings to residents with the hope that one day the community would become urban gardeners. The activists wanted to introduce urban agriculture in a simple way, so that everyone could grow food on their empty plots, balconies or rooftops. They presented their idea to clubs across the country. When they raised enough funds, they sought partnerships with various NGOs to recruit beneficiaries and connect with families. Agricultural consultants helped the activists purchase seedlings and prepare a brochure in Arabic with simple steps for irrigation and plant care.

The results of the initiative were surprising – more and more families started asking for boxes of seedlings. The process of planting or caring for plants brought families and neighbours together. Groups cooperated with each other, and social ties grew much stronger. In addition, urban agriculture has contributed to some extent to improving the aesthetics of neighbourhoods and increasing access to green spaces. This in turn has positive social and therapeutic results [Trivedi C. et al. 2015].

5.4. NBS project analysis – urban vertical farming (Beirut)

In Beirut, a Beirut Farm container has been erected on an empty parking lot in Furn El Chebaak. The author and initiator of this project is Sandro Allouche. The project operates as an urban farm in the heart of the city and falls under the category of vertical agriculture. It is the first farm of its kind in Lebanon, giving residents the opportunity to access food while using 95 to 99% less water than traditional agriculture. It is an initiative of the Agricultural Research Center of the American University in Beirut. The project was also intended to integrate the urban community. The results of the innovation are still in the research phase [Poulsen M. 2017].

When initiating the construction of the container, Sandro Allouche wanted a place that would provide the best quality vegetables. The vertical farm in Beirut uses organic aquaponic cultivation. The project stands out from the rest because of its form – it is the first farm of its kind in downtown Beirut.

Depending on the season, the vertical farm uses specific plants. They are placed one above the other, so that the available space is used much better and so that there is no need to constantly enlarge the container due to lack of space. Such ecological cultivation of plants in a container means that the risk of adverse effects of weather factors on the quality of the crop is significantly reduced.

Tab. 3. Overview of TIS features by NBS case (urban garden's in Beirut). In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary coalition	Knowledge exchange	Public consultation
Community Agriculture in Beirut					

Source: by the authors.

Tab. 4. Overview of TIS features by NBS case (vertical farm, Beirut). In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary coalition	Knowledge exchange	Public consultation
Vertical farming in Beirut					

Source: by the authors.

6. SPATIAL FORMS OF SOCIAL INNOVATION AND NATURE-BASED SOLUTIONS

The spatial aspect in relation to social innovation can take different forms [N. Siggelkow et al. 2005, p. 101-122]. In the case of the community garden project at the Sky Tower in New Doha, the innovations related to education and growing edible plants. The FHF Foundation, after discussions with the city's residents, began creating a garden that was to become a space for neighbourhood activities, a place to provide shade on hot days. The social innovation there is certainly a comprehensive approach to ecology. Residents were to contribute to the production of compost, having been trained by the foundation's staff as to the principles of garbage collection and segregation. Such a garden on the roof of a high-rise building was to be a self-sustaining space that would unite residents.

Evergreen City, on the other hand, is a design premise that involved the reclamation of a disused area of several hectares of forest in Beirut. The main goal of the city's community and architects was to create, together with the authorities, a public green space that would allow people to spend their leisure time surrounded by nature throughout the week.

EW in the case of community garden, agriculture and vertical farm innovations in turn manifests itself in a coalition between the idea's founders and residents. There are no laws or regulations that address the implementation of such solutions in Lebanon. Nevertheless, many private individuals, organizations or students on their own in consultation with the community are trying to implement NBS with elements of TIS.

Only one project met all the assumptions that temporary innovation systems should meet. In theory, they should be innovative ways of working out specific goals by introducing:

- new and effective organizational forms,
- lifestyles,
- regulations and solutions,
- elements for solving problems, different from traditional practices [A. Łuczyszyn 2005, p. 46].

7. NATURE-BASED SOLUTIONS ACCORDING TO THE PEOPLE OF LEBANON

The study included the author's evaluation of projects in terms of the presence of given elements on the site that affect the usability, functionality or aesthetics (in the subjective opinion) of the place. The prepared template was based on a 5-point scale, the criteria of which meant:

- 1 – element missing,
- 2 – negligible number of elements,
- 3 – discernible numbers of elements,
- 4 – a lot of elements,
- 5 – a lot of elements.

Tab. 5. Nature-based solutions survey among Lebanon citizens

Evaluation criterion	Evaluation in scale 1-5			
Project name	Evergreen City in Beirut	Community garden in Beirut	Vertical farming in Beirut	Community agriculture in Sky Tower
Presence of vegetation cover	4 – Numerous pine trees, native shrubs and flowers	4 – Numerous ornamental trees, vegetables grown by residents, flowers	4 – Inside the farm numerous cultivated vegetables	4 – Inside the greenhouse many green crops
Level of land devastation	4 – The area is neglected in places. In the vast majority of the park, the area is maintained in very good condition – no traces of devastation of elements of small architecture	3 – In several places visible elements of devastation of the area – damaged benches, trash garbage cans	5 – The area is very well preserved	5 – The area is very well preserved
Saturation with infrastructure	5 – Numerous pedestrian and bicycle routes	5 – Pedestrian routes	5 – Good access infrastructure	5 – Good access infrastructure

Harmony of landscape composition	4 – Park on a triangular plan with numerous ordered landscape elements	4 – Landscape composition at a satisfactory level – garden layout with symmetry and clarity	1 – Not applicable	1 – Not applicable
Presence of water resources	4 – The middle part of the park with a fountain	4 – Fountain	1 – No	1 – No
Degree of land use	3 – The area is not used in its entirety. For the most part, you can see orderly greenery, elements of small architecture, pedestrian routes, a playground or a place for recreation	4 – The area is practically all used	5 – Farm area entirely used for crops	5 – Greenhouse area entirely used for crops
Presence of forms of landscape protection	1 – No	1 – No	1 – No	1 – No
Landscape dominants	1 – No	1 – No	1 – No	1 – No
View axes	4 – View axis at the intersection of streets Sami El Solh, Tayouneh and Old Saida Road	3 – View axes on city buildings	3 – View axis of residential buildings	3 – View axis of the building complex in the New Doha complex
Urban openings	4 – Urban landscape openings – to the adjacent green area	1 – No	1 – No	1 – No

Source: by the authors.

Evergreen City in Beirut is a project that has most of these elements. The presence of vegetation is abundant in Horsh Park – native species of shrubs, trees and flowers. They are preserved in good condition – as is the entire park. The central part of the park is a fountain, which on summer days provides a place where residents can relax. Also, the saturation of infrastructure is at a satisfactory level in the park – numerous pedestrian and pedestrian-pathways. The area is practically entirely used and developed – there are a few wastelands of land in undeveloped form. There are also several urban openings and view axes in the park.

The community garden in Beirut in terms of the variety of greenery is at a satisfactory level – numerous species of flowers grown by residents. Unfortunately, devastation in the form of graffiti on the fence or damaged benches or trash garbage cans can be seen in the park. The garden maintains a harmonious composition with numerous pedestrian routes. There is a fountain in the area, and the area has been almost entirely landscaped. In some places there are unused or neglected green areas. In the garden, one can also notice view axes to neighbouring buildings.

The vertical farm in Beirut is a peculiar design, as compositional elements were evaluated both inside and outside. Inside the container there are numerous species of grown food. The area is very well preserved and landscaped. Convenient access to it has been provided – access to the building on the roof on which the farm is located is guaranteed by pedestrian and vehicular routes. In turn, the roof of the facility can be reached by stairs and an elevator located inside the building. The view axis from the roof of the building directs to the neighbouring buildings.

Community agriculture in the New Doha complex uses many vegetable species for urban cultivation. The land is well developed for cultivation and maintained in good condition.

There are no landscape conservation forms or landscape dominants in any of the analysed projects.

CONCLUSIONS

The purpose of the research and analysis was to verify whether TIS solutions contribute to a better understanding of the evolution of social innovation projects and/or the potential for more informed design. The main objective of the research was also to verify whether TIS have an impact on the success of the NBS in question. The goal of the research was also to verify whether and to what extent the analysed projects use elements of urban composition.

The author's analysis of the presence of urban composition elements in the four projects has led to the following conclusions:

- none of the analysed projects is covered by a form of landscape protection;
- most of the analysed projects are in good technical condition and well developed;
- water is an element that significantly increases the attractiveness of projects – in those with fountains, many more users of urban space were observed.

An analysis of four nature-based solutions projects in Lebanon in relation to the TIS system has led to the following conclusions:

- temporary innovation systems may have no relation to nature-based solutions;
- in some projects (especially those that can generate the innovations needed to solve social troubles) there is evidence that TIS-like features are emerging and that they are the same as the needs of society [M.L. Rhodes et al. 2019, pp. 16-18];
- in places where there were social problems (especially lack of social activation), there is a predominance of TIS features [C. Hood 1991, pp. 3-19];
- the presence of established local goals and public involvement in project development does not require the implementation of other TIS features. This means that, based on the analyses performed, public involvement does not have the effect of automatically increasing the complexity of the TIS;
- despite the fact that more and more features of the 'new public management' (Hood, 1991) are emerging, such as citizen involvement, private sector involvement and outsourcing, they do not present any pattern specific to NBS projects.

Table 6. Case study analysis. In each case, it is color-coded to facilitate analysis and reference [green – numerous presence of TIS elements (on a 100% scale it is in the range 100%-70%), yellow colour – moderate presence of TIS elements (on a 100% scale it is between 70%-40%), red colour – no or low presence of TIS elements (on a 100% scale it is in the range of 40%-0%)].

Project	Social aspect	Local aim	Temporary coalition	Knowledge exchange	Public consultation	Conclusions
Evergreen City A forest restoration project in Beirut that took advantage of the potential of the area's location	Yes – lack of community integration, lack of access to green spaces and insufficient space for outdoor events	Yes – to create a park that will serve as many users as possible, throughout the week. Integration of society	Indirect – planners formed a coalition with the government to implement the project. Unfortunately, the cooperation with local governments ended after some time due to insufficient funds that theauthorities could offer. During the implementation of the concept, the architects	Indirect - the exchange of knowledge occurred not only between designers, but also between residents	Yes - public participation was conducted to select the best design solutions	Evergreen City is a perfect example of how ideal assumptions that can improve the quality of life in a city can't be realized without government support and adequate funding. As a result, the project did not come to fruition

			also consulted the public to develop the bestsolutions			
Community garden at Sky Tower Sustainable urban agriculture at the Sky Tower residential complex in New Doha	Yes – lack of access to cheap and quality food for residents	Yes – implementation of sustainable agriculture in an urban environment containing production of fresh fruits and vegetables, free-range eggs, etc. Education in terms of environmental awareness of residents	Indirect – coalition of authorities with the foundation, but not with residents	Indirect – the foundation provided full support to residents in growing plants. However, the necessary information on plant cultivation and care was missing	Indirect – the project assumed top-down that Lebanese residents lacked access to sustainable food. Thus, there was noanalysis of what exactly the residents of New Doha wanted access to	The community garden at Sky Tower is a very useful social initiative that aims to provide access to organic, healthy and affordable food in times of economic crisis. The project was completed in 2021 and deemed a success
Community agriculture in Beirut The project was a quick response to the food crisis the city is slowly sinking into	Yes – lack of access by a large group of Lebanese to basic foodstuffs	Yes – creating access to cheap food – it is cheaper to grow your own vegetables or fruit than to buy them from foreign markets. Integration of residents, access to more green spaces	A group of urban activists – students from St. Joseph's University in Beirut and the president of the Rotaract Club of Beirut Center – have formed a coalition with sponsors and beneficiaries. Agricultural consultants helped the activists purchase seedlings	Yes – the project beneficiaries received the necessary brochures with information on plant care and cultivation	Yes – during the public consultation, information was obtained on the demand for specific food products (vegetables, fruits)	The project is a textbook example of NBS containing TIS elements. Among residents, it was considered a success – more and more families started asking for boxes of seedlings. The process of planting or caring for plants brought families and neighbours together. Groups cooperated with each other, and social ties grew much stronger. In addition, urban agriculture contributed to some extent to improving the aesthetics of neighbourhoods and increasing access to green spaces. This in turn has positive social and therapeutic results
Vertical farming in Beirut Self-sustaining vertical farm project in downtown Beirut – open to the public	Yes – lack of access to healthy food for residents	Yes – the ability for residents to access food while using 95 to 99% less water than traditional agriculture	No	No	No	By design, the project was intended to respond to food accessibility problems. At this point, however, the results of the innovation and the effects of its implementation are lacking

Source: by the authors.

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