Exploring the Implementation of Graphic Narratives in Organic Agriculture

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Abstract
Organic agriculture integrates the principles of ecological friendliness and resource recycling, aiming to respect the natural environment and commit to sustainable development in the future. Through participatory observation, the survey results of this design concept are presented in a graphic narrative manner, and the complex organic agriculture design principles of the farm are concretized through visual translation to assist farmers and participating volunteers in gaining a more comprehensive understanding of the operation status of the farm. The graphic narrative showcases important information such as the use of renewable energy and organic cultivation on the farm, making the design principles of organic agriculture more clear and visible. The application of translated content not only provides a deeper understanding but also offers the possibility of future promotion and practical application in organic agriculture design.

Keywords: Graphic Narrative, Organic Agriculture, Participant Observation, Social Design

1. Introduction

In the 21st century, humanity is facing climate change, sustainability, and environmental friendliness issues that are receiving significant attention. To seek sustainable living and adapt to climate change, organic agriculture sustainable design has become a method for exploration and learning. Many cities in Taiwan rely on agriculture as their primary economic source. Most farming practices are still traditional, often using methods that exceed the environmental capacity to increase yield, leading to unsustainable cycles, ecosystem anomalies, and health concerns for growers (Chang & Yang, 2023). Therefore, this study aims to share information on sustainable organic agriculture design through participatory observation results from the World Wide Opportunities on Organic Farms Spain (WWOOF Spain) organization, combining visual narrative texts and images.

Organic agriculture sustainable design respects natural ecosystems and life, avoiding artificial inputs such as pesticides and growth hormones, and adopting systems like crop rotation and organic fertilizers to adapt to climate change challenges (Basnet et al., 2023; Gamage et al., 2023). This study references cases from Spain, collaborating with WWOOF Spain through participatory observation. It records the period spent on farms, recognizing that sustainable organic agriculture design is an environmentally friendly system. It starts with land management, integrating necessary elements from daily life, finding operational models and relationships within the natural environment, and implementing energy recycling to sustain human life. Considering the broad age range of Taiwanese agricultural workers, from elderly farmers to second-generation young farmers, and the general public's insufficient understanding of sustainable organic agriculture design, effectively presenting related information becomes a crucial research focus.

Visual narratives have long been used to explain complex issues, creating a language and space for communication through the combination of visual narrative texts and images. This method, also used as an educational tool, provides a clearer and more intuitive way to assist information transmission. For example, visual and textual representations of cancer patients' treatment experiences serve as a channel for vulnerable medical groups to absorb information (Gurrieri, 2019). We offer a panoramic design of an organic agriculture sustainable design farm, providing an illustrative overview of the entire environment, divided into three areas. Each area describes the implementation conditions and application aspects. Despite the differences in environmental conditions for agricultural setups across countries, this study mainly shares the overall planning, resource integration and utilization, and the possibility of converting living resources into farm resources. Our research emphasizes how the design of visual and textual narratives has the potential to address global environmental issues, helping farmers or environmentally concerned groups receive new information from abroad more clearly and intuitively, thereby facilitating knowledge absorption.

2. Study Design

This study primarily explores the opportunities for using visual narratives as a means of disseminating knowledge about sustainable organic agriculture design. It is a case study that utilizes participatory observation (PO) to experience the WWOOF Spain farms. Through guided tours and teachings from the farm managers, the study observes the farm environment and the design concepts of various areas, recording these through images and notes. This includes documenting the farm's environmental characteristics, operational processes, and the interactions between people and animals.

First, the study examines the components of visual narratives, such as the design elements of visual narratives, text structuring, and composition planning. Then, it integrates the content of sustainable organic agriculture design, creating and pairing visual elements with the design, considering the combination of content expression and imagery. The study proposes the following research framework diagram:

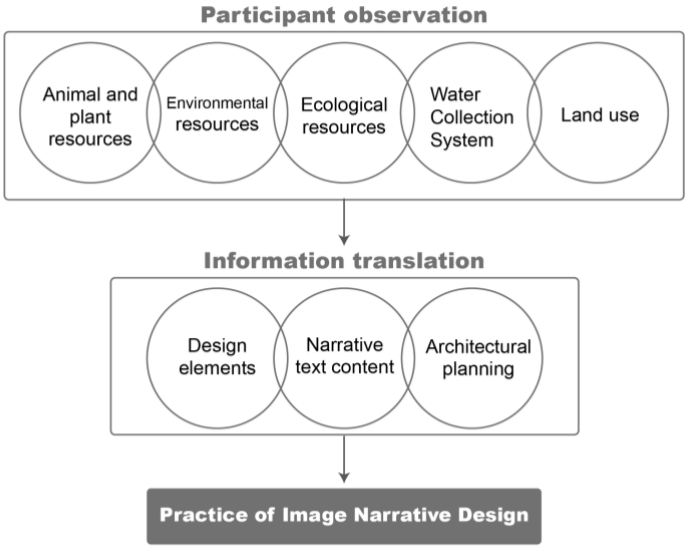

Figure 1. Research architecture diagram

3. Visual Narratives in Sustainable Organic Agriculture Design

3.1 The Relationship Between Sustainable Organic Agriculture Design and Design

In 2017, the United Nations Food and Agriculture Organization (FAO) pointed out that the current consumption of environmental resources is not optimistic, indicating a severe challenge that humanity must face in the future. As hypothesized in "Permaculture One" (Holmgren, 2020; Mollison & McNeilage, 1987), since the Industrial Revolution in the eighteenth century, humanity has made significant progress in various aspects, with booming economic development accompanied by problems of resource depletion (Ferguson & Lovell, 2014), such as extreme climate events and food shortages. With the continuous growth of the global population, resources are not infinitely available, and the environmental carrying capacity is nearing its limit. According to the United States Department of Agriculture (USDA), organic agriculture is a farming system that operates in harmony with nature, following diverse ecological natural systems. It regulates and recycles elements such as crop rotation, organic waste, and animal manure, and during the planting process, it avoids the use of artificial inputs like fertilizers, pesticides, and growth hormones to provide crops with nutrients and support their development. (Gamage et al., 2023).

Design arises in response to social needs: society creates the demand for design, and design, in turn, influences society (Liao, 2022). Design reflects contemporary issues and needs, adjusting design methods to meet these demands. Through design thinking and design frameworks, social problems can be redefined and interpreted, which can be termed as designing for society. Viewing sustainable organic agriculture design through the lens of social design, it aims to maintain a sustainable environment by integrating different

knowledge systems and promoting accessibility, interaction, and participation among various groups and cultures, becoming a universal design (Holmgren, 2020).

3.2 Participatory Observation of the Farm

Participatory observation (PO) initially emerged from anthropological research. It is a method of observing and recording the observed content, providing an opportunity to gain different insights into an organization or group. This study is conducted through "inquiry from the inside" and immersive experiences (Evered, 1981; Iacono, 2009). By engaging sensory experiences and observations, learning through participation in events, and supplementing with daily conversations, relevant information is obtained. As a participant, by engaging in the farm's daily practices over some time and becoming familiar with the overall operation of the farm (Takyi, 2015), observations are recorded objectively. Various pieces of information are integrated to investigate key design elements.

The farm's organic agriculture sustainable design system includes livestock areas, vegetable planting areas, and fruit tree planting areas. The farm's humans, animals, and plants are three indispensable elements. Animal waste and kitchen waste produced by humans, after fermentation over time, can serve as organic fertilizers for enriching the soil and providing nutrients and yield. Collected rainwater is used for irrigation on the farm. The farm achieves nearly zero waste, not only planning for the effective use of overall resources but also forming a more inclusive ecosystem service system.

The livestock area has chickens, sheep, and horses. Chickens are managed in a semi-enclosed mode, while other animals are raised in a free-range mode. The farm is located in a mountainous area where wild animals frequently appear, so for the safety of the chickens, they are released at fixed times each day. In the vegetable planting area, organic fertilizers are used in the planting process. Different plants are intercropped to provide balanced nutrients according to their different growth periods. The fruit tree planting area produces apples, pears, and other fruits for consumption and beverages. Eggs produced by chickens and vegetables and fruits grown on the farm provide nutrients needed for human life, emphasizing the integration and proper use of resources throughout the farm.

3.3 Visual Narratives and Sustainable Design in Organic Agriculture

Sustainable design in organic agriculture adapts flexibly to real-life situations and conditions, while visual narratives aid in conveying visual information, making it more vivid and engaging. This approach can be divided into two main parts: imagery and accompanying text. Through the combination of images and text (Hoffman, 2023), abstract concepts such as history, geography, environment (Menga & Davies, 2020), and advocacy issues (James, 2023) can be more easily understood, enhancing comprehension and memory of the information. Visual-based messages can transcend language and cultural barriers, making them more accessible and understandable to audiences.

Visual narratives are often used in education and promotion to explain complex concepts, interdisciplinary knowledge, and specific ideas. They are powerful tools for attracting attention and resonating with audiences, effectively conveying emotions and information. Visual narratives play a supportive role in many fields, such as local development (Bertoncin et al., 2023), education (Linardatos & Apostolou, 2023), and healthcare (Lalanda, 2022), providing various influential and expressive methods.

Through visual narratives, a clearer and more vivid storytelling experience is provided, depicting interactions within ecosystems, the application of sustainable farming techniques, soil conservation, and water resource management. This enhances the audience's awareness and understanding of sustainable design in organic agriculture.

4. Design Process and Results

Based on the content from the participatory observation, the entire farm is divided into three areas, each with a different focus. Before creating visual narrative illustrations, the content and visual elements of the narrative are established and planned. These include the animal husbandry area, the vegetable planting area, and the fruit tree planting area. The functional visual planning content for each area is as follows: (1) Animal Rearing Area: This section describes the method of raising chickens on the farm. The chickens have a large area to move around, with a coop provided as a place for them to lay eggs. This showcases the connection between the chickens, the land, and humans, highlighting the interaction within the ecosystem. Finally, it presents the process of water resource collection and utilization, explaining the importance of water resources. (2) Vegetable Growing Area: This section explains the staggered mixed planting method of vegetables and the sources of fertilizer used in the planting process, including kitchen waste and animal manure. It integrates the use of human resources, animal resources, and water resources. (3) Fruit Tree Planting Area: This section presents the method of planting fruit trees and the practical uses of the harvested fruits. It highlights the role of fruit trees in the ecosystem and the nutritional benefits of their fruits.

Plan the layout of each area in the visual narrative design, recording the observed elements: (1) Animal Rearing Area: This should include elements such as the chicken coop, chickens, and the water collection area. (2) Vegetable Growing Area: This needs to show the use of kitchen waste as fertilizer and the planting methods. (3) Fruit Tree Planting Area: This should provide the method of planting fruit trees. Design the narrative text to correspond with the content and operational processes required for each area. The detailed planning is as follows.

Table 1: Elements of Visual Narrative and Text Design

	Image elements	Corresponding narrative text
1	**Animal Rearing Area - Chicken Coop and Flock, Water Storage System**	This area primarily raises chickens, with the farm also housing two sheep and a horse. The animals' excrement can be used to enrich the soil with nutrients. (1) Chickens produce eggs, which can propagate to the next generation. When there are sufficient eggs, they can also serve as food for humans. (2) The excrement from the chickens can be used to enrich the soil with nutrients. (3) Given that the farm is located in a rich ecological environment, a semi-enclosed method is adopted. Chickens are released at fixed times daily to avoid attacks from wild animals. (4) The open-air water collection pool can collect rainwater and dew, making good use of water resources for farm maintenance.

2	**Vegetable Cultivation Area - Utilization of Kitchen Waste, Planting Methods**	On the hillside with abundant sunlight, a variety of vegetables are cultivated for self-sufficiency. (1) Staggered Mixed Planting: Vegetables are grown using a staggered mixed planting method to balance nutrient requirements for optimal growth. (2) Utilization of Kitchen Waste and Animal Manure: Kitchen waste is composted to become fertilizer for the soil. Additionally, animal excrement serves as nutrients for the farm's soil. (3) Water Resource Utilization: Water collected in reservoirs is used as an irrigation source for the crops.
3	**Fruit Tree Planting Area - Mixed Planting of Fruit Trees, Land Use**	In the fruit tree planting area, mixed planting is adopted to balance the nutrient requirements of plants and make efficient use of farm space. (1) Fruit trees are planted in a mixed arrangement to optimize nutrient utilization and maximize the use of available agricultural land. (2) Beyond Direct Consumption, the production of Delicious Juices.

Corresponding to the preceding Table of Elements of Visual Narrative and Text Design, first present an overview of the entire farm operation using an aerial view of the farm (Figure 2). Show the locations of the three areas within the farm and provide descriptions. Then, use detailed area maps accompanied by dialogue box text to explain the important narratives of each area's operation (Figure 3 to Figure 5).

Our world is grappling with the challenges of environmental change, including extreme weather patterns that result in both excessive rainfall and drought (He, 2020), profoundly impacting agriculture. Taiwan, too, faces a critical situation that threatens food security. In this context, the importance of sustainable organic agriculture design is underscored. By adopting this model and strategically managing daily resources, it becomes possible to mitigate or enhance excess soil moisture in farmland, thereby influencing agricultural productivity (Furtak, 2023). Rainwater collection tank systems are pivotal in unstable climate conditions, providing crucial water sources for crops. Moreover, through practices such as recycling household kitchen waste and animal manure, maintaining soil nutrients, and fostering soil fertility without resorting to chemical fertilizers and pesticides, significant strides can be made in reducing environmental degradation, enhancing soil health, and managing water resources. These efforts also contribute to mitigating greenhouse gas emissions (Ahmed, 2023), safeguarding ecosystems, and embracing measures for ecological diversity protection, ultimately bolstering ecosystem resilience. Thus, through the use of visual and textual narratives, the principles and strategic plans of sustainable organic agriculture are conveyed, facilitating the dissemination of information and knowledge to empower the public in addressing the challenges posed by global environmental change.

Figure 2. WWOOF Spain Organic Agriculture Sustainable Design - Overview of the Farm

Figure 3. Livestock Area - Description of Animal Rearing Practices, Utilization of Animal By-products, and Management of Recycled Water Resources

Figure 4. Vegetable Cultivation Area - Explanation of Vegetable Planting Methods, Utilization of Animal Resources, and Management of Irrigation Water Sources

Figure 5. Fruit Tree Planting Area - Explanation of Fruit Tree Planting and Utilization Methods

5. Conclusion and Recommendations

This research focuses on the sustainable design of organic agriculture, emphasizing its fundamental philosophy of respecting nature and seeking straightforward, sustainable solutions. This approach not only applies to agriculture but also serves as a holistic framework integrating life's essential needs. Through participatory observation, we have gained profound insights into the practical application of sustainable design in organic agriculture. By dividing the farm into distinct functional zones and employing visual narratives, we illustrate its key aspects, such as the synergistic relationships between plants and animals, the recycling of kitchen waste, and the versatile use of land. These efforts ensure that our findings accurately reflect the research data while effectively conveying the principles of sustainable organic agriculture design to diverse age groups through visual storytelling, thereby enhancing their capacity to address challenges like climate change and food security.

Looking forward, we aspire to integrate visual storytelling with technology or social media to offer more interactive and dynamic formats. Through educational and promotional initiatives, our goal is to broaden the dissemination of sustainable design concepts in organic agriculture, promoting sustainable development and the adoption of sustainable lifestyles. This involves developing digital platforms or applications that deliver compelling and interactive educational content, fostering societal awareness and engagement in the sustainable design of organic agriculture.

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