Global Forum on Food Security and Nutrition • FSN Forum

TEMPLATE FOR SUBMISSIONS

29.05.2023 – 23.06.2023


CALL FOR SUBMISSIONS:
Case studies of agrifood system technologies and innovations for climate action: Call for proposals for the FAO Science and Innovation Forum 2023

Template for submissions (maximum 2000 words in total)

In the context of the upcoming FAO Science and Innovation Forum 2023, the FAO Chief Scientist Office invites you to share illustrative country level case studies of agrifood system technologies and innovations for climate action.

Please use this submission template to share your experience. You can upload the completed submission form online, or, alternatively, send it to fsn-moderator@fao.org.

The Call for Submissions is open until 23 June 2023.
Template for submissions

Proponent (name/institution)

Center for Study Indonesian Food Anthropology (CS-IFA) and Social Enterprise Gastro Tourism Academy

Title for the case study presented

Eco-Gastronomy Tourism: Utilizing Narrow Land for Vertical Farming of Fruits

Country location

Indonesia

Context and background

Eco-Gastronomy Tourism has emerged as a blend of sustainable tourism and gastronomy. With a growing focus on environmental sustainability and the popularity of local food experiences, Eco-Gastronomy Tourism offers a unique approach to promote sustainable practices and culinary delights. In recent years, there has been an increasing awareness of the need for tourism activities that minimize environmental impact and benefit local communities. This has given rise to sustainable tourism practices, including Eco-Gastronomy Tourism. Concurrently, there has been a rising interest in gastronomy and culinary tourism, with travelers seeking authentic food experiences. Local cuisines and traditional food practices have become significant attractions, providing opportunities for communities to showcase their culinary heritage. In response to these trends, Eco-Gastronomy Tourism has gained popularity. It combines sustainable agricultural practices, like vertical farming, with gastronomic experiences. This approach maximizes limited land space for vertical farming of fruits, ensuring the production of fresh, organic, and locally sourced ingredients. By incorporating vertical farming into Eco-Gastronomy Tourism, it becomes possible to grow various fruits in small spaces, even in urban environments. This innovative approach addresses land scarcity while promoting sustainable farming methods that conserve water, reduce the use of synthetic fertilizers, and minimize transportation distances. Utilizing narrow land for vertical farming of fruits in Eco-Gastronomy Tourism brings multiple benefits. It supports local farmers by providing additional income through tourism-related activities. It also enhances visitors' understanding of sustainable agriculture and environmental conservation, raising awareness about responsible food production and consumption. Overall, Eco-Gastronomy Tourism with vertical farming of fruits in narrow land spaces offers a promising pathway to promote sustainability, foster local economic development, and create memorable experiences for tourists.

Key problem(s) addressed
- **Land Scarcity**: Limited availability of land poses a significant challenge for sustainable agriculture and food production. Utilizing narrow land spaces for vertical farming helps overcome land scarcity and allows for efficient land use in urban and densely populated areas.

- **Water Management**: Conventional farming methods often require large amounts of water, contributing to water scarcity and increasing pressure on freshwater resources.

- **Vertical Farming Techniques**: In Eco-Gastronomy Tourism, vertical farming techniques promote efficient water usage through advanced irrigation systems, reducing water waste and promoting water conservation.

- **Chemical Inputs**: Traditional agricultural practices rely heavily on synthetic fertilizers and pesticides, which have detrimental effects on the environment, including soil degradation, water pollution, and negative impacts on biodiversity. Vertical farming allows for precise nutrient management and reduced chemical inputs, promoting organic and environmentally friendly farming practices.

- **Food Transportation**: The global food supply chain involves long-distance transportation, resulting in significant greenhouse gas emissions. By implementing vertical farming in close proximity to urban areas, Eco-Gastronomy Tourism reduces the need for long transportation distances, thereby lowering carbon emissions associated with food logistics.

- **Climate Resilience**: Climate change poses risks to agricultural systems, including extreme weather events, changing rainfall patterns, and rising temperatures. Vertical farming in controlled environments offers climate resilience by mitigating the impact of external climate conditions, enabling year-round production and reducing vulnerability to climate-related disruptions.

- **Community Empowerment**: Eco-Gastronomy Tourism that incorporates vertical farming can empower local communities by providing economic opportunities, enhancing food security, and fostering sustainable livelihoods. This, in turn, strengthens community resilience in the face of climate change.

- **Education and Awareness**: Eco-Gastronomy Tourism presents a valuable platform to educate and raise awareness among tourists and local communities about the importance of climate action, sustainable farming practices, and the link between food production and environmental sustainability. It encourages individuals to make informed choices and support climate-friendly initiatives.

### Technological or innovative solutions employed

- **Vertical Farming Systems**: Advanced vertical farming systems utilize innovative technologies such as hydroponics, aeroponics, or aquaponics to cultivate crops in a vertical arrangement. These systems optimize space utilization, reduce water usage, and enhance resource efficiency, thereby contributing to climate mitigation.

- **LED Lighting**: Vertical farms often utilize energy-efficient LED lighting systems tailored to specific plant growth requirements. LED lights consume less energy...
compared to traditional lighting sources and can be fine-tuned to provide optimal light spectra for plant growth, reducing electricity consumption and associated greenhouse gas emissions.

- Climate Control Systems: Vertical farming allows for precise control of environmental factors such as temperature, humidity, and CO2 levels. Climate control systems employ sensors, automated ventilation, and cooling technologies to maintain optimal growing conditions, minimizing energy wastage and reducing the carbon footprint of crop production.

- Renewable Energy Integration: Integrating renewable energy sources, such as solar panels or wind turbines, into vertical farming operations can significantly reduce reliance on fossil fuels and decrease greenhouse gas emissions associated with energy consumption. These sustainable energy solutions align with the eco-gastronomy concept and promote climate-friendly practices.

- Smart Farming Technologies: IoT (Internet of Things) and data-driven technologies can be applied in vertical farming to monitor plant health, automate irrigation and nutrient delivery systems, optimize resource usage, and minimize waste. Smart farming solutions enhance productivity, reduce inputs, and contribute to climate mitigation by improving resource efficiency.

- Closed-Loop Systems: Closed-loop systems in vertical farming aim to minimize waste and maximize resource utilization. For example, wastewater from fish tanks in aquaponics systems can be recycled as nutrient-rich water for plant cultivation, creating a symbiotic relationship between fish production and crop farming, reducing water consumption, and minimizing environmental impacts.

- Carbon Capture and Storage: Integrating carbon capture and storage technologies within vertical farming facilities can help mitigate the carbon footprint of the operation. Capturing CO2 emissions from the air and utilizing them for enhanced plant growth or storing them underground can effectively contribute to climate mitigation efforts.

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<tr>
<th>Key outcomes and measurable impacts achieved</th>
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<tr>
<td>- <strong>Enhanced Food Security:</strong> Vertical farming increases local food production capacity, ensuring a more stable and secure food supply. This reduces dependence on imported produce and mitigates the risks associated with disruptions in global food distribution networks.</td>
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<td>- <strong>Reduced Carbon Emissions:</strong> By adopting vertical farming techniques and localized food production, the carbon footprint associated with long-distance transportation and conventional agriculture practices is significantly reduced. This leads to measurable decreases in greenhouse gas emissions, contributing to climate change mitigation.</td>
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<tr>
<td>- <strong>Resource Efficiency:</strong> Vertical farming optimizes resource utilization, including water, land, and energy. Through controlled irrigation systems, precise nutrient delivery,</td>
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and efficient use of vertical space, measurable reductions in water consumption, land footprint, and energy usage can be achieved, resulting in more sustainable agricultural practices.

- Conservation of Biodiversity: Vertical farming minimizes the need for agricultural expansion into natural habitats, thereby preserving biodiversity hotspots. By focusing on compact and efficient land use, measurable impacts can be observed in the preservation of ecosystems and the protection of wildlife habitats.

- Economic Development: The implementation of vertical farming within Eco-Gastronomy creates opportunities for local economic development. It generates employment in the agriculture and tourism sectors, promotes entrepreneurship, and enhances income-generating activities, leading to measurable improvements in livelihoods and socio-economic indicators.

- Improved Health and Nutrition: Vertical farming enables the production of fresh, locally grown fruits and vegetables with minimal use of synthetic pesticides and fertilizers. This contributes to improved food quality and nutrition for communities, resulting in measurable impacts on public health and well-being.

- Educational and Awareness Benefits: Eco-Gastronomy incorporating vertical farming provides a platform for educational initiatives and raising awareness about sustainable agriculture, climate change, and environmental conservation. Measurable impacts can be observed through increased knowledge, changed attitudes, and informed consumer choices, which further contribute to sustainable development and climate action.

- Replicable and Scalable Models: Successful implementation of vertical farming in Eco-Gastronomy can serve as replicable and scalable models for other regions. Sharing best practices, knowledge transfer, and capacity building contribute to measurable impacts beyond the local level, fostering a broader adoption of sustainable agricultural practices and climate action.

Key actors and stakeholders involved in the development and implementation (please also describe to what extent a multi-stakeholder and participatory approach has been adopted)

- **Farmers and Local Communities**: Small-scale farmers and local communities play a crucial role in implementing eco-gastronomy and vertical farming practices. They are actively involved in decision-making processes, providing insights into local agricultural practices and traditional knowledge. Adopting a participatory approach ensures that their voices are heard, and their needs and aspirations are considered.

- **Government and Policy Makers**: Government agencies and policymakers play a significant role in creating an enabling environment for eco-gastronomy and vertical farming. They develop supportive policies, regulations, and incentives that promote sustainable agriculture, facilitate access to resources and funding, and ensure that the benefits reach small-scale farmers and local communities. A multi-stakeholder
approach involving government officials, experts, and farmers is essential for effective policy formulation and implementation.

- Tourism Industry: The tourism sector, including tour operators, hotels, restaurants, and travel agencies, is a key actor in eco-gastronomy. They promote and market sustainable food experiences, including farm tours, culinary events, and local food sourcing. Collaboration between the tourism industry, farmers, and local communities fosters mutual understanding, economic benefits, and sustainable tourism development.

- Research and Academic Institutions: Research institutions and universities contribute to the development and knowledge sharing in eco-gastronomy and vertical farming. They conduct research, provide technical expertise, and support innovation in farming practices. Collaboration with farmers and local communities ensures that research outcomes are applicable, context-specific, and beneficial to small-scale farming communities.

- Non-Governmental Organizations (NGOs): NGOs focused on sustainable agriculture, food security, and environmental conservation actively engage in promoting and supporting eco-gastronomy and vertical farming initiatives. They provide capacity building, training, and technical assistance to farmers and communities, facilitating knowledge transfer and empowering stakeholders. A multi-stakeholder approach involving NGOs helps address social, environmental, and economic challenges at the grassroots level.

- Private Sector and Businesses: Private companies, including agribusinesses, technology providers, and retailers, play a role in the development and commercialization of vertical farming systems and related technologies. Their involvement can contribute to scaling up eco-gastronomy practices and making them financially viable. Collaborative partnerships with small-scale farmers ensure that the benefits are shared, and the economic impact is distributed more equitably.

Challenges encountered (any types of trade-offs, and how these were managed) and/or efficiencies gained (e.g. win-win situations)

**Challenges Encountered:**

a. Initial Investment and Costs: The implementation of eco-gastronomy and vertical farming requires significant upfront investment, which can be challenging for financially limited small-scale farmers and communities.

b. Technical Expertise and Knowledge: Adopting vertical farming techniques demands specialized skills and knowledge. Farmers and communities may need training and support to effectively operate and manage these systems.
c. Balancing Food Production and Tourism: Striking a balance between meeting local food demands and catering to tourism activities can be challenging when integrating eco-gastronomy with vertical farming.

d. Limited Space and Scalability: Scaling up vertical farming operations while optimizing land utilization can be challenging, as vertical farming heavily relies on limited space.

Trade-Offs and Management:

a. Trade-off: Yield versus Space Efficiency: Vertical farming optimizes space usage but may result in lower crop yields compared to traditional farming methods. Managing this trade-off requires careful crop selection, system optimization, and improved cultivation techniques.


c. Trade-off: Cost versus Environmental Benefits: While the initial costs of implementing eco-gastronomy and vertical farming can be high, the long-term benefits include reduced carbon emissions, resource efficiency, and habitat conservation. Managing this trade-off involves exploring financing options and support programs for sustainable agriculture.

Efficiencies Gained (Win-Win Situations):

a. Resource Efficiency and Sustainability: Vertical farming optimizes resource usage, such as water, land, and fertilizers, resulting in efficient resource utilization and reduced environmental impact.

b. Climate Change Mitigation: Vertical farming reduces carbon emissions by minimizing transportation distances, utilizing renewable energy, and sequestering carbon through plant growth, contributing to climate change mitigation.

c. Economic Opportunities and Community Development: Eco-gastronomy and vertical farming generate additional income streams through tourism, farm-to-table experiences, and value-added products, benefiting both economic development and environmental sustainability.

d. Food Security and Local Food Production: Vertical farming enhances food security by ensuring a consistent supply of fresh produce, reducing reliance on external sources, and enabling year-round cultivation, strengthening local food systems.

Factors for success

Market Demand and Consumer Awareness: The success of eco-gastronomy and vertical farming in Tasikmalaya relies on a strong market demand for sustainable and locally produced food. Increased consumer awareness of the environmental and health benefits associated with these practices contributes to the success of the initiatives. Collaboration and Partnerships: Successful eco-gastronomy and vertical farming ventures involve
collaboration between various stakeholders, including farmers, government agencies, NGOs, research institutions, tourism operators, and local communities. Building partnerships enhances knowledge sharing, access to resources, and market reach. Capacity Building and Knowledge Transfer: Providing training, technical assistance, and education to farmers and communities in eco-gastronomy and vertical farming techniques is crucial for success. Building their capacity in sustainable farming practices, marketing strategies, and entrepreneurship enhances the quality of products and ensures long-term viability. Infrastructure and Technology: Access to appropriate infrastructure and technology is vital for the success of eco-gastronomy and vertical farming. Adequate facilities for vertical farming systems, including climate control, irrigation, and efficient use of space, enable optimized production and resource efficiency. Policy Support and Regulations: Supportive policies and regulations play a significant role in fostering the success of eco-gastronomy and vertical farming. Governments can incentivize sustainable agriculture practices, provide funding opportunities, and create a favorable business environment for farmers and entrepreneurs. Community Empowerment and Participation: Engaging and empowering local communities in the decision-making process and providing opportunities for their active participation in eco-gastronomy and vertical farming initiatives are key factors for success. This fosters a sense of ownership, social cohesion, and economic empowerment. Marketing and Branding Strategies: Effective marketing and branding strategies are essential to promote and differentiate eco-gastronomy and vertical farming products from conventional alternatives. Highlighting the environmental benefits, local origin, and quality of the products can attract consumers and create a niche market. Economic Growth and Job Creation: The success of eco-gastronomy and vertical farming contributes to local economic growth by creating employment opportunities, supporting entrepreneurship, and generating additional revenue streams. This uplifts the standard of living and enhances economic resilience within the community. By considering and implementing these factors for success, eco-gastronomy, vertical farming, and the economic growth impact for the community of Tasikmalaya can thrive due to the high demand for their products. This enables the community to capitalize on the benefits of sustainable farming practices, promote environmental conservation, and achieve socio-economic development.

Lessons learned (both positive and negative) and whether these could be applicable in other contexts with similar characteristics

**Positive Lessons Learned:**

a. **Environmental Sustainability:** Eco-gastronomy and vertical farming contribute to environmental sustainability by reducing carbon emissions, conserving resources, and promoting biodiversity. These practices can be replicated in other regions to address environmental challenges and promote sustainable food production.

b. **Economic Opportunities:** The integration of eco-gastronomy and vertical farming with tourism and local entrepreneurship creates economic opportunities for communities. Similar strategies can be implemented in other contexts to foster local economic growth, job creation, and income generation.
c. Health and Well-being: Increased fruit consumption due to eco-gastronomy and vertical farming practices positively impacts public health and well-being. Encouraging similar dietary changes in other communities can lead to improved health outcomes and increased happiness.

d. Home-based Entrepreneurship: The success of home-based entrepreneurship in generating income and enhancing the happiness index highlights the potential for individuals to pursue entrepreneurial ventures from their homes. This flexible and accessible business model can be replicated in other regions to empower individuals and foster economic resilience.

Negative Lessons Learned:

a. Technical Challenges: Implementing eco-gastronomy and vertical farming requires specialized knowledge and technical expertise. Adequate training and support must be provided to farmers and entrepreneurs to overcome technical challenges and ensure the long-term viability of such initiatives.

b. Financial Considerations: The initial investment costs associated with eco-gastronomy and vertical farming can be significant. Access to financing options, grants, and subsidies is crucial to overcome financial barriers and promote widespread adoption of these practices.

c. Market Demand and Consumer Awareness: The success of eco-gastronomy and vertical farming relies on market demand and consumer awareness. It is essential to invest in marketing and education campaigns to raise awareness and create a market niche for sustainable and locally produced food.

d. Policy Support and Infrastructure: Supportive policies and adequate infrastructure are vital for the successful implementation of eco-gastronomy and vertical farming. Governments need to develop and implement policies that incentivize sustainable farming practices and invest in infrastructure development to facilitate their adoption.

Contact information for further inquiries

**Repa Kustipia (Gastronomist & Ethnofood Anthropologist)**  
Center for Study Indonesian Food Anthropology (CS-IFA) and  
Social Enterprise Gastro Tourism Academy,  
Tasikmalaya, West Java - Indonesia  
email: rkustipia@gmail.com  
https://linktr.ee/repakustipia

Links and additional materials

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