Urban Farming Community Space: an Idea to Overcome the Decreasing of Agricultural Land in Kitakyushu, Japan

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Abstract. Japan faces many social and environmental problems especially population aging, social communication degradation and decreasing of agricultural land. Kitakyushu city is one big city in Japan, which the old people take 30% in population, while younger people are moving to the big cities for working and other desires. It is common that Japanese people is less and less communicate with other people and tend to curl up in their personal space due to the modern stressful life. Besides, a big ratio of Japanese farmers recently did not do the farm work anymore, leading to a considerable abandoned agricultural land. So, there should be done to improve the lives of older people, heal social communication, or revive the barren land. The designing site is placed in Hibikino area, Kitakyushu city, Japan, a farmland area operated by Japan Agriculture Association where citizens can hire some slots to plant vegetables themselves. However, this place does work effectively when only a few people come to hire the land. This research method is a descriptive study aimed to obtain qualitative data. The purpose of this study was to create a design idea the agricultural community space where parents can work and communicate with children, customers, and strangers with three targets of sustainable environmental, social, and economic. And then, this system not only helps to create the green lifestyle for inhabitant but also improves social communication, reducing CO2 emission with its sustainable working process.

1. Introduction
Japan is a developed country, but also had to face many social and environmental problems, especially a decrease in population, population decline, and decline in agricultural land [1]. Kitakyushu is a city located in Fukuoka Prefecture, Kyushu island, Japan. A city that has an area of 486.81 km² is the ninth most populous city in Japan after the city of Fukuoka. Its population numbered 999,373 inhabitants with a population density of 2052.9 inhabitants / km². A big challenge for Kitakyushu is a decline in population. Within the last 20 years, this city of Kitakyushu always decreased the population from year to year [2] (See Figure. 1).
The decrease was driven by net migration population out, the most important are the tendency of young people to leave the city, including a large number of students who leave Kitakyushu City after graduation to seek opportunities elsewhere. In addition, Japan is a country that has the largest elderly population in the world. Kitakyushu has the highest percentage of over 65 years of age among all the cities in Japan are appointed and selected by the central government as a special national program [3] (See Figure. 2).

In FY 2010, this share had grown to 25.1%. The population under 15 years declined from 23.1% in FY 1980 to 12.9% in FY 2010. The working population (15-64 year olds), represented 68% in FY 1980 and 61.3% in FY 2010. These tendencies are reflected in the highest elderly dependency rates among OECD metro-regions. In addition, a large ratio of Japanese farmers recently did not do farm work again, leading to a sizeable agricultural land which was later abandoned, while land areas declined [4] (See Figure. 3).

Figure 1. Population data of Kitakyushu Japan from 1995-2015

Figure 2. Population data of Kitakyushu Japan from 1995-2015

Figure 3. Agricultural Land (% Land of Area ) in Japan
Kitakyushu has the use of forest land (42.7%), residential land (14.0%), industrial land (7.0%), agricultural land (6.0%), commercial land (3.2%) (as of March 2011). Based on these facts, a solution is needed to increase the activity of the elderly in society and revive agricultural land by providing a social communication that not only serves as a shelter, but also builds a space to nurture community spirit [5].

Here, the purpose of this study was initially to respond to and solve social and environmental problems in Kitakyushu City related to the decline in population, aging population, and a decline in agricultural land by introducing urban farming can be a space farming community where parents can work and communicate with children, customers, and strangers with three goals of sustainable environmental, social, and economic. The target of this research is to create the idea of the idea of design as an argument in terms of the importance of agriculture facilities as a system that not only helps create a green lifestyle for the residents but also can enhance social communication with the ongoing work process[6].

2. Methods

2.1. Research Approach
This research approach is descriptive research that aims to obtain qualitative data. Source of research data obtained from field notes are the result of direct observation of the writer and the participation in the situations, processes, and behaviors related to the research and documentaries acquired through a variety of sources such as the internet, newsletters, and magazines related to the theme of research and further used as a solution in the form of design ideas to respond to the phenomenon that occurs.

2.2. Case Study Area
The first step of this research is the selection of the site. Regional case studies are the areas that have agricultural land which is specifically located in the area Hibikino, Wakamatsu Ward, Kitakyushu City, Fukuoka Prefecture, Japan (See Fig. 4).

![Figure 4. Location of Hibikino, Wakamatsu Ward, Kitakyushu City, Fukuoka Prefecture, Japan](image)

The agricultural land is already operated by the Japan Agricultural Association where residents can hire some slots that can be farmed agricultural land for themselves. But her placement does not work effectively when only a few people come to rent land while not optimal utilization.

2.3. Survey and Visit
Surveys and visits are required to get the latest information about the circumstances of the case study areas. Current information about the area researched, collected by observation for a week, namely in April 2016. Furthermore, interviews were also conducted with several representatives of community that exists around the research site to obtain more accurate research data (See Fig. 5).
3. Results

3.1. Current Condition Analysis

Agricultural land operated by the Japan Agricultural Association where slots can be rented its land is having an area of 10 hectares and is adjacent to the main street area Hibikino, housing, education area, forest, hospitals, and other commercial buildings (See Fig. 6).

![Figure 5. Pictures of existing agricultural land in Hibikino](image)

![Figure 6. Selected area master plan](image)

Site research has the 75% of agricultural land area, 20% of the existing building which is agricultural land management office and public buildings, as well as 5% of the access link. (See Figure, 7)
3.2. Analysis

3.2.1. Problem Analysis

Problem analysis is shown in Fig. 8. This figure describes what is fact, issue, and potential.

| Fact | Japanese agriculture shortage of land |
|------|---------------------------------------|
|      | JA (Japan Agricultural Co-operative) purpose to protect farming and living |
|      | Kitakyushu city aims at developing a sustainable society |
|      | Old people population in Kitakyushu almost 30% |

| Issue | Children and mostly people didn’t know agriculture process |
|-------|---------------------------------------------------------|
|       | Lack of social interaction |
|       | Old people activity after retirement |
|       | There are a lot of people who want to do farming but they didn’t have any space or have no knowledge how to do it |

| Potential | JA Co-operative have a big impact to all of the Japanese farmer and agriculture |
|-----------|--------------------------------------------------------------------------|
|           | Most of Wakamatsu area is a nature zone and country side (rural district) |
|           | Student and foreigner of Kitakyushu Science and Research Park, Hibikino welcome the Japanese culture and study about environmental issue |

Figure 8. Fact, Issue, and potential from Japan

3.2.2. Population

A survey conducted by the University of Kitakyushu found that 33.3% of the population of the population is older people aged over 65 years. While the population of young people moving to big cities to work and other desires. Kitakyushu also has a number of foreigners who pretty much amounts to 10,707. (Results for Fiscal 2004) (See Fig. 9 and 10)

| Area | Sex | Household |
|------|-----|-----------|
| Total area | Male | Female | Total population |
| Total population | 1,514,599 | 1,016,923 | 2,531,522 |
| Male | 76% | 24% | Total population |
| Female | 24% | 76% | Total population |
| House | Male | Female | Total population |
| House | 594,218 | 594,218 | Total population |
| Household | Male | Female | Total population |
| Household | 642,257 | 642,257 | Total population |

Figure 9. Area, population, sex and number of households of Kitakyushu
3.2.3. Climate Conditions
Kitakyushu has a temperate climate with warm humid hot summers and no dry season. During the year, temperatures usually vary from 37°F to 86°F and rarely below or above 32°F 91°F. Warm season lasts from June 24 to September 24 with an average daily high temperature in the upper 78°F the hottest day in August. Winter lasts from December 7 to March 19 with an average daily high temperature under 54°F with the coldest day in January (See Fig. 11).

![Figure 11. The daily average low (blue) and high (red) temperature with percentile bands (inner band from 25th to 75th percentile, outer band from 10th to 90th percentile)](image)

3.2.4. Plants and Ecosystem Analysis
Based on the prevailing climatic conditions, Kitakyushu has tremendous potential for the cultivation of fruits, vegetables, flowers, and fixing nitrogen that serves to reduce CO₂ (See Fig. 12).

![Figure 12. Timetable of fruits, vegetables, flowers, and Nitrogen Fixing in Kitakyushu per months](image)
3.2.5. Japanese Activity
Analysis of activity aims to sort out and determine community activities that could be used time together as sustainability of land utilization. The division mapped the elderly, parents who go to work, housewives, and children as land dwellers (See Fig. 13).

![Japanese activity timetable analysis](image)

Figure 13. Japanese activity timetable analysis

4. Design
4.1. Masterplan
Agricultural land was created with the concept of urban farming can be a farming community space where parents can work and communicate with children, customers, as well as foreigners who come (See Fig. 14). To create environmentally sustainable aspects of composting area, a modern farm, green house, flower house, public farm, as well as the preservation area created for the aspects of the environment and reduce CO2 emissions with a continuous work process. To create sustainable social aspects of open areas, public areas, exhibition and farming education made to better communication between communities. Then, sustainable economic aspects as a target by the management house, open market, souvenir shop, and healthy & food restaurant.
4.2. Vision

For the vision, we describe the vision on Fig. 15. This includes phase 1 (2016), phase 2 (2021), and phase 3 (2026).

| Phase 1          | Year 2016 | Develop design concepts in small holdings. Providing urban farming space designed with attractive services through economic support by the media to entice people to come |
|------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------|
| Phase 2          | Year 2021 | Expanding the existing farm around the site and keep the functioning of agriculture under the operating system. Then continue the development of all system operation services. |
Phase 3  
Year 2026  
Residential areas and buildings with other functions will be built around the site area. More interesting to invite people to come and continue to expand the functionality of agriculture. Mainly agricultural town hall area.

Figure 15. (a) Phase 1 Year 2016, (b) Phase 2 Year 2021, (c) Phase 3 Year 2026.

4.3. Operation Process
Benefit of the system is to improve possibility of capital rotation, attracting people and improving family and social relationship, create green life style, turn empty barron land into farm land again, solving old people problems, and aising green land in Urban area (See Fig. 16).

4.4. Public Area Plan
Public area has different functions including healthy food restaurant, souvenir shop, exhibition, open market, and landmarks. Souvenir shop sells the product made from the ingredients the farm provide it as well as handicrafts. Open market sells vegetable, fruit, and flowers and customers can try the free fruit. Healthy food restaurant with meals and drinks made from fruits and vegetable from the farms. And then, exhibition and farming education area are where people can learn about agricultural and how to plant them (See Fig. 17 and 18).
Photovoltaic glass on the roof to absorb solar energy and rain harvest tower collects rainwater while this creates a comfortable gathering place in a public area (See Fig. 19).

5. Conclusion
Our concept is redesigning this space to become a community green space which promotes agriculture activities and leading inhabitant to do farm works. We designed a supporting system for the current renting farm which provides the ingredient and energy themselves with three “sustainable targets”: Environment, social, and economic. This system not only helps to create the green lifestyle for inhabitant but also improves social communication, reducing CO2 emission with it sustainable working process. Benefit for everyone.

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