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**International Journal of Innovation for
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Urban Regeneration in Post-pandemic era

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Co-creation in Sustainable Revitalization of Coastal Hakka Village The Case of Mui Tsz Lam Conservation Project in Hong Kong

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Abstract

In Hong Kong, the one-way rural-urban migration has led to the gradual decline of the northern New Territories, so that many coastal villages with rich cultural heritage have gradually disappeared. In addition, some land-use conflicts are caused by policies and historical reasons, it is difficult for people to return and live in the rural area, thus a large amount of land in the suburban area is left behind while the urban area is land-stressed. Based on the experimental rural revitalization project of the North District of Hong Kong Government, traditional Hakka villages Mui Tsz Lam was selected as the research object. This article aims to introduce the concept of new co-creation and sustainable development into the revitalization of the Mui Tsz Lam. Different stakeholders, including universities, volunteers, residents, and different NGOs spontaneously realized knowledge transfer and social innovation through three stages of co-creation: pre-design research, participatory workshops, and collaborative construction. This study explores a sustainable regeneration design and construction method that is suitable for the whole life cycle of traditional coastal villages, attracts public attention to the living environment and development issues in the urban fringe, and provides a new idea for rural conservation in the urban fringe.

Keywords: Coastal rural-urban fringe; Co-creation; Sustainable development; Hakka Village; Earthen construction

1. Introduction

Since Asia's economic take-off in the last century, contemporary research on Hong Kong more focuses on the problems posed by its urban high-density development, such as urban land shortage and poor living environment. However, more than 75% of Hong Kong is a rural area^[1]. After the 1960s, with the decline of the traditional agricultural economy, the further separation of the relationship between urban and rural areas led to the gradual emigration of villagers, forming nearly one hundred hollow villages in the New Territories, accompanied by the continuous disappearance of local culture [1]. Since the 1990s, the government began to pay attention to rural issues and

tried to carry out the initial rural revitalization, but its top-down reconstruction approach could not take into account the interests of multiple parties and the effect was poor. After 2019, the rise of the new co-creation model, which is supported by the government, led by the elite of non-governmental organizations, and co-built by villagers and social groups, has provided great opportunities for rural revitalization and sustainable development in Hong Kong. This paper will take The Mui Tsz Lam project as a case to explain the theoretical basis and operation mode of the new co-creation, and also discuss its characteristics and advantages.

2. The Plight of Rural Development in Hong Kong

Rural areas in Hong Kong mainly refer to the New Territories, which account for more than three-quarters of Hong Kong's area. The New Territories was once a centre of agricultural production and trade in Hong Kong. However, with the continuous rural-urban migration after the 1950s, the rural population decreased, and the traditional farming and fishing industry gradually declined[2]. In the 30 years from 1960 to 1990, the proportion of Hong Kong's rural

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population fell by nearly 15% (Fig.1). In the context of rapid industrialization and urbanization, villages passively or actively joined into the process of marketization, forming two degenerate forms of "decay" (hollow village) and "alienation" (industrialization village)[3]. In the 1970s, with the development of Hong Kong's industry and the establishment of new towns, the rural labor force migrated to urban areas on a large scale to enjoy better living services and work opportunities, and rural areas in the New Territories experienced varying degrees of decline in the industrial economy, physical landscape, traditional culture and other aspects [4]. Many villages with inconvenient transportation conditions, or located in ecological nature reserves are gradually vacant, resulting in a waste of land resources[5]. At the same time, due to trade changes and water pollution, the fishery and salt industry in coastal areas gradually declined, and the related traditional coastal villages were also negatively affected, with the outflow of population and the gradual disappearance of the physical landscape.

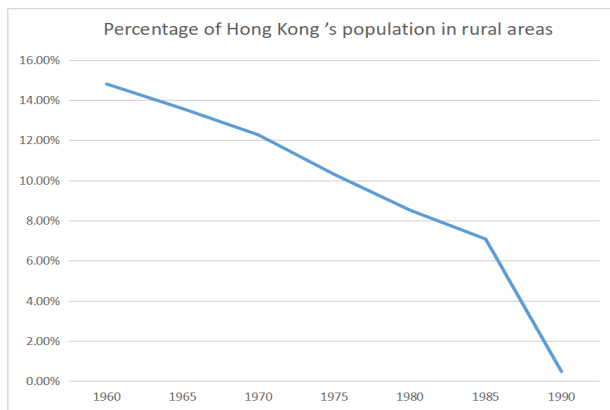


Fig.1. Percentage of Hong Hong's population in rural areas.

Since the 1990s, as problems in rural areas have intensified, the government has begun to pay attention to rural revitalization in the New Territories. It has carried out rehabilitation and reconstruction projects in coastal areas such as Tai O Village. Large-scale demolition and reconstruction activities led by the government have developed local tourism. However, it has brought irreversible damage to the local material and cultural landscape [6]. The government's renovation plan, which focuses on the needs of tourists, is not consistent with the actual needs of villagers, so the project is still at a standstill stage. Such traditional government-led village rehabilitation projects are highly flawed and unsustainable.

In 2018 and 2019, the Hong Kong government has set up the Countryside Conservation Office and the Advisory Committee on Countryside Conservation. To coordinate with relevant government departments, NGOs, and other stakeholders (village representatives,

relevant rural committees, etc.) to discuss and study rural conservation strategies and provide financial support. The Advisory Committee is chaired by the Secretary for the Environment, members include academics, professionals, relevant rural/district officers, representatives of environmental groups and relevant government departments, etc. Under the guidance of the Committee, a pilot rural conservation project was carried out in the Sha Tau Kok area in the New Territories through a collaborative creative approach. The traditional form of government-led reconstruction has been changed to a multi-party new co-creation model, jointly led by non-governmental organizations (elite class, academia), and participated by villagers and other NGOs.

3. New Co-creation Mode

Since the 1990s, the concept of co-creation has been further perfected and widely used in architectural design, urban planning and landscape design. Co-creation usually refers to any group creative activity in which multiple stakeholders, including designers, researchers and end-users, participate in the design development [6]. Co-creation provides an interactive platform for participants to express and communicate their explicit, implicit and latent needs to designers and researchers [7]. Value co-creation is at the heart of co-creation, with a focus on value production. Some terms are similar to co-creation, including participatory design, co-production, co-design, etc. The terms participatory design and co-creation are today often treated synonymously with one another, the emphasis is placed on participation and creativity in the design process. However, Some researchers are re-evaluating participatory design in the rural context, attempting to broaden its definition to include the stages preceding and following the standard "design" process. Rural communities emphasize residential function and social organization system, with the dual concept of society-space [8], rural revival is not a simple participatory design process. So the author believes that, from a macro perspective, the participatory design is only a part of the co-creation, which can also be called a specific form of expression. In the context of sustainable revitalization of traditional villages described in this paper, the participation and creativity of new co-creation is not only reflected in the design level but also in the construction, operation and promotion level. At different stages, there are significant differences in participants, participation ways and participation relations. Different from the participation mode in which the designer is the leading subject in participatory design, different participants are interdependent subjects and contain each other in the process of co-creation. Participation modes at different stages may promote the realization of the implicit identity of participants at the next stage. So some of the results of co-creation cannot be designed or decided in advance.

4. Application: Mui Tsz Lam Conservation Project

4.1. Project Background



Fig.2. Location of Mui Tsz Lam village.

Mui Tsz Lam is a traditional Hakka village with a history of more than 400 years, it is in the northeastern New Territories of Hong Kong where near Sha Tau Kok Sea and Plover Cove Country Park (The Hakka is a race in history that moved south from the central Plains of China). The village has been gradually abandoned since the 1950s due to inconvenient transportation, and there were no permanent residents in the village after the 1980s. However, due to its excellent ecological and natural environment, as well as its well-preserved cultural landscape, such as Fengshui forest and traditional Hakka architecture (Fig.2), it has attracted high social attention. In 2019, The first phase of Mui Tsz Lam Village revitalization plan was launched, jointly promoted by The Hong Kong Countryside Foundation, the Chinese University of Hong Kong, the Hong Kong Institute of Construction and Mui Tsz Lam Village. As an experimental rural revitalization project of the North



Fig. 3. Conditions of villages before revitalization.

District of Hong Kong Government, the design and research direction of this project is aimed at the regeneration of traditional Hakka buildings, and to accomplish the sustainable development of traditional villages utilizing the new co-creation method.

In this project, the co-creation process includes pre-design with the community as the research basis, Social need-oriented participatory design, and the establishment of multi-party collaboration mode with sustainability as the target. By strengthening the process of front-end pre-design and middle participatory design, it enhanced the sense of belonging of different participants to the community and their sense of responsibility for future development. Indirectly leading to sustainability of end organization operations and platform creation. Each process will be described below.

4.2. Pre-design with Community as the Research Basis

Unlike other village conservation projects, Mui Tsz Lam conservation and revitalization in the context of co-creation has increased the emphasis on the front end of design. This process, also known as "pre-design", involves several activities to inspire and explore some open-ended questions. This stage is often referred to as the "fuzzy front end" because of its ambiguous and confusing nature^[9]. Pre-design is also mentioned in Peter's study^[10], and although it is not clear how the outcomes of this process are logically related to the real design process, they are generally documented as visual results. In the pre-design phase, the main focus is on digging and documenting local knowledge, such as understanding the background of users, culture, and living customs, learning about important historical events. The goal is to accompany local people to remember "what our village used to be like?" from an outsider's perspective, integrate into local life, and build mutual trust through this process of joint discovery.

(UNESCO) defines local knowledge as a system of understanding, skills, and philosophies developed over time as a society interacts with its surroundings. This knowledge is widespread in language, recreation, medicine, architecture, food, social interaction, ritual and spirituality, and other elements. They are embedded in the lives and wisdom of villagers, providing the basis for action in daily life. Also, make efficient and adequate use of indigenous resources, and form the foundation for locally appropriate, culturally diverse, and sustainable development^[11]. A university-led research team conducted a month-long detailed survey and mapping of the entire village. In addition to documenting the current state of the village and its problems, the research focused on deducing what each village house and the village as a whole looked like when it was built based on villagers' oral accounts, relevant historical information, and research literature reviews. The results were reproduced in a form that was easy to understand and experience and were presented

in detail to users and stakeholders. The process of presenting helped them to reconnect with their memories, and to recognize their environment and culture again through visualization. All of this helps them to trigger a sense of community and confidence in their own culture.



Fig.4. First presentation. Fig.5. Second presentation.

4.3 Social Need Oriented Participatory Design

The pre-design process is followed by the participatory design (PD) process, which is different from the previous result-oriented design process and integrates the participation of users and stakeholders throughout the process. In the early stages of PD, the focus is shifted from "community research" to "social needs". That is, from figuring out "what was our village like before?" to "what kind of village do we need in the future?" This step was done by empowering each participant to actively express their needs, in addition to uncovering their unconscious needs through behavior mapping. Ultimately summarizing them into a co-creation goal. Through this interactive process, it is hoped that participants will develop a sense of belonging to the community and a sense of responsibility for future development.

To be specific, PD is organized through some workshops. In first workshop, we aim at understanding the backgrounds, culture, and life of Mui Tsz Lam, and the overall visions of participants towards the revitalization. The design of workshop tasks also focuses on increasing participants' interest and involvement and their sense of belongings in the co-creation process by creating opportunities for every participant to voice out comfortably and freely, with the aid of local elements and interactive tools. Three tasks are designed for this workshop.

Task 1: Sharing on different utensils and materials

Task 2: Activity Mapping of the Past & Present

Task 3: Bullseye vision board



Fig.6. Task 1.

Fig.7. Task 2.

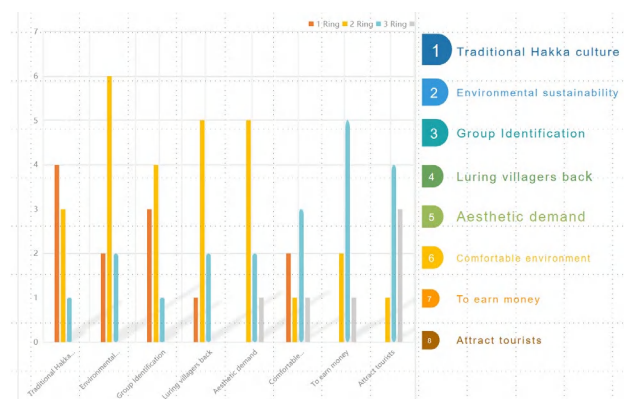


Fig.8. Task 3 and result.

In task 3, by counting the number of stickers in each ring on the board, we have generated a list of preferences on each value (Fig.8). Besides the data directly obtained from the vision board, some concerns were repeatedly addressed by participants throughout the discussions. They could be generalized as larger themes when considering design.

Overall, despite some unexpected situations, like the extreme distribution of villagers and volunteers, the outcomes and data obtained in general met our expectations. We also recorded some side stories like memories of living in the old house, which is valuable to revitalize the traditional living style in the future. And participants had pointed out ways to improve the workshop, for example, a clearer definition of the options provided. We could avoid this situation in the next workshop to improve the quality of data collected.

The second workshop focused on the concrete advancement of the design, with the participation of designers from CUHK, volunteers, and villagers. The focus of the workshop here is to obtain more specific design directions for the old house, in terms of programs, materials, and structures. With the results and findings from workshop 1, we propose the preliminary of these to start the discussion with villagers and volunteers. With the aid of photographs, a 1:20 model of the current site and preliminary structure design, and tools like foam blocks and memos, four tasks are designed for this workshop.

Task 1: Vernacular craft

Task 2: Spatial layout

Task 3: Choice of Materials / Crafts

Task 4: Timeline Planning & Phase Objectives

In general, the results of this workshop are also in-line with our expectations. Participants agreed with our preliminary thoughts of having a workshop space in the old house and showed appreciation to the preliminary structure, while options for the themes and materials have also provoked fruitful discussions in the process. It can be observed that participants can understand

most of the practical concerns as proposed by designers,



Fig.9. Task 1&2.



Fig.10. Task 3.



Fig.11. Task 4.

yet have significantly less interest and engagement in these aspects.

The entire PD process is organized and carried out in a visual form. The first aim is to improve the full understanding of people from different backgrounds, and the second is to increase participation by making it more interesting. Especially in Workshop 2, the parts related to design solutions are presented in the form of models and images, which not only reduces the cognitive barrier between different groups but also allows for real-time changes to advance the design. It is worth mentioning that not only the original residents participated in this session, but also relatives of the residents, local craftsmen, volunteers, and NGOs were involved to give their opinions. Thinking of today's rural revitalization, the countryside is no longer the original countryside in its original sense, will the definition of villagers be limited to the original residents? Who are we really designing for? Perhaps the "New Villagers" project in Lai Chi Wo, which is also located within Sha Tau Kok, will bring some inspiration to us [12].

4.4 Multi-collaboration With Sustainable Goal

4.4.1 Construction

In traditional vernacular settlements, house building is a social event. The masters take up the job of organizing the construction, and villagers from different families organize themselves into groups according to their skills, such as carpentry groups, masonry groups, procurement groups, etc. Each group has its duties and collaborates flexibly so that the

connection between them can be developed continuously along with construction^[12]. For Mui Tsz Lam, traditional building skills have been lost, and the original residents do not have the ability to build houses independently. So, it is a challenge to build a sustainable construction system with the participation of multiple parties. To adapt to the transportation and construction conditions, as well as to the knowledge level and construction capacity of different teams involved, the construction process is decomposed into different parts.

1) Scaffolding structures: traditional structural inheritance and spatial growability

The load-bearing structure is one of the most technically advanced parts of the cooperative building. Usually, in Hakka traditional dwellings, the timber frame is made by an experienced carpenter who will also be in charge of the whole project. The remote location of Mui Tsz Lam with its narrow and steep roads linking outside made it impossible to transport large pieces of building materials. Considering this, a prefabricated light steel structure system was chosen, which can be flexibly disassembled and transported while also being quickly erected on site. In addition, the flexible joint allows for secondary alterations or additions, inheriting the logic of traditional dwellings while making them spatially growable. Scaffolding structures is mainly done by designers, construction schools, and builders due to its professionalism.



Fig.12. Transportation.

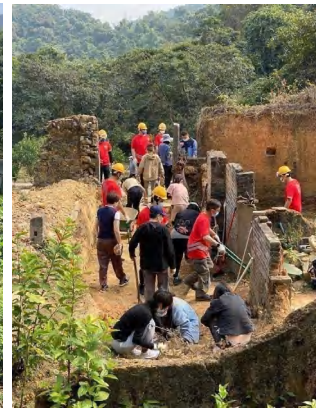


Fig.13. Scaffolding.

2) Rammed earth walls: scientific update of traditional construction techniques under cooperative construction

The original Hakka houses in Mui Tsz Lam used a large number of earthen construction techniques, but they are now lost. It is difficult to pass on these traditional techniques because it is difficult to become a universal system for long-term reference. With the help of scholars, it is possible for us to optimize soil materials through experiments, and to establish a common construction system that can be used in each region with only minor adjustments. (Fig.15, 16) It is

beneficial to the techniques transmission and the entire project in the long run. After the establishment of the scientific construction system, the construction school and volunteers also improved and upgraded it during the practice on site. (Fig.17, 18)



Fig.14.Learn from craftsman. Fig.15. soil analysis.

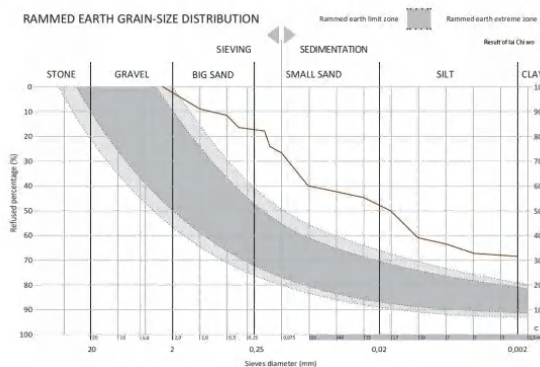


Fig.16. Soil scientific upgrading.



Fig.17. Soil preparation. Fig.18. Ramming.

3) Bamboo panel: integration of ethnic crafts and local architecture

The traditional Hakka crafts include a large number of bamboo products, such as bamboo cool hats, bamboo baskets, bamboo kitchenware, etc, reflecting the Hakka people's preference for natural materials and their wisdom in life. In addition to the rammed earth walls for the exterior, the interior partitions and windows are made of bamboo panels. Before the construction, different styles of the bamboo panel were designed, some of which were inspired by the Hakka dwelling decorative patterns found in the pre-design mapping. (Table.1)

Moreover, different connectors were developed depending on the method of scaffolding connection, thus creating several windows with different opening effects. (Table.2)

4) Paving: Recycling of traditional construction waste

Table.1. Bamboo panel pattern



Table.2. Panel fixing pattern

	Fixed	Awning	Bifolding
Opened			
Closed			

Table.3. Paving pattern.

Red	Black	Orange	Grey
Mixed Tiles A	Mixed Tiles B	Mixed Tiles C	Mixed Tiles D

Paving is a kind of construction method that the participants initiatively mentioned during the PD session. They wanted to make full use of the tile fragments produced during the damage and

reconstruction of the village so that the construction could solve the waste problem and beautify the environment at the same time. Here the designers helped the villagers to design the paving style and collected some building methods. (Table.3) Suitable construction methods were found with the help of local craftsmen, and samples were made with the help of volunteers and villagers. (Fig.19)



Fig.19. Paving.

4.4.2 Operation

"Government-led rural revitalization" is a top-down approach to promote socio-economic development, which is planned, directive, and administrative. The advantage is that the government can integrate multiple social resources to carry out large-scale, comprehensive rural infrastructure construction. However, there are many significant problems, such as institutional rigidity and poor planning, which make it more focused on short-term effects, while neglecting endogenous development capacity and community spiritual construction^[13].

The government only acts as a financier and starter in this project, while the elite representatives of the society (scholars from universities) and other groups work together. In the pre-design phase, the government and scholars take the lead role in bringing in start-up funds and social attention, then integrate into the rural context together with designers, NGOs, media representatives, volunteers, and local craftsmen. In the PD stage, designers and villagers take the lead, government, NGOs, media representatives, volunteers, local artisans, and visitors arrive at development goals through participatory activities and derive designs through rounds of derivation. At the last process, builders (academics), designers, and villagers take the lead, local craftsmen, builders (practitioners), scholars, and volunteers collaborate to complete the project. Within the three stages, the teams work together flexibly, giving full play to their respective strengths and advantages but without authoritative suppression.



Fig.20. Operation structure.

4.4.3 Construction of "Local Cultural Knowledge" Platform

It is necessary to pay sufficient attention to local knowledge in rural revitalization, transform cultural resources into shareable knowledge, and establish a platform that can directly contribute to co-creation. This study activates and facilitates the process of knowledge translation and transformation between different fields and participants, such as knowledge transfer between the local, tacit knowledge of villagers, and the macroscopic, conceptual knowledge of architects. This transfer takes place throughout the entire life-cycle of co-creation. In the PD phase where the workshop is the main form of extrapolation, the villagers' knowledge of local building materials facilitates the architect's idea of material selection and construction system integration. For example, the selection of earth material and the scientific improvement of traditional rammed earth techniques are the products of the knowledge transfer process. Architect learns the local materials and skills through the villagers' and craftsman's knowledge, and at the same time improves it with scientific methods. The updated method then continued locally practiced and upgraded by villagers again. This process further facilitates the conflict, improvement, and integration between traditional construction techniques and new construction methods, and the knowledge transfer thus forms a virtuous cycle. What's more, the platform can be disseminated through a variety of media, such as museums, new media, conservation manuals, exhibitions, local skills training courses, etc.

4.5 Results and Reflection

1) Collective Memory Construction

The willingness of residents and social organizations to participate in co-creation comes from the strong demand for their environmental transformation, and the recognition of local culture and co-construction goals as well. As the actual carrier of local characteristics and cultural spirit, local knowledge's reasonable protection and display can make villagers more actively participate in community issues, and recall and rebuild the spirit of co-creation. In addition, reconstructing the rural space also has a positive effect on boosting the endogenous power of the village. The pre-design process, the participatory design, and the collaborative construction help villagers to form a collective memory. These collective memories not only increase the bond between people in the community but also deepen their emotional connection with the place.

2) Establishment of Management System

The existing management system led by the village head provides institutional support for this project and runs through all levels of funding applications, construction management, and cultural promotion. At the same time, the university, volunteers, the villagers, and the NGOs have worked out a system of labor and responsibility distribution in long-run cooperation, and have jointly completed phase 1 of this project in a top-down and bottom-up combined way. Thus, we are taking this opportunity to promote and update the

construction management system.

3) System continuity and elite inheritance

As motivators, the elites have the ability to take the lead to conduct the operation and promotion of the project. How to inject this inheritance and organizational power into the current conservation and development, must be inseparable from the continuation and inheritance of the management system. As we know, although there is little physical space to carry out activities in Mui Tsz Lam, a systematic system has been formed under the guidance of villagers' strong sense of subjectivity. Among the group of fewer than 20 villagers, they have formed groups according to different skills: kitchen group, wedding group, construction group, outreach group, etc. They have flexible collaboration through the guidance of the village head and have continuously promoted social innovation. By far, they have organized activities such as the National Day celebration, camping, and village tour. And they continue to engage elite from a different career to join this project.

5. Conclusion

The rural is all the geographical space within the administrative scope, while the rural community emphasizes the living function and social organization system, with the dual concept of society-space. Rural revitalization is not a simple revival of architecture and planning scale, but involves the transformation and balance between a variety of complex social relations. In this context, the whole life-cycle co-creation model can reflect the maximum application adaptability. From the perspective of social demand and sustainability, this paper summarizes the rural revitalization in the form of new co-creation. Compared with the traditional top-down rural reconstruction by the government, the new co-creation model has the following characteristics:

1) It has a large number of stakeholders and participants, but they are mutually dominant to avoid fair intervention, which is conducive to solving the neglect of some groups' benefits in the traditional government-led rural revitalization project.

2) It is conducive to the spontaneous potential role transformation process. By strengthening the front-end(pre-design) and the mid-end(participatory design) process, participants can complete the transformation from bystander to the potential villager, which is make for enhancing the sense of belonging and responsibility of participants, and also indirectly promoted the occurrence of co-construction behavior in the later period.

3) Through the open guidance process, as well as the systematic opinion collection and sorting process, it is beneficial to realize the rationalization of knowledge transfer and establish the local knowledge platform.

This study explores a demonstration method applicable to rural revitalization in urban fringe areas. Although co-creation has a strong application in community development, we need to reflect on how the

current co-creation applies to different villages? Since the practical application of co-creation theory is still in the exploratory stage worldwide, some issues such as the degree of participation of the participants involved in this study and the influence of the authority of rural elites on the decisions of other members need to be continuously discussed in future studies.

6. References

- 1) Global Institute for Tomorrow, (2016) A new model for rural revitalization: rediscover rediscovering Hong Kong's forgotten treasures.http://prog.global-inst.com/ftp/GIFT_Rural_Revitalisation_HongKong2016_ExecSummary.pdf
- 2) Davis S G. (1961) The rural-urban migration in Hong Kong and its new territories. *The Geographical Journal*, 1962, 128(3):328-333.
- 3) Zhang Jinxiang, Shen Ruiming, Zhao Chen. (2014) Rural Renaissance: Rural China Transformation Under Productivism and Post-productivism. *Urban Planning International*, 2014, 29 (5) : 1-7.
- 4) James Hayes. (2008) The great difference, the great rift and the great need: The new territories and its people, p a stand present. *Asia Pacific Journal of Public Administration*, December 2008, 30(2):139-64.
- 5) Sin S K. (1971) Rural depopulation of clan villages:a case study of San Tin,unpublished B.A.dissertation, University of Hong Kong, 1971.
- 6) Chan A H Y. (2003) Community planning for sustainable tourism in Hong Kong-case study: Tai O Fishing Village. Centre for Urban Planning and Environmental Management,University of Hong Kong, 2003.
- 7) Sanders, E. B.-N., and Stappers, P. J. (2008) Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5-18.
- 8) Sanders, E. B. E. (2002) From user-centered to participatory design approaches. *Design and the Social Sciences Making Connections*, 1-8.
- 9) Yan Wentao, Lu Jianglin. (2017). Two Models for Revitalizing Village: Enlightenments Under Resilient Perspective. *International urban planning* (04), 22-28.
- 10) Sanders, E. B.-N., and Stappers, P. J. (2008) Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5-18.
- 11) Hasdell, P., Ku, H. B., & Kuo, J. Y. (2019). Miaoxia community kitchen: a socio-material approach towards rural sustainability. In *Practice and Progress in Social Design and Sustainability* (pp. 1-28). IGI Global.
- 12) Guo Y, Ji T. (2018) Social Transformation and Design Participation in Rural Cultural Construction. *Decoration*, (04),39-43. (in chinese)
- 13) Faculty of social science. Sustainable Lai Chi Wo, four-year review and outlook. The university of Hong Kong. 2018.4. (in chinese)
- 14) Zhihong, W. (2015). Synergistic design study based on autopoietic mechanism of morphological evolution of contemporary vernacular residence. *Journal of Architecture*(S1), 124-128. (in chinese)
- 15) Wu Zihong, Wu Yutong, Shi Wenbo. (2017). Revitalization of Endogenous Mechanism: Vernacular Synergistic Design Based on Neo-Logic of Vernacular Settlements. *Journal of Architecture*, (02),108-113. (in chinese)

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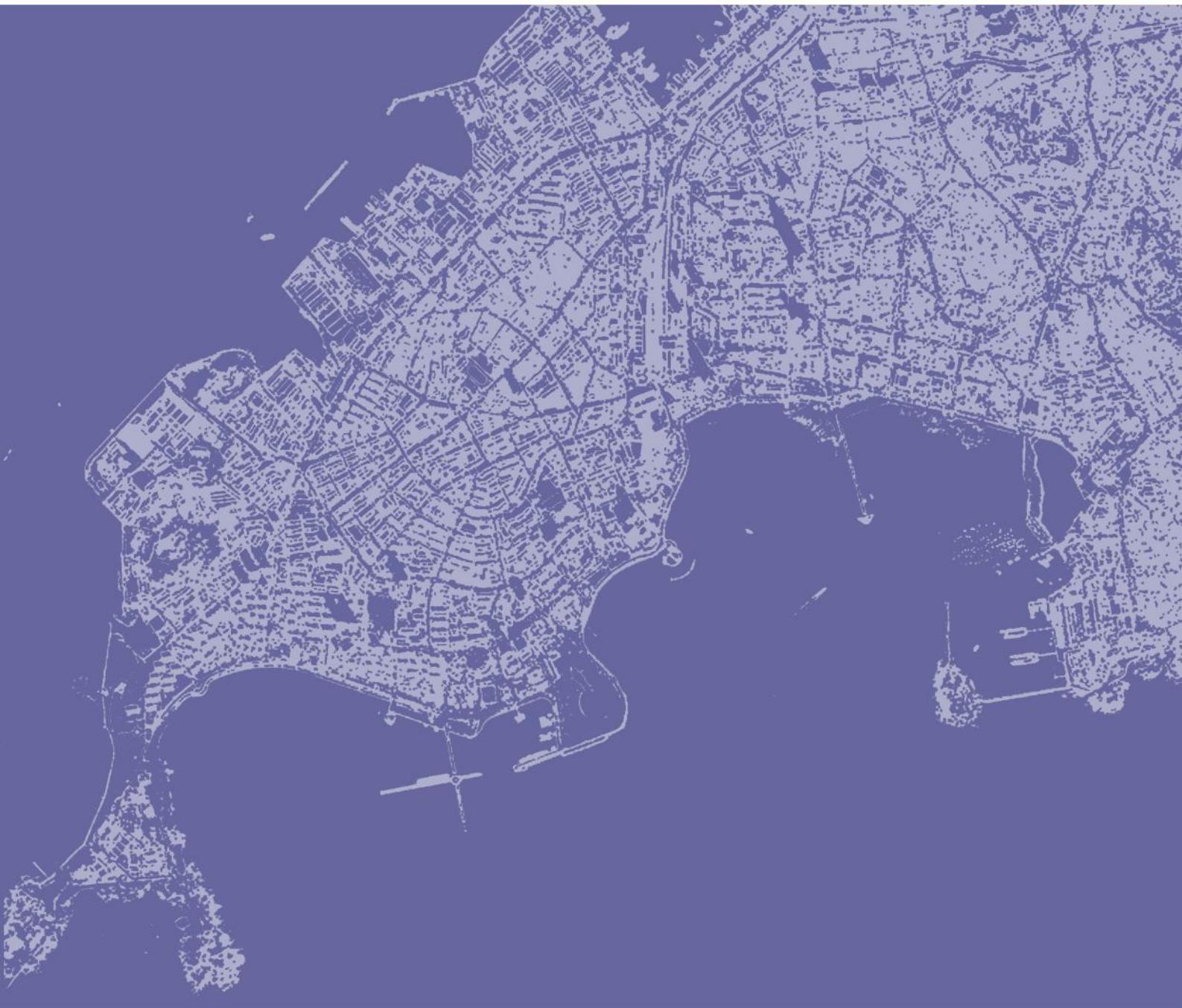
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