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Local food innovation for food security in west timor during social restrictions

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ABSTRACT
Food security during social restrictions is crucial, making the strengthening of local food systems essential in such situations. The study aims to (i) analyze the influence of food processing technology innovation, local food management, and the quality of local food on food security in West Timor during social restrictions, and (ii) identify strategic priorities for achieving food security in West Timor. The research was conducted on Timor Island, particularly in North Central Timor Regency, with a sample of 75 respondents distributed across four sub-districts. The analysis employed logistic regression and the Analytical Hierarchy Process (AHP). The logistic analysis revealed that innovation in local food management significantly influenced food security (α = 5%) with an odds ratio of 18.119, whereas innovation in local food processing technology (odds ratio = 1.429) and the quality of local food (odds ratio = 1.593) were not statistically significant. Further analysis using AHP identified the strategic priorities for achieving food security, which included: technology transfer procedures (32.20%), upstream and downstream integration of local food—including production, preservation, processing, packaging, marketing, and consumption (31.90%), regulation of local food nutritional standards (21.90%), and management of local food stocks (14.10%). Based on these findings, a comprehensive roadmap is necessary to effectively achieve food security in the region.

Contribution/Originality: This research is one of the few studies that have investigated local food management and the use of local food processing technology to produce quality instant local food that functions to achieve food security, especially during times of social restrictions.

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1. INTRODUCTION
United Nations in the document, namely, Transforming Our World: The 2030 Agenda for Sustainable Development, states that there are 17 Sustainable Development Goals; these are integrated into national and regional development in Indonesia through Presidential Regulation Number 59 of 2017. One of the goals is ending hunger, achieving food security, and improving nutrition, as well as promoting sustainable agriculture. Food security conditions

are influenced by many factors under normal circumstances and during social restrictions such as the COVID-19 pandemic that affected the world. (Ayyildiz, 2022; Rizwana et al., 2022) stated that COVID-19 has an impact on food security conditions.

Food security on a national development scale is the strength of a country in providing a guarantee to all citizens to obtain sufficient, quality food by optimizing the diversity of food resources. Law No. 18 of 2012 concerning food describes food security as a condition of meeting food needs for a country and individual food needs. The food needs include quantity and quality, diversity, nutritiousness, equity, affordability, and must not be contrary to religion, belief, and the culture of the people residing in an area to enable the population to meet the needs of a healthy, active, and sustainable productive life. In line with Elizabeth (2011), who stated that food security is a component that is difficult to separate from national security because it functions to determine the quality of human resource intelligence.

Low food security also impacts malnutrition status and the high number of stunting cases in Indonesia. The Indonesian Ministry of Health Research and Development Agency (2018) stated that East Nusa Tenggara Province is one of the provinces in Indonesia with high cases of stunting or malnutrition in infants and toddlers, with a percentage of 30.8%. It also stated that North Central Timor Regency (known as TTU Regency) reached 51.8%. The high stunting rate in the TTU Regency reflects a lack of food security and nutritious food intake for infants and toddlers. Indications of food insecurity, malnutrition, and stunting are important issues for promoting food security at the regional, village, and household levels to develop quality human resources.

TTU Regency has a variety of local food potentials besides rice, such as corn, tubers, and beans. However, food production is seasonal, leaving some residents without sustainable food security (including instant local food), and nutritional adequacy remains a challenge. The situation is exacerbated by social restrictions during the COVID-19 pandemic; as found in research by Bonuedi, Gerber, and Kornher (2021), which stated that food shortages during the famine season, especially in rural communities, were due to the difficulty of accessing food markets, which were caused by limited infrastructure and the lack of economic conditions.

These obstacles need to be addressed by the local government and community through local food processing technology and local food management institutions to produce high-quality, continuously available processed food. Therefore, an institutional diagnosis, including local wisdom, is necessary as stated by Schouten, Vink, and Vellema (2018), to restructure institutions to achieve food security; this is also regulated regarding the strengthening of food and nutrition institutions in Presidential Regulation No. 83 of 2017.

It has provided space for the district government of TTU Regency to achieve food security through institutional innovation and food processing technology that can serve as guidelines, methods, and approaches for communities to attain food security. Furthermore, strengthening food processing innovation also offers opportunities for communities and the government to participate in maintaining food stocks, improving food quality and nutrition, and stabilizing prices. Jayne (2012) stated that food price instability causes a food crisis, so intervention is needed to stabilize food prices, which also requires a credible commitment between the public and private sectors in the food market.

Innovation in local food management is also related to coordination and partnerships between food business actors, which start from the provision of inputs, production, processing, distribution, and consumption. Osei-Amponsah, van Paassen, and Klerkx (2018) stated that identifying potential partners is necessary to facilitate collaborative intervention processes between food business actors (market logic) and farmer empowerment actors (institutional logic). It also emphasized that the identification of potential partners is needed to facilitate the collaborative intervention process. Collaborative interventions can improve food security in a region and enhance its distribution to other regions due to increased digital accessibility, as found in (Birner, Daum, & Pray, 2021).

Previous studies by Jayne (2012), Osei-Amponsah et al. (2018), and Birner et al. (2021) successively focused on achieving food security through food price stability, collaboration among food stakeholders, and ease of access through digitalization. Similarly, a previous study by Leischnig, Geigenmueller, and Lohmann (2014) emphasized technology transfer between institutions, and Young, Brown, Collins, and Glanz (2024) focused on food insecurity and lack of access to public nutrition. This study differs from previous research because it seeks to achieve food security through innovation in food management and technology. Therefore, a portrait of technological and management innovation towards food security is necessary; it can serve as a basis for determining appropriate alternatives to support the roadmap toward food security in North Central Timor Regency. Based on the background, this study aims to (i) analyze the influence of food processing technology innovation, local food management, and the quality of local food on food security in West Timor during social restrictions, and (ii) analyze strategic priorities for achieving food security in West Timor.

2. MATERIALS AND METHODS

2.1. Research Sites

The research was conducted in West Timor, Indonesia, specifically in the North Central Timor Regency, East Nusa Tenggara Province, as illustrated in Figure 1. The study duration was five months, from August to December 2021. The data used were collected during the period when social interaction restrictions were in place due to Covid-19. There were 75 respondents from several districts, including West Miomaffo, East Miomaffo, and Insana; these three sub-districts are key centers for corn production and have the potential to process Bose corn into instant local food sustainably to achieve food security. Additionally, some samples were from the Kota Kefamenanu sub-district, which functions as a trade center and residential area, thereby encouraging the development of small food processing businesses. The number of respondents was relatively small in each location due to the homogeneity of corn processing and local food management.

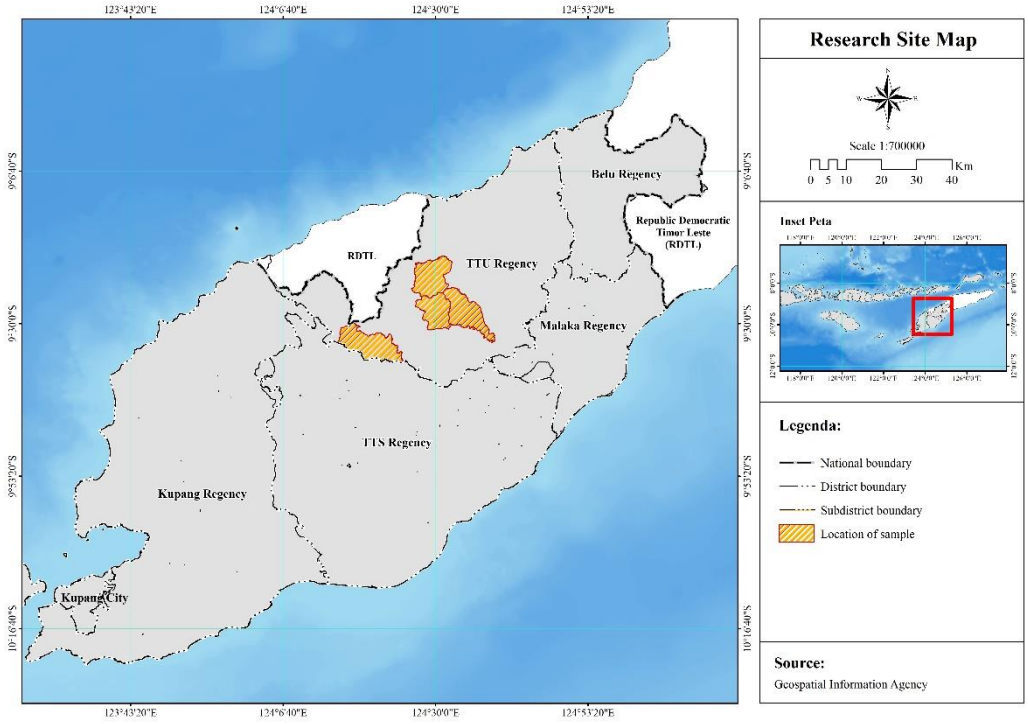

Figure 1. Map of research location.

2.2. Data Collection

The study employed a survey method, with data collection through in-depth interviews, observation, and focus group discussions (FGDs). Data sources included farmers; local governments (food institute, health institute, and one-stop integrated investment and licensing institute); micro, small, and medium enterprises (MSMEs) in the food sector; and non-governmental organizations. Hennink, Kaiser, and Weber (2019) stated that FGDs are a popular method used to collect relatively large and comprehensive data in a short time. Information conveyed by FGD participants typically includes insights, perceptions, and experiences.

2.3. Data Analysis

Data analysis began with a logistic analysis to assess the influence of innovations in technological and food management, as well as local food quality, on achieving food security. The analysis continued with AHP to analyze stakeholder perceptions of food security strategy priorities from several alternatives: transfer procedures of food processing technology, food stock management, upstream and downstream integration of food businesses, and regulations of local food nutrition standards. The data analysis framework of this study is shown in Figure 2.

2.3.1. Logistic Analysis

The logistic analysis aims to evaluate the current condition regarding the impact of technology, management, and quality of local food on food security, which is the primary objective. Logistic analysis is employed to determine the significant effect of local food factors on food security. The mathematical formula follows the reference by Pervaiz, Ninghui, Manzoor, and Altangerel (2017).

$$L_i=\ln\left(\frac{P_i}{1-P_i}\right)=Z=\beta_o+\beta_1 X_1+\beta_2 X_2+\beta_3 X_3+e_i \qquad (1)$$

Information:

β_0 : Intercept.
$\beta_1, \beta_2; \beta_3$: Regression coefficient.
X_1 : Innovation of local food processing technology (Ordinal data).
X_2 : Innovation of local food management institutions (Ordinal data).
X_3 : Quality of local food (Ordinal data).
e_i : Error.
Z : Food security (Ordinal data).
ln : Logaritma natural.
P_i : Probability.

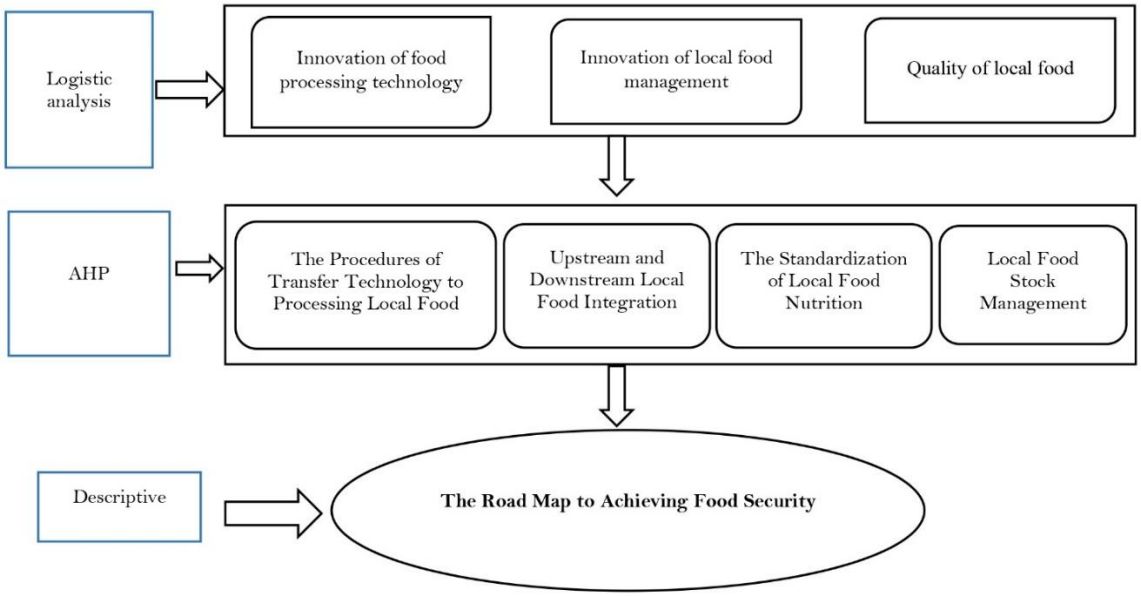

Figure 2. Data analysis framework.

2.3.2. Analysis Hierarchy Process (AHP)

Furthermore, it is necessary to analyze stakeholder perceptions regarding the priority of local food management strategies to accelerate the achievement of food security. Therefore, the analysis of the second objective uses the AHP with the following stages: defining the problem, creating a hierarchical structure, creating a matrix and pairwise comparison values, determining priorities, and testing logical consistency. Saaty (2008) and Granemann and Figueiredo (2013) state that the minimum AHP structure consists of objectives, criteria, and alternative recommendations. The objective to be achieved is to attain food security during social restrictions. These criteria or factors include local food processing technology, local food management, and local food quality; each factor has sub-factors. The alternative strategies include procedures for transferring local food processing technology, upstream-downstream integration, stock management, and local food nutritional standards. The AHP structure is shown in Figure 3. The consistency test uses the following formula.

$$CI = \frac{\lambda_{maximum} - n}{n-1} \qquad (2)$$

Information:
CI : Consistency Index.
λmaximum: The eigenvalue.
n : Number of subcriteria.

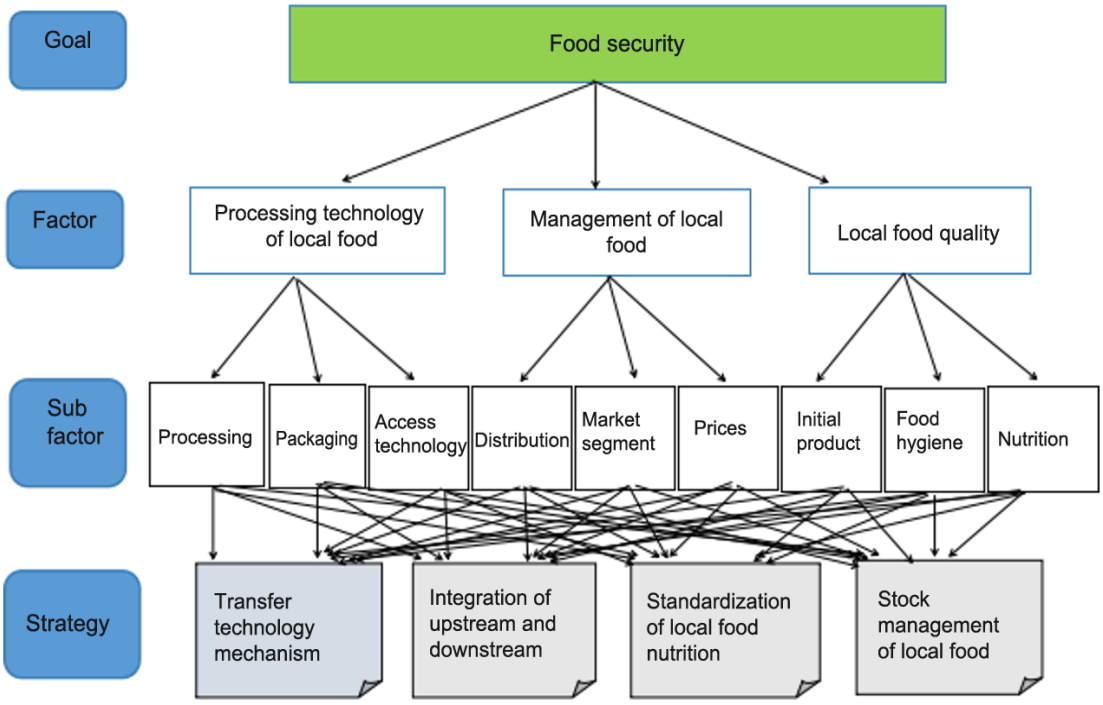

Figure 3. AHP structure.

3. RESULTS AND DISCUSSION

3.1. Logistic Analysis of the Effect of Local Food Innovation Technology, Management, and Quality of Local Food on Food Security in West Timor

The logistic analysis results indicate that innovation in strengthening local food management (X_2) is a significant factor (α=0.05), with an odds ratio of 18.119. Innovation in local food management will increase the chances of achieving food security by 18.119 times at α=0.05. The logistic analysis results also show that innovation in local food processing technology (X_1) is not significant (α=0.05), but its odds ratio is positive at 1.429, indicating that the increase in food security is relatively small. Likewise, food quality (X_3) has an odds ratio of 1.593 for food security, but it is not significant. The results of the logistic analysis are shown in Table 1.

Table 1. The result of logistic analysis.

Variable		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Technology (X_1)	0.357	0.594	0.362	1	0.548	1.429
	Management (X_2)	2.897	1.139	6.474	1	0.011	18.119
	Quality (X_3)	0.466	1.284	0.132	1	0.717	1.593
	Constant	-2.204	1.672	1.737	1	0.188	.110

Note: a. Variable(s) entered on step 1: Technology, management, quality.

3.1.1. Innovation of Food Processing Technology

Food is generally a perishable product, so technology in food processing can provide variety. The food processing technology (especially corn) currently used by the people of Timor-Indonesia is relatively simple, making it less likely to contribute to food security, or in other words, has not significantly impacted food security. This is due to slow technology adoption, the unavailability of processed foods, and a lack of consumer interest due to unattractive packaging. Novalinda and Asni (2013) noted that local foods have not been able to attract many people due to their unattractive appearance and lack of prestige. The innovation of processing corn into instant food in West Timor is an innovation that can improve food security, providing the community with a more varied food alternative.

Therefore, it is necessary to innovate the diversity of food consumption with balanced nutrition and attractive packaging. One interesting innovation is processing bose corn (note: bose is the local name for processed corn food in West Timor) as instant food with balanced nutrition for consumption. Future efforts include utilizing technology for the mass production of bose corn and instant bose corn; however, more than that, a mechanism for transferring local food processing technology is needed to support food security. Technological innovation, combined with management innovation, can achieve food security because the result is not only the accumulation of technology and management but also the integration of the two, as stated by Dechow, Granlund, and Mouritson (2007).

3.1.2. Innovation of Local Food Management

Local food management consists of providing inputs, farming, the product processing industry, marketing, and supporting institutions. In TTU Regency, each of these subsystems generally does not consider the interrelationship between them; therefore, innovation in local food management is needed by enhancing the forward and backward linkages of the Kefa corn business as an inseparable system. The linkage is realized through the smooth distribution of products between business actors in each subsystem. This situation can create food security, and logistics analysis is significant at α=5%. Enthoven and Van den Broeck (2021) stated that the local food supply chain serves to connect producers and consumers, which also impacts food security. These conditions can create food security, so logistic analysis is significant at α=5%.

Pricing locally processed foods (such as instant corn) that are affordable for various market segments allows for equitable distribution across community segments and regional clusters. This promotes food self-sufficiency because upstream and downstream processes operate within a single region as a unified whole, which also requires increased participation from all stakeholders. Public sector institutions are necessary to bridge farmers with the market to increase food procurement, technology, food processing services, and infrastructure. In harmony with Guillaumie, Kamgang, Brotherton, and Boiral (2025), collaborative governance with broad participation from all stakeholders plays a crucial role in ensuring the sustainability of local food supplies to support food security.

3.1.3. Quality of Local Food

The quality of local food is determined by its safety and nutritional content. Food safety results from chemical-free production, storage, and processing. One food product that is mechanically processed without chemicals is instant Bose corn, which has nutritional value. Laboratory analysis at Biotrop IPB stated that the nutritional content of Kefa corn, combined with corn, peanuts, and sei meat (local name for meat processed by smoking), is as follows: carbohydrates (28.0%), fat (8.62%), protein (8.31%), crude fiber (24.5%), and water content (66.7%). However, in general, residents of TTU Regency do not view food quality as a determinant of food security but rather focus on the quantity of food consumed, as evidenced by the positive but insignificant results of the logistic analysis. Zhang, Chen, and Hu (2019) have not been fully convinced of the authenticity and quality of local food as competitive advantages. Therefore, an analysis of the nutritional content of various local foods is needed, as well as consumer understanding of the nutritional content of each local food, to achieve food security and community health.

3.2. The Priority Strategy for Food Security

Based on the AHP, the priority strategies for strengthening local food management in North Central Timor Regency are, respectively, the transfer procedures of local food processing technology (32.2%), upstream and downstream integration of local food (31.90%), regulation of local food nutrition standards (21.90%), and local food stock management (14.10%). A summary of the AHP analysis results is shown in Figure 4. Previous findings from Arif, Khan, Rehman, Kabir, and Imran (2020) stated that strategies to improve community food and nutrition security include food availability (input supply, increased production, linkages to markets), food access for all, utilization of food to improve food security, and nutritional fulfillment, including by providing supplementary food.

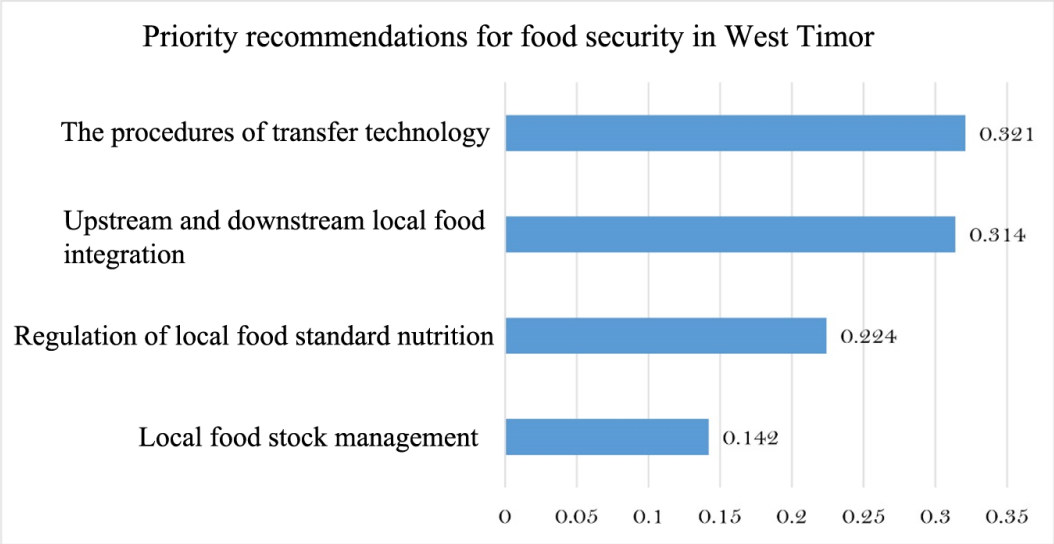

Figure 4. Priority recommendations for food security in West Timor.

3.2.1. The Procedures of Transfer Technology

Based on the AHP results, the transfer procedure for local food processing technology is a top priority for realizing local food security. Appropriate transfer of local food processing technology can increase the availability of local food in the long term, boost public interest in local food consumption so that it can replace rice, enhance appreciation for local food and their providers, increase the economic added value of local food, which in turn improves food security. The results of this study align with Fajri, Putri, Novita, Gusmalini, and Muchrida (2021), who stated that the use of local food processing technology in exploiting the potential of local food as an alternative food can increase the economic added value of local food through processing, preservation, packaging, and food deviation.

The transfer of local food processing technology in North Central Timor Regency plays a crucial role in providing guidance, knowledge, and methods to the community. The impact can optimize the processing of widely available local food potential, thereby increasing food diversity and product added value. Furthermore, this technology transfer can improve community nutrition to address malnutrition and stunting by utilizing local food resources and existing local wisdom. An, Sukiyono, and Sugiarti (2013) state that local community wisdom in food provision is classified into wisdom in providing food that must be available daily and food that does not need to be available daily.

Developing a mechanism for transferring local food processing technology requires the involvement of the government, stakeholders, and the community. Synergy and commitment from various parties (government, private sector, academics, and community) are essential for meeting food needs within the economic framework, as various factors determine food security. Agricultural extension workers and academics have an obligation to bring technology closer to the community in a way that is easy to understand, accessible, and sustainably used to achieve food security.

3.2.2. Upstream and Downstream Local Food Integration

Food security systems in the regions require significant attention to the upstream and downstream integration of local food. It begins with the provision of agricultural land and other production inputs, followed by production processes, harvesting, and food preservation. Local food processing and packaging, distribution, access to local food, and consumption are also critical components. Timisela, Leatemia, Polnaya, and Breemer (2017) stated that the application of supply chain management in the local food agro-industry starts from upstream to downstream; by focusing on the approaches used, namely the cultivation process to produce raw materials; transformation of raw materials (harvest and post-harvest handling) related to changing raw materials into finished and semi-finished products; and delivery of products to consumers through the distribution system. The upstream-downstream integration of local food as an agribusiness system can also enhance the added value of the economy. Clark, Jablonski, Inwood, Irish, and Freedgood (2020) stated that the added value of agricultural food commodities occurs due to utility, supply chains, and value distribution among each food business actor.

Upstream and downstream integration of local food requires cooperation and collaboration between farming communities that allocate production resources, local food supply businesses, universities as technology developers, and local governments. Local governments, through technical agencies, help coordinate, supervise, and innovate every

aspect into a unified whole in the upstream and downstream integration of local food to achieve food security in TTU Regency. In line with Hribar, Visković, and Bole (2021), who stated that the government plays a role in providing facilities and conducting outreach, while farmers act as producers of food inputs, business actors act as professionals in managing food businesses offering additional products and services, and researchers play a role in transferring knowledge and technology for the development of food products.

The upstream-downstream integration of local food can increase food security and realize local food self-sufficiency, and with the right combination, can provide a menu with balanced nutrition for the community so that it can overcome health problems, including stunting. Salarkia, Abdollahi, Amini, and Neyestani (2014) stated that sufficient food is food that is beneficial to health. Arif et al. (2020) emphasized that nutritious food can reduce stunting and other malnutrition; therefore, it is used as the basis for the plan for the fortification of food products. Consequently, other supporting institutions, such as nutrition and health organizations, are needed to ensure the availability of quality and nutritious food for the community.

3.2.3. The Standardization of Local Food Nutrition

There is a national reference that provides space for each region to optimize the development of local food processing through Presidential Decree No. 22 of 2009 concerning the Policy for the Acceleration of Diversification of Food Consumption Based on Local Resources and Regulation of the Minister of Agriculture No. 43 of 2009 concerning the Movement for the Acceleration of Diversification of Food Consumption Based on Local Resources. These policies/regulations became the basis for making regional policies/regulations that regulate structurally and technically the development of local food in the context of meeting food needs in the TTU Regency.

Local food diversification has been implemented in various regions by different groups. This aligns with the research of Utami (2018), which states that to optimize the diversity of local food consumption, local governments establish policies on the acceleration of food diversification based on local resources. TTU Regency possesses significant potential for local foods such as corn, beans, and cattle. However, the nutritional content of each local food is not yet fully understood, making it difficult to appropriately combine local foods to provide balanced nutrition for the community.

3.2.4. Local Food Stock Management

Local Food Stock Management is a solution to overcoming food insecurity. The community food stock in TTU Regency is carried out by drying and smoking. This is due to a lack of knowledge about local food storage and preservation, causing farmers' food stocks to be damaged, and therefore farmers sell part or even all of their harvests to meet other needs at low prices. As a result, local food stocks cannot meet the food security of the community. Therefore, the new food stock management recommended for the community in TTU Regency is in the form of providing instant food (such as bose corn instant) as part of logistics management. Logistics management is needed, as found by Accorsi, Cholette, Guidani, Manzini, and Ronzoni (2022), that logistics management, influenced by food supply chain strategies, requires handling at every stage to ensure food products remain available with guaranteed quality until consumed by consumers.

The results of AHP and logistic analysis are formulated in the road map to operationalize the stages toward achieving sustainable food security. Suryana (2014) stated that a strategy to achieve sustainable food security requires adjustments to the policy formulated in the road map. This implies the need for a roadmap and action plan that operationalize concrete actions at each stage to ensure the achievement of sustainable food security.

3.3. Road Map of Local Food Innovation Towards Food Security

The innovation of local food processing technology into quality, safe, and highly nutritious food stored in good packaging will increase food diversification. The technology transfer procedures carried out at this stage are (i) research on food processing technology innovations and transfer procedures, (ii) provision of equipment, and (iii) training and assistance for the community of food processing business actors. Innovation in agricultural processing technology, accompanied by appropriate technology transfer, increases food diversification, especially during the COVID-19 pandemic (Rozaki, Siregar, Pratama, & Istiyanti, 2023).

Local food that is available in sufficient and varied quantities, is feared not to be available at all times to all in circles of society (market segment). Therefore, upstream-downstream integration is needed to ensure sufficient raw material availability, which contributes to the sustainability of food processing and distribution in various market segments. In line with this, Sukhwani et al. (2019) stated that partnerships and collaborations between food business actors can improve food security. The action plan at this stage is as follows: (i) training for extension workers, (ii) information transfer from agricultural extension workers for the dissemination of agribusiness information as a system, (iii) monitoring and evaluating commitments between communities and business actors in implementing upstream-downstream integration because each agribusiness subsystem contributes to overall food security.

Furthermore, the government can determine quality local foods (such as bose corn from West Timor) to meet the community's food needs. This local food can be combined with other local foods (peanuts, cowpeas, and beef) to produce local food with balanced nutrition. The action plan at this stage includes (i) establishing policies governing the nutritional standards of local foods, and (ii) socializing and enforcing policies to improve food security and community nutrition. Previous research by Suryana (2014) stated that adjustments to the direction of food policy are necessary, particularly regarding food availability and nutritional adequacy, which are indicators of food security.

An integrated food security system makes it easier for all groups of people to access quality local food. These conditions can increase local food stocks in various forms so as to increase self-esteem and pride in local food consumption wherever located, including instant of bose corn which has a high nutritional content. The action plan carried out is (i) determining the business groups that can produce of bose corn instantly so that it can be an example for other business actors, and (ii) promoting directly or through social media. One of the goals of the local food road map is to grow local food MSMEs (Food Security Agency, 2020). In summary, the road map of local food innovation towards increasing food security is shown in Figure 5.

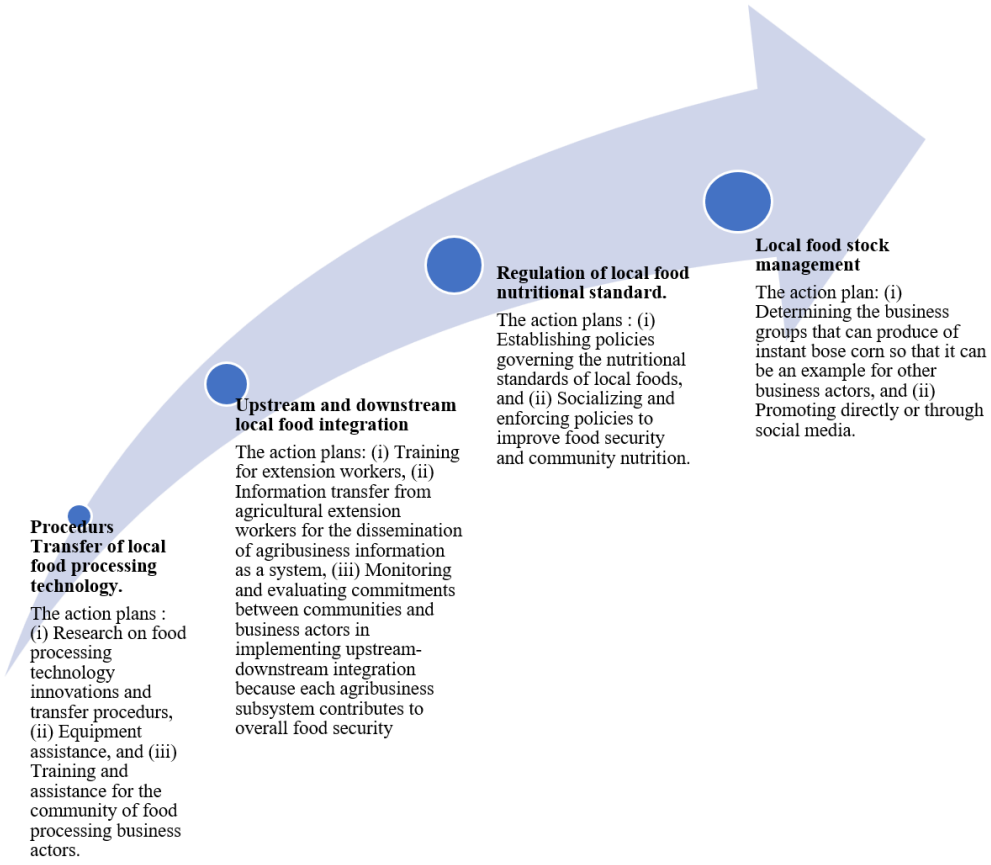

Figure 5. Roadmap of local food innovation towards food security.

4. CONCLUSION

The results of the logistic analysis showed that food processing technology innovation and the quality of local food have no significant effect, while local food management institutions have a significant effect on food security (α=5%). Furthermore, alternative local food management based on the AHP results recommends the following priority: transfer of local food processing technology (32.20%) and upstream and downstream integration of local food (production, local food processing) (31.90%). Therefore, a roadmap is needed to achieve food security through collaboration between farmers and stakeholders to facilitate technology transfer and integrate upstream and downstream processes to produce quality local food, including instant food that is ready for market acceptance. This study is limited to local corn food and uses qualitative data that is quantified, so more comprehensive research is needed, including a more diverse analysis of local food.

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Institutional Review Board Statement: The Institute for Research and Community Service of Timor University, Indonesia, under protocol number [IRB No: 007/UN60.6/PP-PM/2022], dated [14 January 2022]. Informed verbal consent was obtained from all participants, and all data were anonymized to protect participant confidentiality.
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Accorsi, R., Cholette, S., Guidani, B., Manzini, R., & Ronzoni, M. (2022). Sustainability assessment of transport operations in local food supply chain networks. *Transportation Research Procedia, 67*, 1–11. https://doi.org/10.1016/j.trpro.2022.12.049

An, D., Sukiyono, K., & Sugiarti, S. (2013). Analysis of technical efficiency and factors influencing efficiency in cabbage farming in Talang Belitar Village, Sindang Dataran Sub-District, Rejang Lebong District. *Agrisep Journal: Study of Socio-Economic Problems in Agriculture and Agribusiness, 12*(2), 177-194.

Arif, S., Khan, M. A., Rehman, S. U., Kabir, M. A., & Imran, M. (2020). Investigating smart home security: Is blockchain the answer? *IEEE Access, 8*, 117802-117816. https://doi.org/10.1109/ACCESS.2020.3004662

Ayyildiz, M. (2022). Asymmetrical relationship between COVID-19 global fear index and agricultural commodity prices. *Emirates Journal of Food and Agriculture, 34*(3), 239-247. https://doi.org/10.9755/ejfa.2022.v34.i3.2798

Birner, R., Daum, T., & Pray, C. (2021). Who drives the digital revolution in agriculture? A review of supply-side trends, players and challenges. *Applied Economic Perspectives and Policy, 43*(4), 1260–1285. https://doi.org/10.1002/aepp.13145

Bonuedi, I., Gerber, N., & Kornher, L. (2021). Intervening in cash crop value chains for improved nutrition: Evidence from rural Sierra Leone. *The Journal of Development Studies, 58*(1), 38-54. https://doi.org/10.1080/00220388.2021.1945043

Clark, J. K., Jablonski, B. B. R., Inwood, S., Irish, A., & Freedgood, J. (2020). A contemporary concept of the value (s)-added food and agriculture sector and rural development. *Community Development, 52*(2), 186-204. https://doi.org/10.1080/15575330.2020.1854804

Dechow, N., Granlund, M., & Mouritson, J. (2007). Interactions between modern information technology and management control. In (pp. 45-64). Harlow: Prentice-Hall.

Elizabeth, R. (2011). Strategy for achieving food diversification and independence: Between hope and reality. *Food Crop Science and Technology, 6*(2), 230–242.

Enthoven, L., & Van den Broeck, G. (2021). Local food systems: Reviewing two decades of research. *Agricultural Systems, 193*, 103226. https://doi.org/10.1016/j.agsy.2021.103226

Fajri, P. Y., Putri, N. E., Novita, R., Gusmalini, G., & Muchrida, Y. (2021). Transfer of local food processing technology in Andaleh Subdistrict, Lima Puluh Kota. *LOGISTA- Scientific Journal of Community Service, 5*(1), 81–86.

Food Security Agency. (2020). *Local food roadmap: Strengthening food security through local food enterprises.* Jakarta, Indonesia: Food Security Agency.

Granemann, S., & Figueiredo, A. (2013). Logistics applied to export - instrument of competitiveness. *Revista Brasileira de Economia de Empresas, 1*(1), 51-62.

Guillaumie, L., Kamgang, S. É., Brotherton, M.-C., & Boiral, O. (2025). Achieving sustainable development goals through the governance of local food systems in Western countries: A realist synthesis. *Environmental Policy and Governance, 35*(3), 488-504. https://doi.org/10.1002/eet.2153

Hennink, M. M., Kaiser, B. N., & Weber, M. B. (2019). What influences saturation? Estimating sample sizes in focus group research. *Qualitative Health Research, 29*(10), 1483-1496. https://doi.org/10.1177/1049732318821692

Jayne, T. S. (2012). Managing food price instability in East and Southern Africa. *Global Food Security, 1*(2), 143-149. https://doi.org/10.1016/j.gfs.2012.10.002

Leischnig, A., Geigenmueller, A., & Lohmann, S. (2014). On the role of alliance management capability, organizational compatibility, and interaction quality in interorganizational technology transfer. *Journal of Business Research, 67*(6), 1049-1057. https://doi.org/10.1016/j.jbusres.2013.06.007

Ministry of Health Research and Development Agency. (2018). *Indonesia health profile 2018.* Jakarta: Ministry of Health of the Republic of Indonesia.

Novalinda, D., & Asni, N. (2013). *Local food technology.* Jambi: Jambi Agricultural Technology Assessment Center.

Osei-Amponsah, C., van Paassen, A., & Klerkx, L. (2018). Diagnosing institutional logics in partnerships and how they evolve through institutional bricolage: Insights from soybean and cassava value chains in Ghana. *NJAS: Wageningen Journal of Life Sciences, 84*(1), 13-26. https://doi.org/10.1016/j.njas.2017.10.005

Pervaiz, B., Ninghui, L., Manzoor, M. Q., & Altangerel, O. (2017). Determinants of household food security in Punjab, Pakistan: A binary logistic regression analysis. *World Applied Sciences Journal, 35*(7), 1021-1028.

Rizwana, R., Padmalini, S., Ahalya, N., Sanjay, N., Narmada, N., & Nayanika, B. (2022). Changing consumption behaviour towards immune-boosting food amidst COVID-19 outbreak: Tracing the future trajectory. *Food Research, 6*(6), 149-156. https://doi.org/10.26656/fr.2017.6(6).798

Rozaki, Z., Siregar, H., Pratama, I. A., & Istiyanti, E. (2023). Chapter Two - Food security, diversification, and inequality: Indonesia in the era of economic recovery and high price trends. In M. J. Cohen (Ed.), Advances in Food Security and Sustainability (Vol. 8, pp. 43-94): Elsevier. https://doi.org/10.1016/bs.af2s.2023.07.007

Saaty, T. L. (2008). Decision making with the analytic hierarchy process. *International Journal of Services Sciences, 1*(1), 83-98. https://doi.org/10.1504/IJSSCI.2008.017590

Salarkia, N., Abdollahi, M., Amini, M., & Neyestani, T. R. (2014). An adapted household food insecurity access scale is a valid tool as a proxy measure of food access for use in urban Iran. *Food Security, 6*(2), 275-282. https://doi.org/10.1007/s12571-014-0335-7

Schouten, G., Vink, M., & Vellema, S. (2018). Institutional diagnostics for African food security: Approaches, methods and implications. *NJAS: Wageningen Journal of Life Sciences, 84*(1), 1-5. https://doi.org/10.1016/j.njas.2017.11.002

Sukhwani, V., Nurzaman, A., Kusumawardhani, N. P., Alhinai, A. M., Hanyu, L., & Shaw, R. (2019). Enhancing food security by institutionalizing collaborative food alliances in urban areas. *Sustainability, 11*(15), 4103. https://doi.org/10.3390/su11154103

Suryana, A. (2014). Towards sustainable Indonesian food security by 2025: Challenges and their solutions. *Agro-Economic Research Forum, 32*(2), 123–135.

Timisela, N. R., Leatemia, E. D., Polnaya, F. J., & Breemer, R. (2017). Supply chain management of agro industry of cassava. *Jurnal Aplikasi Manajemen, 15*(1), 135–145. https://doi.org/10.18202/jam23026332.15.1.16

Utami, S. (2018). Implementation of local food consumption diversification policy in Pati Regency. *Research and Development Journal: Information Media for Research, Development, and Science and Technology, 14*(2), 93–106.

Young, A. O., Brown, A. G. M., Collins, T. A., & Glanz, K. (2024). Food insecurity, neighborhood food environment, and health disparities: State of the science, research gaps and opportunities. *The American Journal of Clinical Nutrition, 119*(3), 850-861.

Zhang, T., Chen, J., & Hu, B. (2019). Authenticity, quality, and loyalty: Local food and sustainable tourism experience. *Sustainability, 11*(12), 3437. https://doi.org/10.3390/su11123437