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# Co-Creating for Locality and Sustainability: Design-Driven Community Regeneration Strategy in Shanghai's Old Residential Context

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**Abstract:** Community regeneration has drawn much attention in both the urban development and sustainable design fields in the last decade. As a response to the regeneration challenges of Shanghai's old and high-density communities, this article proposes two design-driven strategies: enabling residents to become innovation protagonists and facilitating collaborative entrepreneurial clusters based on the reorganization of community resources. Two ongoing collaborative projects between the Siping community and Tongji University—Open Your Space microregeneration (OYS) and the Neighborhood of Innovation, Creativity, and Entrepreneurship Towards 2035 (NICE 2035) living labs project—are adopted as main case studies. Research findings are put forward through a structured analysis of qualitative data. Firstly, we reviewed the situation and sustainable goals for Shanghai's old residential communities, and how design-centric social innovation and collaboration can be effective interventions. Secondly, we analyzed resident empowerment approaches to decision-making, co-design, and co-management processes in OYS with participatory observation. Finally, through participants' interviews and key events analysis in NICE 2035, we investigated how living labs reuse community distributed resources to develop lifestyle-based business prototypes. The inquiry of this article proposes a co-creation mechanism and action guides towards localized and sustainable community regeneration, which can provide a contextual paradigm for similar challenges.

**Keywords:** community regeneration; design-driven collaboration; urban sustainability; social innovation; Shanghai community

## 1. Introduction

In the Chinese context, "community (社区)" has multiple meanings, including residential areas, residential quarters, neighborhoods, and housing estates. Due to the different perspectives of sociological research, scholars have not formed a unified definition of old residential community. These residential areas can be characterized by "comprehensive obsolescence," in which case their functional status is affected by urban development, social needs, and material aging factors as service life increases [1]. Shanghai is one of the most historic and cosmopolitan cities in China [2]. Its large area and population account for the high density of the residential fabric, with a large proportion of old residential buildings. In the 1990s, the city entered an era of rapid urban construction and real estate development, and single-function housing was the typical feature of residential communities during the period. As service life increases, backward infrastructures and limited development approaches in such areas cannot meet the material and spiritual demands of contemporary residents. A series of social problems have emerged and seriously affect people's living quality, such as the poor accessibility

of pedestrian and public spaces, a lack of cultural identity, and alienation with regard to interpersonal relationships. Therefore, the systematic and sustainable regeneration of old urban communities has been an urgent issue for economic, environmental, and social development.

In response to the above problems, scholars have proposed methods in terms of physical space redevelopment, collaborative planning with consensus and jointness [3,4], cultural-led and context-based regeneration [5,6], place quality, and environment content improvement to facilitate spontaneous and social activities [1]. Such practices explored available interventions and improved community vitality to some extent. However, some research contents have not been fully demonstrated and practiced in recent academic and practical fields. For example, it remains a problem to preserve the community's local culture and living habits when developing design-driven regeneration concepts, and to optimally activate residents' creativity and community business vibrancy towards sustainable regeneration, especially for Chinese high-density cities like Shanghai, with so many old residential communities and large elderly populations.

Through the above considerations, this paper studies community regeneration with the following driving questions: What are sustainable community regeneration goals and approaches regarding Shanghai's unique social problems? Can we use design-driven and user-centric solutions to build a mutual-aid network towards such goals? We selected case study analysis as the main research method and chose the Siping community, where Shanghai Tongji University is located, as the study area. Considering two projects, Open Your Space (OYS) and Neighborhood of Innovation, Creativity, and Entrepreneurship Towards 2035 (NICE 2035), this article discusses design approaches from the perspectives of resident empowerment and resource reorganization, and studies the collaboration model and corresponding regeneration strategies. The research conclusions enrich and expand the theoretical application of the paradigm of sustainable urban development and provide practical guidance for other related community regeneration issues as well.

## 2. Related Works

### 2.1. Sustainable Urban Regeneration

As a research branch and practice area of urban regeneration, the characteristics and methods of community regeneration need to be studied on an urban level, especially in the sustainable urban regeneration context. The notion of urban regeneration refers to a process of slum clearance and physical redevelopment that takes into account other elements, like heritage preservation [7]. Urban regeneration aims at promoting land values and improving environmental quality with methods of redevelopment and rehabilitation [8]. A promising approach, sustainable urban regeneration has been put forward to cope with the challenges of urban sprawl, abandoned spaces, and the weak interlink between urban design and the needs of local communities [9,10]. Moreover, it has also made an active contribution to the increasing number of possibilities of promoting communities' cohesion and people's engagement [11–13].

Aiming at sustainable regeneration, several scholars have discussed methods of tangible and intangible local resource reuse through evidence-based research. Ho put forward an action guide including strategies to improve the effective use of the building stock and land resources in the city [14]. Additionally, Lak pointed out that a city can be regenerated physically, socially, and economically with cultural heritage when it makes maximum use of cultural policy-making, cultural events, participatory management, and the enhancement of public urban spaces [15]. Similarly, Degen and Garcia highlighted the role of local culture to improve social cohesion and market the city's brand [16]. Further, Seo addressed an active effort of "Community Planning Group" policy and the commitment of artists to urban regeneration governance [17].

People, including residents and other stakeholders, play an important role in regeneration processes aiming at promoting urban vibrancy and a sense of cohesion, in which strong partnerships at different levels are crucial [18]. Consequently, the co-creation mechanism of the knowledge resource

(experts), adjacent public (end users), and private sectors (developers and investors) should be fully developed [7,19]. The preferences and habits of residents, as the most basic and ultimate stakeholder in such co-creation, influence regeneration decision-making directly through participatory planning and networked governance [20]. Following this basic view, Teder has explored the approaches of collaborative place-making between professionals and citizens [21], while the work of Tan and Altrock focused on how stakeholders use storylines driven by local and expert knowledge to frame regeneration problems and continuous experimentation [22].

*2.2. Action Direction for Sustainable Community Regeneration in the Shanghai Context*

Shanghai's old residential communities, built between the 1980s and 1990s, are characterized by times and regionalism, such as a high plot ratio, an aged infrastructure, less concentrated green spaces, fewer leisure spaces, linear public space (alley and lane), and mixed community traffic. Today, the single division of spatial functions and the lack of places where residents can spontaneously interact in such residential communities have clearly affected the social relationships and community vibrancy [23]. In the early part of this century, community regeneration in Shanghai was based on a comprehensive physical space renewal, with the demolition and repair of dilapidated infrastructure. In recent years, references and publications provide relatively strong evidence that environmental improvement, cultural context, and local attributes are the major considerations or concerns of designers while regenerating communities in Shanghai. Such as the Xintiandi reconstruction project, as a method of urban heritage preservation, it has greatly promoted the culture values of community regeneration. Designers and architects adopt adaptive regeneration to protect and enhance the cultural elements of old built community and to transform it into a tourist business district. This cultural value reshaping has been a tentative sustainable exploration [24]. After this, community regeneration practices show a trend of environment diversity improvement and microregeneration with public participation, visible in the co-design and co-planning of more public spaces, parks, and neighborhood centers for resident interaction and leisure.

Now, the reorganization and management of resources have been considered as another effective form of sustainable community regeneration. The "Implementation Measures of Shanghai Urban Regeneration" promulgated by the urban government put forward a concept of resource redevelopment. It refers to making the regeneration solutions more people-oriented, like mobilizing the enthusiasm of social subjects, promoting the development of regional functions, and improving public services [25]. In addition, the resource means space reuse. For example, the 2016 Planning Guidance of 15-Minute Community-Life Circle, developed by the Shanghai Urban Planning and Land Resource Administration Bureau, also encouraged hybrid and embedded innovation spaces during community regeneration. According to the guidance, based on a collaboration with universities and research institutions, more low-cost and co-work offices should be opened to microenterprises, startups, and creative groups by redeveloping idle community space [26].From the perspective of the social and psychological connection between people and between people and their living environment, community building as an active method has been fully discussed recently. The definition from Wikipedia points out that it is the creation or enhancement of a community among individuals within a regional area or with a common need or interest. In summary, achieving localized and sustainable community regeneration goals in Shanghai's native context is a systematic sociology experiment. This suggests that the actions and directions towards resident empowerment and resource reorganization are effective methods that should be considered by urban planners, designers, and community administrators.

*2.3. Design-Driven Social Innovation and Collaboration as a Sustainable Engine*

Design, as a collaborative inquiry, is a social process for building coherence to co-construct valid knowledge [27]. This process facilitates social changes and enables people to exchange their physical needs for spiritual rewards [28]. Richard Buchanan [29] put forward the concept of the "Four Orders of Design" and divided design objects into four fields: symbols with text and graphics as media, tangible

artifacts, activities and events, and systems and environment. The fourth area puts more emphasis on exploring the role of design in sustaining, developing, and integrating human beings into broader ecological and cultural environments, as well as shaping such environments whenever desirable and possible. Design concepts evolved from real context problems based on in-depth research and the prediction of user behavior. Therefore, design can also be understood as a problem-based learning cycle [30].

On the one hand, design for social innovation is one of the sustainable engines of community regeneration. As "a new idea that works in meeting social goals", it often unifies personal interests with social and environmental benefits [31]. Further, design for social innovation is also based on the well-being of an ecosystem formed by the relationship between people and between people and the environment [32]. Moreover, from the perspective of the relationship between people, social values are created by reshaping identities and interpersonal relations in view of small but decisive qualitative changes [33]. As for the relationship between people and the environment, design for social innovation has been applied to three fields, including spatial planning and community development, governance, and co-production and service design [34]. From 2016 to 2019, the Shanghai Urban Public Space Promotion Center recruited 20 architects and designers to participate in the Walking Shanghai Plan community microregeneration project. In this project, community vibrancy and people interaction were activated by co-creating children's playgrounds, micro public gardens, community entrance renovations, and slow road designs, and by landscaping and upgrading old housing corridors [35].

On the other hand, design-centric collaboration is another sustainable engine and foundation of community regeneration. It amounts to co-creating values by engaging people as co-producers and embedding design experts as parts of a community to improve living quality [36]. Such collaboration enables multirole capacity and benefit-sharing, and facilitates complex solutions in state agencies and the market, voluntary, and community sectors [37]. Nowadays, designers are no longer just technical experts or decision-makers. In effect, they are playing a parallel role in innovation process. With people's knowledge collection, the optimal use of capabilities, and the reduction of waste, the co-creation groups promote sustainable community regeneration. Under this collaboration culture, some universities and design colleges are trying to build collaboration networks. Table 1 shows how they can play an active role in community regeneration.

**Table 1.** Participant Collaboration Cases of Community Regeneration.

| Organization | Project | Collaboration Methods | Action Direction |
|---|---|---|---|
| Tongji University | Co-Governance Landscape | The Flower Friendship Association invited children and the elderly to design and claim their own vegetable or flower gardens | People empowerment |
| Harlem Social Lab | Harlem Collaboration Project | Joint action of universities, local communities, and businesses to promote housing regeneration, community health services, and youth engagement towards an overall improvement in the vitality and quality of the young population in Harlem | Resource reorganization |
| Daito Bunka University | Takashimadaira Danchi Regeneration | Universities promoted the redesign of vacant houses and co-created a local currency with residents, for exchanging services and other community resources | Resource reorganization |

## 3. Study Area and Research Method

This article adopted a mixed case study analysis as main research method. Based on the hypothesis that design-driven co-creation and social innovation interventions can be the sustainable engines of the aforementioned community problems, two inter-related research questions to be further discussed are as follows:

- What are the contributions, motivations, and modes of participation of multiple stakeholders in a community regeneration co-creation network?
- How to enable the localized and sustainable community regeneration driven by approaches of resident empowerment and community resource reorganization?

*3.1. Study Area: Shanghai Siping Community*

Siping community, the study context of this article, is located in the midwestern part of the Yangpu District, with a permanent population of more than 100,000 people (as shown in Figure 1a,b). In this community, covering an area of 2.75 km², there are many old housing buildings with over 20 years of age, and 70% of the dwellings are after-sale public houses built between the 1950s and 1980s. This mature residential community stands out for its monotonous living forms, backward infrastructures, the population pattern of elderly retired workers, and a lack of community vibrancy (as shown in Figure 1). In response to the challenges of such complex social issues, Tongji University College of Design and Innovation (Tongji D&I), which is located in this community, took actions with community administrators to integrate design knowledge and local resources to activate a series of social innovation projects.
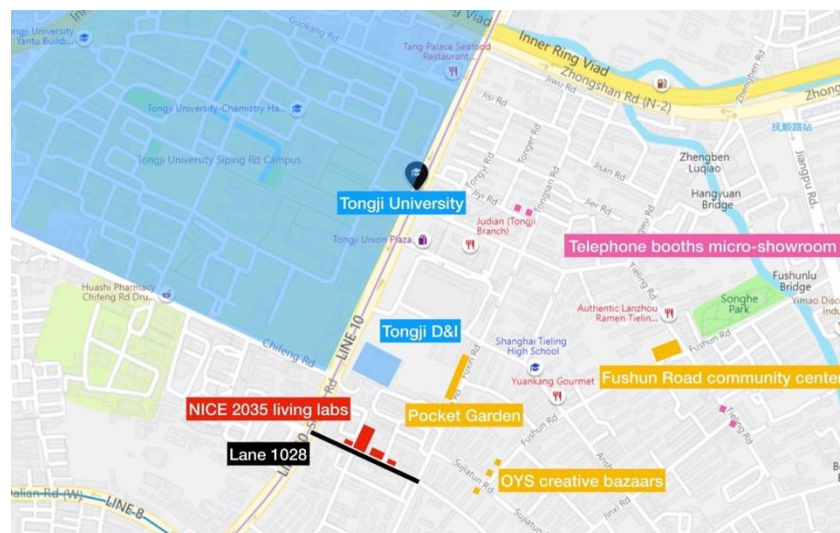


(**a**)



(**b**)

**Figure 1.** (**a**) Project Location and (**b**) Residential Buildings in Siping Community (Source: Figure 1a was drawn by the authors based on Bing Maps: https://cn.bing.com/maps).

The first case, Open Your Space, is a community microregeneration and social innovation project jointly initiated by the Tongji D&I and the Siping committee. The word "Open" has multiple meanings in contexts such as culture, emotion, cohesion, sustainability, connection, sharing, and interaction [38]. This project brings the expertise of environmental design, service design, and graphic design into the built environment of urban communities and explores how to use sociological and cultural approaches to facilitate community creativity (Tongji University. Fourth Season of Siping Open Your Space: Progressive Promotion of Community Regeneration, Design for Community Resilience. http://tjdi.tongji.edu.cn/NewsDetail.do?ID=4826&lang=).

The second case, NICE 2035 [26], is a collaborative regeneration project between Tongji D&I and the Siping committee, initiated by Prof. Yongqi Lou. Based on the space reuse and business upgrade, Tongji D&I has attracted lifestyle-based startups and innovation projects to build a series of future living labs in an old alley (Lane 1028) that needs to be renovated (as shown in Figure 1a). New products, services, and living experiences offered by such living labs are related to the future lifestyles that the residents are most interested in, like future catering, sound, art, mobility, education, and shared kitchens. With the design approaches of pop-up stores, immersion exhibitions, interactive games, and training workshops, local people can not only understand what designers and researchers are doing, but also become involved in ideas, businesses, and community ecosystem generation with scientists and artists. Meanwhile, living labs test a series of prototypes of business models through this real interaction and conduct real-time user tests with residents. Since the business prototypes and community ecosystem are iterated and incubated in this real-life scenario, this alley is also called "Prototype Street" (Tongji University. NICE 2035 Prototype Street for Future Living. https://tjdi.tongji.edu.cn/NewsDetail.do?ID=4627&lang=). Consequently, this typical residential community has completed the regeneration transformation from a "consumption end" with problems to a "source of innovation" with creativity and entrepreneurship [39].

### 3.2. Research Method: Case Study Analysis

According to the previous two research questions, Table 2 shows the research framework of this article, which includes the sustainable directions of two cases, study objectives, data collection methods, and the corresponding regeneration strategies through the structured analysis of qualitative data. As the researcher and designer, we tracked the OYS design approaches from concept generation to implementation through a participatory observation method during five years. The analysis focused more on localized regeneration explorations of resident empowerment. Qualitative data were collected from two sources:

- Design-driven approaches and outcomes during three important stages of the design and co-creation process (i.e., decision co-making, co-design, and co-management). The practice which facilitates residents' actively contributing abilities and co-creating, based on local issues, cultures, and lifestyles.
- Stakeholders' collaboration, motivation, and performances during the above-mentioned stages.

In the case of NICE 2035, the analysis focused on the sustainable directions of resource reorganization. We studied the wide-attention interactive activities and main offerings provided by the living labs, recording events during two years after the beginning of the project (as shown in Table 4). Subsequently, through structured interviews (refer to Table 5) to lab and operation team organizers, the participation motivations, co-creation modes, and how to reorganize the community's stock resources for business prototype testing were investigated. Accordingly, the exploratory strategies for promoting sustainable community creativity and business vitality were drawn from this inquiry process.

**Table 2.** Research Framework.

| Case | Sustainable Directions | Study Objectives | Data Collection Methods | Qualitative Data | Corresponding Regeneration Strategy |
|---|---|---|---|---|---|
| OYS | People empowerment | Design interventions for residents' active co-creation (capability contribution and benefit sharing) | Participatory observation and reflection for related design approaches | Community microregeneration outcomes in three aspects of the design process: decision co-making, co-design, and co-management Stakeholder collaboration modes. | Co-creating for locality: from participant to protagonist |
| NICE 2035 | Resource reorganization | Community stock resources reuse and reorganization approaches for facilitating community entrepreneurial vibrancy | Recording of events and in-depth interviews to active lab organizers | Design-driven interaction activities of living labs. Each living lab's core offering, including products, service, business prototypes Collaboration motivation, pattern, and future business plan based on user requirements | Co-creating for sustainability: from startups to entrepreneurial clusters |

## 4. Case Analysis

### 4.1. The Case of OYS: Resident Empowerment Approaches

OYS aims to explore design intervention as the activation and catalysis of built environments and social relationship reconstruction within China's cultural context [38] From 2015 to 2019, the regeneration project has been carried out for five years. Designers, researchers, artists, and college students were involved in reshaping old residential buildings and the underutilized remaining public spaces to endow people's daily lives with art and creativity. The regeneration approaches that were developed included the redesign of old corridors, public space reuse, street art installations, and reconstruction community centers as miniature collection spaces for the residents' daily culture activities (e.g., discussion forums, interactive exhibitions, elderly activities, and co-working). Table 3 shows the analysis perspective of resident empowerment performance, which focuses on three main stages of regeneration concept development and implementation, including decision co-making, co-design, and co-management for design outputs.

**Table 3.** OYS Case Analysis.

| Resident Empowerment Performance | Design Outcomes | Major Collaboration Roles |
|---|---|---|
| Co-making regeneration decision | Problem interview and living quality investigation organized by students in environmental graphics design courses for the regeneration of old corridors and entrances Residents are involved in regeneration decision-making through participatory design workshops | • **Residents**: expressing demands based on living problems, responsibility sharing, acting as co-creators and direct beneficiaries of livable environment improvement. |
| Co-design for concept development | Household waste redesigned by residents for handicraft products, decorations, and visualization identities of Fushun Road community center Redesigning the traditional phone booth into a micro exhibition hall of community handicraft works Flash mob, design bazaars, and creative activities organized by local high school students | • **Designers**: facilitators, solution providers for regeneration solutions with participatory design, and collecting feedbacks from residents. |
| Co-management for design outputs | Flowers and plants in Pocket Garden are claimed by school students, managers, and residents in the Siping community Elderly residents as volunteers are responsible for the daily operation and maintenance of a new community center | • **Community administrators**: offering foundation, space, and policy support, and granting regeneration requests as agents. |

This suggests that each stage involves designers and community administrators' active facilitation for enabling local people to express opinions and share capacities like artistic taste and craftsmanship. For the co-making stage of decision, designers focused on residents' living quality requirements and existing problems to regenerate the old dwellings which were built between the 1970s and 1980s. During the second year of the OYS project, the Tongji D&I undergraduate students redesigned eight corridor spaces with the environmental graphics experts. They widely adopted demands and preferences of involved residents when determining the specific design points and construction plan. Designers also held several participatory workshops to get in-depth understanding and empathy for local people's actual living situations and predicaments, and then jointly decided on where to redesign, what materials and cultural elements, how to promote the plan collaboratively. Design outcomes during this stage include uniform colors to regulate wall facades, stylish floor guides visualization, and mailbox logos designed by residents.

On the stage of concept co-design, designers focused on localized social values based on the participants' co-creation. In the third year of the OYS project, design interventions integrated public art and enhanced the residents' capacity to improve community living and artistic quality. Co-design workshops with elderly people to regenerate Fushun Road community center and visualization guidance for different space functions were developed by participants using waste materials including audio tapes, plastic products, and wool. Similarly, children were involved in co-creation by participating in the outside wall drawing of this center, led by artists and designers. Owing to the support of design

expertise, the wisdom of ordinary residents has not only been enhanced, but also transformed into parts of the physical and cultural environment of the community. In addition, the social values of co-design were reflected in another collaborative workshop between Tongji D&I designers and Yangpu High School (located in the Siping community) students in the third year of OYS. During a two-day tutorial, teenagers learned to investigate the problems of relationship alienation in this area and subsequently organized design flash mobs on weekends to improve neighborhood creativity. This was created and managed by themselves and included a series of gamification activities based on local culture and the resident's preferences, such as poetry recitals, postcards for the future, and second-hand bazaars. Other design-driven approaches during this stage included turning unused telephone booths into micromuseums of local crafts (Figure 2a), co-designing old dwelling entrances and floor identities (Figure 2b), and transforming the community's waste station into an open social innovation research lab (Tongji DESIS lab and MIT-Tongji City Science lab) (Figure 2c). They have empowered residents for self-actualization and social change, and co-created a livable, vibrant, and emotional community as well. Such co-design approaches have enhanced local people's natural interaction, emotion cohesion, and a sense of identity during their daily lives through a self-directed participation in innovation.



**(a)** **(b)** **(c)**

**Figure 2.** (**a**) Telephone Booths Micromuseums; (**b**) Redesign for Old Dwelling's Entrance; (**c**) Tongji DESIS Lab and MIT-Tongji City Science Lab. (Author self-pictured, reference: Tongji University College of Design and Innovation, OYS Project Team, and Sustain X Research Center).

For the stage of design output co-management, designers involved community managers, retired people, and elderly volunteers to build a group for daily maintenance and basic service in Fushun Road community center. Another microregeneration project during OYS's fourth year, Pocket Garden, was a microplayground transformed from an unused open space. Designers invited community administrators, residents living in different corridors, and the middle and primary school students in Siping to claim plants separately and become responsible for their daily maintenance. In addition to these two points, the designer has also encouraged residents and students to provide feedback and actively iterate the microregeneration outputs and art installations that were built a few years ago in the community. Clearly, these resident empowerment methods have changed the role of residents from passive receivers to active creators. The co-management practice made design interventions take root in the local cultural context, not only to provide the residents with a sense of belonging, but also to develop a street quality and community resilience with accessible, flexible, and spontaneous popular participation.

*4.2. The Case of NICE 2035: Resource Reorganization Approaches*

NICE 2035 project is located in Shanghai, in a typical old residential lane (Lane 1028) of the Siping community, 200 meters long and 7 meters wide. Before the regeneration, the entire street was occupied by group renting houses, chess and card rooms, and abandoned houses. The community manager leased this space to Tongji for introducing innovative living labs to co-create future lifestyles. The aim of a living lab, according to the definition of the European Living Lab Network (European Network of Living Labs Network, available online: http://www.openlivinglabs.eu), is to coordinate different

stakeholders and lead to mature business models through a series of innovation, application, testing, iteration, and improvement processes [40]. In this project, such labs' offering is developed to lead and satisfy people's future living experience (Figure 3). They created ideas, products, and service prototypes in a collaborative cluster and helped the residential community to become a continuous entrepreneurship generator [39]. The stakeholders' roles were more diverse in this regeneration case. In addition to the locals and designers attracted by the university's knowledge resources, there were also capital companies, incubators, and start-ups whose core business is closely related to community lifestyle and user-driven innovation. This regeneration project reused both tangible resources (space close to university talents) and intangible resources (data on needs, preferences, and satisfaction in a real living context) to achieve a sustainable goal and a new community economy.



**Figure 3.** Interactive Exhibition on the Opening Day of NICE 2035 Living Lab (Author self-pictured, reference: the New Center of Contemporary Jewelry and Design Culture, Design Harvest, Neuni Materio).

Through key events recording (Table 4) and interviewing organizers (Table 5), we studied the living labs' experimental content and participation motivation through. As one of the first members to move in, Fablab O (future education lab) provides innovative education services of two kinds: (1) maker curriculums for children and middle school students, such as STEAM, 3D printing, and programming skills to cultivate systematic thinking through a learning-by-doing process; (2) sharing activities open to the public, such as discussion sessions, exhibitions, opening nights, the youth maker and entrepreneurship competition, etc. The participation motivation can be seen in the interview to the organizer, Xue:

**Table 4.** NICE 2035 Living Lab Key Events Record.

| Events | Organizers | Date |
|---|---|---|
| NICE 2035 opening ceremony, exhibition, forum, and roadmap | Project management team and Tongji D&I | 6 February 2018 |
| "Sound Glaze" interactive performance | Dadawa Sound Lab (future sound lab) | 6 February 2018 |
| Interactive exhibition on "World Entrepreneurship and Innovation Day" | Neuni Materio (future material lab) | 21 April 2018 |
| Fablab O opening night | Fablab O (future education lab) | 3 June 2018 |
| X Future City workshops | Fablab O | 12~14 June 2018 |
| Summer school on future robots | Fablab O | 7~8 July 2018 |
| Summer school on Scratch | Fablab O | 19~20 July 2018 |
| Fab X student training | Fablab O | 23 July 2018 |
| Young Maker competition and exhibition | Fablab O | October 2019 |
| New Space opening preparatory meeting: including X thinking lab (TANG design consulting) and HAIER future sharing kitchen, bakery, and cooking workshops | CREATOR studio (创邑) (operation teams) | February 2019 |

**Table 4.** *Cont.*

| Events | Organizers | Date |
|---|---|---|
| "Beautiful is in the Waves" sound art exhibition | Dadawa Sound Lab and Aston Martin (future mobility lab) | 24 March 2019 |
| Lab opening, digital media performance, and "Future City Mobility" design workshops | Aston Martin (future mobility lab) | 20 May 2019 |
| "Shining on the Stage" contemporary jewelry design exhibition | NoCC (future jewelry lab) | September 2019 |
| "Engine Wing" interactive installation workshop | Dadawa Sound Lab and robotic rm lab | October 2019 |
| "From STEM to STEAM" education forum | Tongji D&I and Fab O | 30 October 2019 |
| "Future Community Living" Tongji x Kolding collaborative design workshops | Tongji D&I and NICE 2035 project | November 2019 |

**Table 5.** Interview Outline.

| | |
|---|---|
| **Interviewee** | Mr. Xue of Fablab O<br>Organizer Liu of Dadawa Sound Lab<br>Manager Lu of CREATER<br>Manager Fang of CREATER |
| **Structured Questions** | Q1: What are the core products, services, and business models in this lab?<br>Q2: What is the participation motivation in this project?<br>Q3: How does your lab collaborate with Tongji University, other labs, community administrators, residents, and capital companies?<br>Q4: How to reuse community resources and develop interactive events for business prototype tests?<br>Q5: What are the plans or requirements for future commercialization and entrepreneurial project incubation? |

"Yangpu district has relatively rich student resources, like the Dahushan Road First Primary School and the Shangshi Normal University Second Affiliated Primary School. But there are fewer mature STEAM education brand competitors here. Thus, we have settled down in this space and hope to link to such schools for developing collaborative curriculums and potential target users nearby. Since the field of maker education is still relatively unfamiliar to Chinese parents and students, it is much appropriate to start from such a point in this residential community."

The maker education service within a walking distance is very attractive and convenient for community users, especially for students who come here by themselves or picked up by grandparents. Another collaboration motivation for Fablab O is the presence of professional instructors attracted by knowledge-sharing activities in Tongji D&I, which can greatly support their curriculum development. The excellent space location, abundant educational resources, and parents' needs together constitute intangible resources for testing future business models.

The Dadawa Sound Lab (founded by the famous Chinese singer Zhu Zheqin and Tongji D&I) focused on the possibility of interactive and artistic sound. They explored an integration of music and algorithms through main experiments and exhibition touchpoints. As with Fablab O, the great potential for user resources was the reason why they engaged in the project. Specifically, the collaboration motivation was accumulating multiple participators' sound materials for future commercialization with digital art design. The experiments of future business prototypes were driven by the residents' preferences, which included following the items: immersive performances, community live shows based on local people's sound materials, the sound images or related products for other labs, music experiments and maker curriculums for Fablab O, and residents' demo recording for personal voices design.

The Neuni Materio and NoCC labs focus on new materials and contemporary jewelry design in various application scenarios. They develop collaborative workshops and experience events with crossover brands to extend social impacts and potential users, such as fashion design studios, eco-friendly bag brands, high-end auto customization (Aston Martin future mobility lab), and furniture design studios. By leveraging each other's industry influence and sophisticated design expertise, the living labs can seize industry trends and users' emerging demands to take business priorities to the next stage.

CREATER, as the operation team for the NICE 2035 project, is a design studio specializing in regeneration and operations within cultural communities. The main role of this network is promoting online and offline resident activities, communicating with other stakeholders (i.e., community administrators, colleges, media, and capital companies), organizing the property rights, and optimizing the physical and collaboration environment for the living labs. CREATER also plans to develop more sustainable lifestyles combining work, living and art, like the ones promoted by the alley (Nong tang 弄堂) art museum, community co-working spaces, and the cooking and bakery lab in this area. As for the collaboration motivation, the manager, Lu, told us in the interview that it is the high degree of relevance linking this community regeneration project's goals and their own business development. Owing to testing the living lab modes in a real market context with target users, the mature regeneration approaches and creativity system can be copied and commercialized to other old residential community sections.

## 5. Findings

Based on the qualitative data analysis of the above case studies, the research findings will be elaborated in this paragraph from two aspects. One is stakeholder collaboration networks and the mechanism of two cases, which will be described in detail in Section 5.1. Another is the two substrategies of community regeneration supported by such collaboration. The first strategy, *"Co-creating for locality: from participant to protagonist"*, was studied through the practice of resident empowerment, in the case of OYS, and will be fully discussed in Section 5.2. Additionally, the strategy *"Co-creating for sustainability: from startups to entrepreneurial clusters"* was studied through the analysis of the resource reorganization methods of NICE 2035. Essentially, the two aspects of research findings are internally linked and mutually reinforced. The collaborative networks, as a foundation and innovation infrastructure, can build the social expertise prerequisite for the two action strategies. For the localized and sustainable strategies, they present a mutual promoting tendency towards the creative, vibrant, and circular regeneration paradigm.

### 5.1. Co-Creation Networks

In the two aforementioned cases, by means of the university's design-driven knowledge resources, the localized exploration was based on the action direction of sustainable community regeneration. The OYS project focuses more on the people empowerment level. Three important roles are involved in this collaboration network, including residents, students majoring in design and professional external designers (university-centric design resources), and community administrators. Essentially, residents need not only design interventions from experts to help improve their living environment, but also the participation in the construction of community habits and the self-expression of life aesthetics. With these basic requirements, design experts open the boundaries of the university and use the Shanghai residential community as a natural experimental field for social innovation design. Additionally, the community administrator acts as an agent for seamless communication between residents and designers about existing problems and solutions. This role dominates the effectivity of dealing with residents' opinions and the potential conflicts resulting from spatial and policy changes. Local people, external designers, and community administrators jointly build the collaboration network of community regeneration, in which their motivation and contribution are mutually promoted and circular (as shown in Figure 4a).

In addition to the characteristics of OYS noted previously, the stakeholders are more diverse and complicated in the NICE 2035 collaboration network. For external stakeholders, living labs provide contents including products and business prototypes, and the design talents co-create such contents and testing scenarios, while the capital companies invest in promising projects and attract potential job opportunities. For local roles, the community administrators provide support in the form of space, policy, and advocacy, and residents provide feedback on the user test data and results with real business prototypes. The internal participants of the living labs cooperate with each other spontaneously according to product characteristics, innovation capabilities, and business demands, and jointly form a business collaboration microecology. Consequently, the collaborative network in this project presents an integrated and multidirectional relationship. Each stakeholder contributes with capabilities while sharing resources, which means each end user in the network is not only the new experience requester, but also an innovation supporter. This reveals a mutual coordination of capabilities and needs to facilitate the formation of a circular collaboration mechanism (Figure 4b).
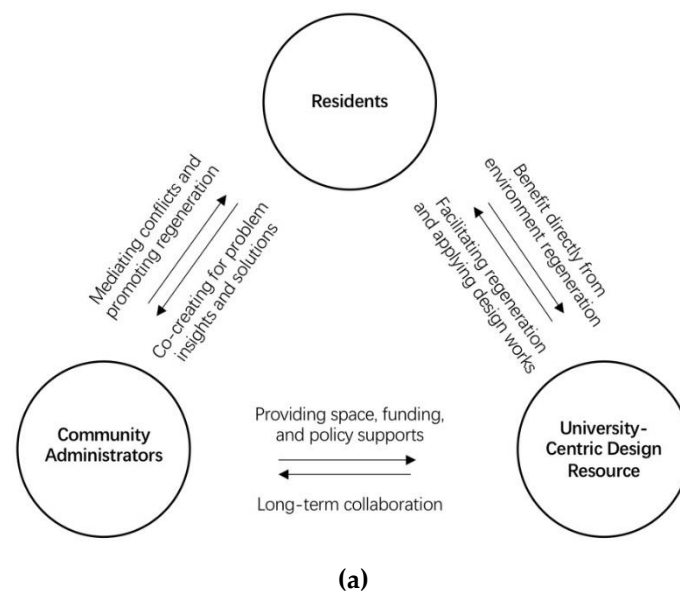


**(a)**

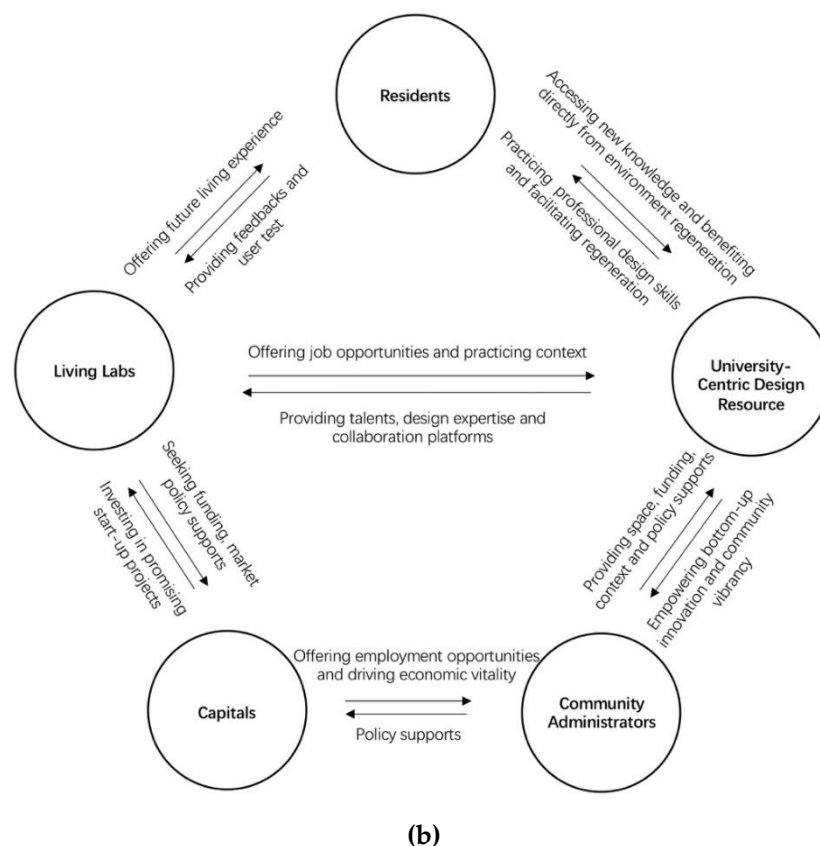**Figure 4.** *Cont.*

**Figure 4.** (**a**) The Collaboration Network of Project OYS; (**b**) The Collaboration Network of Project NICE 2035.

*5.2. Co-creating for Locality: from Participant to Protagonist*

This strategy provides a contextual paradigm which can break the boundaries of resident empowerment and reconstruct new forms of involvement. This refers to the self-driven co-creation, in three stages, of community regeneration participatory design, which includes decision co-making, concept co-design, and output co-management. In the first stage, the driving force is a common understanding of living problems and pain points among stakeholders. Designers should encourage residents to put forward requirements, preferences, and potential difficulties with a sense of innovator. For example, making full use of empathetic design tools and scenario simulations to investigate practical problems in an early stage of decision-making. Voting, drama performance, gamification, and participation in supervision and design prototypes to show the regenerated situation can effectively reduce the potential conflicts brought by differences in living habits.

In the second stage, with the driving force of residents' living wisdom, artistic tastes, and capacities, residents co-design the regeneration scheme with an in-depth understanding of community cultural life and common psychological needs. Designers can incorporate the enthusiasm of local people and their cultural history, traditional craftsmanship, and artistic expertise in concept co-creation. Like the environment redesign of Fushun Road community center by the residents' handcrafts, the organization and production of creative bazaars by local youth, and the micromuseum of aged telephone booths, they are all derived from residents' and designers' collaboration based on the interpretation of community culture and artistic aesthetics. Such outputs will increase people's unnecessary stay and interpersonal interaction towards connected community relationships.

For the stage of output co-management, the driving force is their recognition of the role of design outputs in promoting living quality and a common aspiration to maintain it. Designers should develop a series of collaboration approaches to facilitate people treating the community as the

place of their own spiritual aspirations and living taste expression. As shown in the Fushun Road community center and Pocket Garden projects, residents are responsible for the daily operations, the development of activities, and the management and maintenance of the surrounding art installations. With gamification tasks, such practices can endow the place with an emotional connection and turn it into a trigger point for residents' creativity expression. At the same time, with an increase of service life, residents can be encouraged to actively reflect on the actual effects and user experience of these design outputs, and to give feedback to designers and community administrators to facilitate a new cycle of problem-based design.

*5.3. Co-creating for Sustainability: from Start-ups to Entrepreneurial Clusters*

This strategy was developed through the living lab regeneration approaches for creating future lifestyles, in the case of NICE 2035. As a sustainable engine for facilitating the entrepreneurial environment, living labs have reorganized the intangible stock resources in residential communities. These resources refer to a great number of residents' demands and behavioral data in the community which have not been fully explored in the past, including the local participation and enthusiasm for new living experiences and real-time user feedback. With user-oriented and lifestyle-led business development based on capacity sharing, living labs can jointly promote small volume experiments and a flexible iteration of the community's entrepreneurial system.

On the one hand, this strategy aims at a series of design-driven startups focusing on creating new lifestyles closely related to daily needs. In the community, the complex population structure has huge amounts of demands for accessible, convenient, and nearer products or services. This can explain why living lab modes such as incubators are located in such old residential communities rather than the central business districts. As in the case of the business plan of the CREATER team, after entering the living labs, participants focused on triggering community creativity and living art, then planned the future sharing kitchen project. The lab development plan was based on population composition insights and the gap between existing services and the young generation's cultural or social needs. It included a series of popular but underdeveloped activities such as coffee, baking, and cooking workshops in a community shared kitchen. Another example is the experimental project of the X thinking lab and the alley art museum project (waiting for development), which fully integrated the design, artistic talents near Tongji, residents' demands for living quality, and commercialization needs of the core community regeneration business of CREATER. Furthermore, like the entrepreneurial project incubated in the Siping community, the designers of Fab O developed maker curriculums based on a concrete study of Siping schoolchildren, their family structures, and related innovative education brands. Subsequently, they put emphasis on the imbalance of needs and existing market offers, and cooperated with local primary and middle schools to embed the core curriculum packages into parts of the student quality development courses.

On the other hand, this strategy requires a connection between independent lifestyle-based startups, and turning them into spontaneous and non-predetermined collaborative clusters, which can activate an open-ended community entrepreneurial production process. As shown in the case of NICE 2035, co-creation between labs has not only generated more business ideas, but also enhanced the value of each participator's commercialization capacity. As in the Dadawa sound lab, the development of objective and future business positioning was initially set on the combination of sound art, digital design, and algorithms, prior to the opening of the lab. Based on the positive feedback after co-designing the digital curriculum development and interactive performance with other labs, the organizers redefined the lab's development direction. It focused more on sound maker curriculums and other living lab's sound identities, and acted as a provider of immersive performances in the community and design college's exhibitions or sharing events. As a networked practice, co-creation with each member's advantages also attracted a variety of potential users to the sound lab, while accumulating sound materials and a user base for future commercialization. Consequently, from the perspective of a co-creative cluster, this strategy is essentially to build an effective connection between needs and

capabilities for living labs. In addition, the services for a cluster's mutual promoting culture and sharing mechanism also deserve more design attention.

## 6. Concluding Remarks

In response to sustainable and localized community regeneration challenges, in the context of China's high-density cities, this article adopted a structured case analysis for the study of two ongoing projects from the perspectives of resident empowerment and resource reorganization. By analyzing the collaboration modes and design-driven approaches, the research findings have presented the localized and sustainable strategies. Further, the exploratory action strategies revealed in this study contribute to form an accessible method connecting design talents, local people, startups, and external resources, and reshape community vibrancy and spontaneous creativity as well. Besides, the stakeholder collaboration networks, including motivation and contributions, have provided a contextual practice path for capacity sharing and optimal resource allocation towards social, economic, and environment sustainability.

Additionally, it is noteworthy that there are some interesting research topics to be further investigated, such as how to include these strategies in a visualized toolkit with action guides for non-expert users, or the issue of approach reproducibility. Further research can put more emphasis on quality tracking after regeneration implementation, like the research of user experiences and regional social change. From the perspective of general guides for non-experts, the research findings can be refined into an instruction with modular design knowledge, especially for the context of elderly community or resident self-governance.

Community regeneration is a long-term social change which needs constant reflection in any social context. To achieve sustainable progress in social life and promote active innovation on the part of residents, both designers and practitioners need to make the best use of suitable and systematic design methods. The exploratory strategy proposed in this article provides a contextual reference and paradigm guidance for similar community problems and validates the effectivity of design as a solution-led discipline and problem-based science.

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