Al-Muhajirin International Conference

PROPOSAL FOR THE FREE NUTRITIOUS MEAL MODEL WITH FAMILY NUTRITIONAL FOOD INDEPENDENCE (RAPILA) ISTIMEWA

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Abstract

Stunting, a manifestation of chronic malnutrition during the critical first 1,000 days of life, remains a pressing public health challenge in Indonesia, with profound implications for human capital development and socioeconomic. According to recent national surveys, approximately 24.4% of children under five years old in Indonesia are stunted , reflecting persistent disparities in access to adequate nutrition, healthcare, and clean water, particularly in rural and underserved regions. This issue is exacerbated by the pervasive presence of extreme poverty , with an estimated 9.5% of the population living below the national poverty line , further limiting households' ability to provide diverse, nutrient-rich diets and essential health services for their children.

The intersection of stunting and poverty underscores significant barriers to achieving key targets within the Sustainable Development Goals (SDGs) , particularly SDG 2 (Zero Hunger) , which aims to end all forms of malnutrition by 2030, and SDG 1 (No Poverty) , which seeks to eradicate extreme poverty globally. The Indonesian government is trying to reduce stunting with a free nutritious meal program- Makan Bergizi Gratis (MBG)

Efforts to address stunting and poverty in Indonesia must adopt a multi-sectoral approach, integrating interventions that promote food security, maternal and child health, and economic empowerment. This research uses descriptive qualitative methods and data analysis on Stunting and Extreme Poverty in Indonesia. The result of this research is that the integration of multidisciplinary engineering and the optimization of village resources produces a Hexa-Helix model to continuously reduce the rates of stunting and extreme poverty.

Keywords: FREE NUTRITIOUS MEAL, FOOD SECURITY

INTRODUCTION

Stunting, a manifestation of chronic malnutrition during the critical first 1,000 days of life, remains a pressing public health challenge in Indonesia, with profound implications for human capital development and socioeconomic. According to recent national surveys, approximately 24.4% of children under five years old in Indonesia are stunted , reflecting persistent disparities in access to adequate nutrition, healthcare, and clean water, particularly in rural and underserved regions. This issue is exacerbated by the pervasive presence of extreme poverty , with an estimated 9.5% of the population living below the national poverty line , further limiting households' ability to provide diverse, nutrient-rich diets and essential health services for their children.

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Planning of the MBG Program : a). The MBG program is designed to improve the quality of Indonesia's human resources. b). This program aims to reduce the rates of malnutrition and stunting. c). This program also aims to improve students' academic performance.

This program also aims to boost the local economy by involving MSMEs, farmers, and fishermen.

Implementation of the MBG Program : a). The MBG program involves cooperatives, villages, and BUMDes to supply food ingredients. b). The MBG program involves the school authorities to determine the ideal meal times.

The MBG program implements a food distribution cluster system based on distance and operational hours from the kitchen.
Target of the MBG Program: a).The MBG program focuses on children or other vulnerable groups. b). The group includes toddlers, children, pregnant women, and breastfeeding mothers.
An alternative option besides Free Nutritious Meals is to build nutritional food independence by planning the production of plant and animal protein using yard land. This option was created by the writing team as the Family Nutritious Food Yard Program (RAPILA). The main focus is on supporting Indonesia Emas Bebas Stunting Sakinah Mawwadah Warrahmah (ISTIMEWA). Based on the initial survey conducted by Uninus students and lecturers in 2024, it was found that 100% of the respondents, 12 families surveyed, stated that they were willing to cultivate their yard independently for the development of animal and plant protein. Based on this, UNINUS lecturers and students developed integrated agriculture, livestock, and fisheries in the narrow yards of families benefiting from stunting. The average yard area that can be utilized is 1 x 2 meters. Therefore, the research team continues the community service activities of lecturers and students in 2024 by continuing the design of integrated steel racks for fisheries, livestock, and agriculture. The capstone design team equipped this tool with Internet of Things (IoT) devices.

RESEARCH METHOD

Design Specifications

This Light Steel Rack includes dimensions, load resistance, and compatibility with hydroponic systems or storage. This rack will be made with a modular design, making it easy to assemble and adjust to the user's needs. Here are the detailed specifications of this tool:
a). Dimensions and Material
Size:
Rear width: 1.500 cm
Side width: 1.000 cm
Height: 1.100 cm
Contexto: Material: Texto a traducir: Material:
Surface: Plant pot holder (C - 0.50 mild steel), chicken coop (C - 0.50 mild steel + ram wire/harmonica wire), fish pond (C - 0.50 mild steel + tarp).
Frame: Lightweight and strong steel rack.

b. Automatic Deletion Technology
· Deletion System:
Using an automatic motorized system with a touch sensor or button to automatically erase writing.The touch sensor on the glass surface detects the area of the writing that needs to be erased and triggers the cleaning mechanism (roller or microfiber cloth).
· Type of Cleaner:
The removal is done with a microfiber cloth that moves automatically through rollers or mechanical belts driven by an electric motor.
· Deletion Speed:

The deletion of the text occurs within 3–5 seconds after the button or sensor is activated.

c. Resources
· Using household electrical power
· Using a 12V DC power adapter for Arduino

d. Additional Features
· Aerator
· Arduino
· Automatic faucet
· Small Pump

e. Aesthetics and Design
· Minimalist and Functional
The design is simple with a lightweight steel frame structure in the shape of cubes and squares arranged neatly.
· Symmetrical Structure
The placement of design elements is balanced with straight lines that reflect stability and solidity.
· Multi-Function
The top part serves as a plant pot area, the middle part as a chicken coop with good air circulation, and the bottom part as a catfish pond lined with tarpaulin.
· Space Efficiency
Combining three functions into one unit makes this design assembled, disassembled, or modified as needed.

Design Outcomes
The output of the design from the proposal Lightweight Steel Rack that can be used as storage or as a support system for modern agriculture such as hydroponics and aquaponics. The final product will be tested to ensure its reliability.
a.Scope of the Capstone Design Project
The scope of this capstone project includes the design, development, and implementation of Light Steel Racks as storage spaces or as support systems for modern agriculture such as hydroponics and aquaponics. This project aims to create practical technology outputs for users, particularly in the field of agriculture.
b. Product Design and Development
The process of designing lightweight steel racks begins with user analysis, material selection, and the creation of an initial design that considers both functionality and aesthetics.
c.Testing and Validation
The lightweight steel rack will be tested to determine its load-bearing capacity, environmental resistance, and effectiveness in the application of appropriate technology.

Additional Technology Features
The integration of technologies such as Aerators, Arduino, Automatic Taps, and Small Pumps will be tested to improve the efficiency and automation of the system applied to the light steel racks.

Product Improvement Evaluation
After testing is conducted, the evaluation results will be used to refine the design to be more optimal and meet user needs.

The scope of this Capstone Design Project includes all stages from the design and development of the Light Steel Rack, equipment testing, assessment of effectiveness in learning, to the implementation and dissemination of technology to users in the agricultural environment.
Stages of Design
a). Identify Needs
Gathering information related to user needs and technical specifications.
b) Concept Planning
Creating the initial design for a light steel rack.
d). Prototype Development
Realizing the design in the form of a functional prototype.

Testing and Evaluation
Conducting tests on the strength and effectiveness of light steel racks.

Design Refinement
Making improvements based on the test results.

RESULTS AND DISCUSSION

There are several advantages to putting a program like RAPILA into place:
Better Nutrition: Families have direct access to wholesome, fresh food, which lowers the risk of malnutrition and diseases linked to diet.
Economic Savings: By growing their own food, households can save money and free up resources for other purposes.

Environmental Sustainability: Growing food on a small scale decreases the use of hazardous chemicals, increases biodiversity, and cuts down on food miles.
Empowerment: Women, who frequently oversee the preparation of food in the home, have more influence over the income and diet of the family.
Resilience: Families are less susceptible to changes in the price of food and interruptions in the supply chain.
When putting the RAPILA program into practice, you could run into issues like:
Restricted Area: To increase output in tiny spaces, use hydroponics, container gardening, or vertical farming.

Lack of Knowledge: To boost confidence, set up display plots and offer ongoing training.

Water Scarcity: Encourage water-saving methods such as rainwater collection and drip irrigation.
Diseases and Pests: Promote the use of natural repellents and provide participants with integrated pest management (IPM) training.
Similar initiatives have been successfully implemented in a number of nations:
Indonesia: To improve household nutrition and food security, the Pekarangan Pangan Lestari (P2L) program encourages households to cultivate food in their yards.

Kenya: The Shamba Shape-Up program encourages smallholder farmers to use sustainable farming methods and backyard gardening.
India: The National Rural Livelihoods Mission's Kitchen Garden Scheme helps households headed by women grow fruits and vegetables in their backyards.
These illustrations show how yard-based food security initiatives have the power to enhance livelihoods and change communities.detailed description of how to use the Hexa Helix Concept, which incorporates six important stakeholders—Academia, Business, Community, Government, Media, and Society (ABCGMS)—to create a paradigm to solve stunting.

Step 1: Outlining the Issue and Goals
1.1 Comprehending Stunting

A major global public health concern is stunting, which is characterized as stunted growth and development brought on by chronic undernutrition. Irreversible physical and cognitive abnormalities result from prolonged food deprivation throughout crucial stages of fetal and early childhood development. Stunting is a major obstacle to reaching Sustainable Development Goals (SDGs) 2: Zero Hunger and 3: Good Health and Well-Being, according to the World Health Organization (WHO).

1.2 Research Goals
This model's main goal is to create an integrated framework that addresses stunting by utilizing the Hexa Helix Concept and including cooperation from academia, business, the community, government, the media, and society. Identifying the roles and responsibilities of every stakeholder group is one of the specific goals. establishing workable plans to lower the prevalence of stunting. ensuring that initiatives are scalable and sustainable.
Step 2: Design of the Framework Applying the Hexa Helix Theory
In order to guarantee inclusion and systemic resilience, the Hexa Helix Concept expands on the classic Triple Helix model by adding three more stakeholders: the community, the media, and society. A detailed guide to model design is provided here.

Step 3: Role assignment and stakeholder analysis
3.1 The role of academia: Conduct research, provide knowledge based on evidence, and offer technical assistance.

Generate evidence-based knowledge, conduct research, and provide technical expertise.
Steps to take: Perform epidemiological research to determine the prevalence and contributing factors of stunting in certain areas.
Create and verify instruments (such as anthropometric measures and dietary assessment techniques) for tracking children's development and nutritional status.
Educate legislators, community workers, and medical experts on evidence-based stunting prevention strategies.
Publicize results in peer-reviewed publications to help guide national and international policy.

3.2 Business Role: Offer monetary resources, cutting-edge technology, and solutions that are pushed by the market.
Steps to take: Make investments in the manufacturing and marketing of reasonably priced, nutrient-dense meals (such as ready-to-use therapeutic foods and fortified cereals). Encourage the creation of online resources for campaigns aimed at changing behavior and educating people about nutrition.
Implement Corporate Social Responsibility (CSR) programs centered on maternal and child nutrition in collaboration with governments and non-governmental organizations. Encourage sustainable farming methods to improve household food security.

3.3 The Community
Role: Take an active part in initiatives and serve as the main beneficiaries.
Actions: Take part in awareness-raising initiatives to support hygienic behaviors, breastfeeding, and supplemental feeding. Create cooperatives or community gardens to cultivate crops high in nutrients, such as legumes and vegetables.
Encourage caregivers to form peer-to-peer learning networks in order to exchange best practices about child feeding. Promote locally relevant and culturally appropriate solutions.

3.4 Guarantee accountability.
Actions: Create national plans and strategies to reduce stunting that are in line with international frameworks like the Scaling Up Nutrition (SUN) Movement.
Enforce laws pertaining to food safety, fortification, and the promotion of unhealthy goods to minors. Provide funds for social protection initiatives, nutrition-sensitive agriculture, and healthcare infrastructure. Using strong governance structures, track and assess how stunting reduction programs are being implemented.

3.5 Media Role: Spread knowledge, influence public opinion, and increase awareness.
Steps to take: Start multi-media campaigns to inform the public on the value of a healthy diet in pregnancy and early life. To encourage behavior change at the community level, highlight achievements and positive role models.
Use fact-checking and evidence-based reporting to refute myths about diet and health.
Use social media platforms to engage younger audiences and amplify advocacy efforts.
3.6 Society

Function: Advocate for grassroots movements, faith-based organizations, and civil society organizations (CSOs).
Actions: Encourage local communities to take part in initiatives aimed at preventing stunting. Encourage more funding for nutrition on a local, national, and international scale. To guarantee inclusive and equitable solutions, encourage collaborations amongst various societal actors. Keep an eye on stakeholders and make them responsible for fulfilling their pledges to lower stunting.

Step 4: Execution of the Model
4.1 Input Phase Data Collection: Compile baseline information on socioeconomic determinants, the prevalence of stunting, and current interventions.
Mobilization of Resources: Determine the financial resources, technical equipment, and human resources needed for execution.
Make ensuring that policies are in conformity with both national and international frameworks, such as the SDGs and WHO guidelines.
4.2 Phase of the Process
Collaborative Planning: Arrange workshops with multiple stakeholders to jointly develop intervention tactics.
Building Capacity: Educate stakeholders on the Hexa Helix framework's roles and responsibilities.
Implementation: Pilot projects in high-priority areas should be the first step in implementing interventions in phases.
4.3 Phase of Output
Behavioral Change: Make quantifiable progress in the feeding habits of mothers and children. Systemic Changes: Make social safety nets, food supply chains, and healthcare systems stronger. Disseminate knowledge by publishing research results and lessons discovered through conferences, scholarly journals, and other outlets.
4.4 Result Stage
Short-Term Results: A decrease in the prevalence of stunting in the populations that are being addressed. Long-Term Results: Future generations' increased economic production, educational attainment, and cognitive development.

Step 5: Observation and Assessment
5.1 Measures
Health Indicators: Underweight, wasting, and stunting prevalence in children under five. Micronutrient consumption, exclusive breastfeeding rates, and dietary diversity scores are examples of nutritional indicators. Systemic Indicators: Access to healthcare services, availability of fortified foods, and coverage of nutrition programs.
5.2 Equipment
For real-time data collecting and analysis, use digital platforms.
Use mixed-methods techniques (qualitative interviews, quantitative surveys) to evaluate the impact of your program.
5.3 Systems of Feedback
Create feedback loops so that lessons learnt can be applied to current and upcoming interventions.
By providing all stakeholders with progress reports, you may promote transparency.

Phase 6: Scalability and Sustainability
6.1 Sustainability
To maintain continuity, integrate initiatives into current systems (such as healthcare and education). Utilize local capabilities and resources to lessen reliance on outside funding.
6.2 Expandability
Keep track of effective procedures and duplicate them in other nations or areas. Encourage higher governance levels to implement policy reforms that formalize the Hexa Helix strategy.

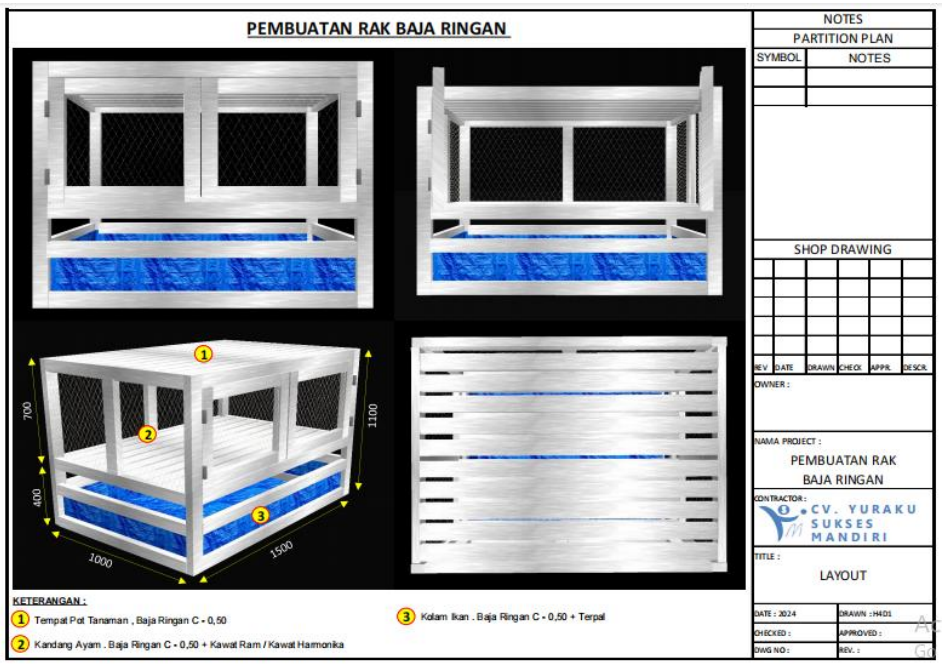

Fig 1. Desain RAPILA ISTIMEWA Steel Light Rack

A thorough description of the variable definitions for a business model that combines farming, fishing, and small-scale smart home yard-based agriculture.
1. Overview
An inventive strategy for combating chronic undernutrition is the incorporation of tiny smart home yard-based farming, fishing, and agriculture into a stunting reduction model. This strategy seeks to boost nutritional diversity, increase food security, and support sustainable livelihoods by utilizing the limited land and water resources found inside family premises. Determining the important factors involved is crucial to the successful creation and assessment of such a model.

2. Important Model Variables 2.1 Dependent Variable: The main outcome variable, stunting prevalence, is defined as the percentage of children under five who fall below -2 standard deviations (SD) from the WHO Child Growth Standards median height for their age.
Measurement:
Anthropometric Data : Height-for-age z-scores (HAZ) collected through standardized growth monitoring.
Prevalence Rate : Percentage of stunted children in the target population.

2.2 Independent Factors: Determinants and Interventions
2.2.1 Farming and Agriculture Factors
Utilization of Home Gardens: Definition: The degree to which homeowners plant nutrient-rich foods in their yards.
Measurement: The area in square meters of land used for farming.crops that are grown, such as fruits, vegetables, and legumes.Yield (kg/m²/year) per unit area.
The Crop Diversity Index is a metric that quantifies the range of crops grown in a home garden.
Measurement: Simpson's Index or Shannon Diversity Index, which is determined by the quantity and variety of crop species.
Smart farming technologies, such as hydroponics, vertical farming, and Internet of Things sensors for soil moisture and nutrient levels, are defined as the application of technology to improve agricultural processes.
Measurement: Smart technology adoption rate (percentage of homes utilizing them).increases in productivity that can be attributed to the application of technology (e.g., reduced water usage, higher yield).
2.2.2 Variables in Fisheries
The method of integrating fish farming with plant cultivation in a symbiotic system is known as aquaponics/fish farming integration.
The quantity of fish produced in each cycle is the measurement. Diversity of fish species (e.g., catfish, tilapia). Efficiency of nutrient recycling (e.g., nitrogen conversion rates).
Rate of Consumption of Fish:
Definition: The amount and frequency of fish that households eat as a source of micronutrients and protein.
Measurement: Grams of fish eaten daily per person. percentage of families that consume fish to satisfy recommended dietary allowances (RDAs) for protein.
2.2.3 Economic and Social Factors
Household income is defined as the total amount of money earned by the household, including money from fishing and small-scale farming.
Measurement: Local currency earning each month.Yard-based activities' percentage contribution to overall household income.
Food expenditure is defined as the percentage of household income that goes toward buying food.
Measurement: The proportion of revenue spent on food.lower food costs as a result of domestic production.
2.2.4 Health and Nutrition Factors
The Dietary Diversity Score (DDS) is a metric that indicates the nutritional sufficiency of the foods that households consume.
Measurement: The total number of food categories ingested throughout a 24-hour period, for example.Women's and children's minimum dietary diversity (MDD-W and MDD-C, respectively).
The nutritional state of mothers during pregnancy and breastfeeding that affects the growth outcomes of their offspring is known as maternal nutrition status.
Body Mass Index (BMI) of women who are pregnant or nursing is measured.Hemoglobin levels (to determine the prevalence of anemia).
Child Feeding Practices :

Definition : Adherence to recommended infant and young child feeding (IYCF) practices.
Measurement :Exclusive breastfeeding rate (% of infants aged 0–6 months).Timely introduction of complementary foods (% of children aged 6–23 months).
2.2.5 Environmental Factors
The quantity of water needed to generate one unit of agricultural output is known as water usage efficiency.
Water liters per kilogram of produce is the measurement.
adoption of water-saving methods (such as rainwater collecting and drip irrigation).
Signs of Soil Health:
Definition: Home garden sustainability and soil fertility metrics.
Measurement: Content of organic materials (%). pH and nutrient (such as potassium, phosphorus, and nitrogen) levels in the soil.

3. Control Variables
To account for confounding factors, the following control variables should be included:
Demographic Factors :Household size, age distribution, and gender composition. Education level of caregivers (years of schooling).
Healthcare Access : Distance to the nearest healthcare facility (kilometers). Frequency of antenatal care (ANC) visits.
Cultural Practices : Traditional beliefs and taboos related to food consumption. Gender roles in household decision-making.

4. Variables of Interaction
Connections between Agriculture and Nutrition:
Definition: The connection between household nutrition outcomes and the productivity of home gardens.
Measurement: The relationship between scores for dietary variety and crop diversity. effects of fish farming on children's growth and protein consumption. Adoption of Technology and Productivity:
Definition: The impact of smart farming technologies on revenue creation and agricultural output.
Metric: The rise in yield per unit area following the adoption of aquaponics or hydroponics.return on investment (ROI) for adopting new technologies.

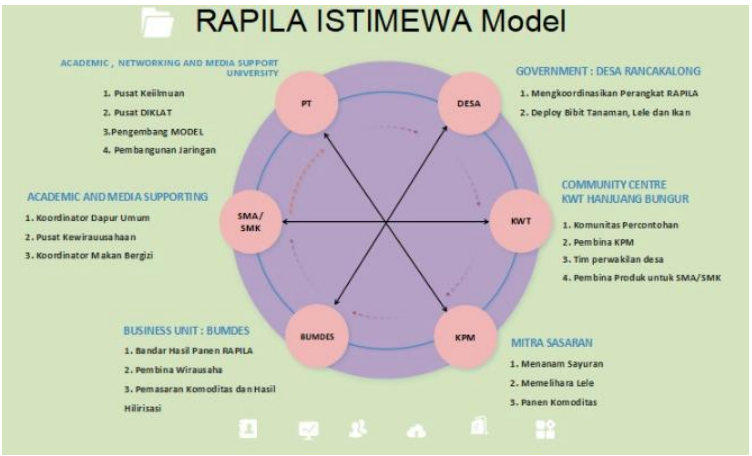

Fig 2. Iniitila Model RAPILA ISTIMEWA for Stunting Handling

CONCLUSION

To improve food security at the household level, the Family Nutritious Food Independence (RAPILA) program is a useful and effective strategy. Families can become more self-sufficient, enhance their health, and support environmental sustainability by using yard area to grow wholesome crops. This initiative has the ability to change lives and create resilient food systems with careful design, community involvement, and continuous support.

A concerted, multi-sectoral approach that capitalizes on the advantages of various stakeholders is needed to combat stunting. In order to develop lasting solutions, the Hexa Helix model offers a strong framework for combining academia, business, community, government, media, and society. This concept has the potential to drastically reduce stunting and improve the well-being of disadvantaged groups by encouraging cooperation, creativity, and accountability.

A thorough grasp of the crucial factors involved is necessary for the effective use of a stunting reduction model based on small smart home yard agriculture, farming, and fisheries. These factors cover a wide range of topics, such as environmental sustainability, socioeconomics, nutrition, and agriculture. Researchers and practitioners can assess the efficacy of interventions and pinpoint avenues for improving children's health and developmental outcomes by methodically defining and assessing these characteristics.

Fig 3. Assembling RAPILA ISTIMEWA Rack

Fig. 4. Team and Community KWT

Fig 5. Real Initial Design

Bibliography

Andreassen A., Bard. “Human Rights and Legal Empowerment of the Poor”, *Extreme Poverty and Human Rights Expert Seminar*, Geneva 23-24 February 2007, Norwegian Centre for Human rights, University of Oslo.

Geertz, Clifford. “Religion: Anthropological Study”, in David L. Sills (ed.) *International Encyclopedia of the Social Sciences*. London: Collier-Macmillan Publishers, 1965: 2-20.

Sutrisno, B. (2018). Teknologi Tepat Guna dalam Pengembangan Produk Inovatif. Jakarta: Gramedia.

Rahman, A. (2019). Material Baja Ringan dan Aplikasinya. Bandung: Pustaka Teknik.

Setiawan, R. (2020). Sistem Hidroponik Modern: Konsep dan Implementasi. Yogyakarta: Andi Publisher.

Nugroho, T. (2021). Pengembangan Teknologi Akuaponik Berbasis Arduino. Surabaya: ITS Press.

Jurnal Teknologi Tepat Guna (2022). "Pemanfaatan Baja Ringan dalam Inovasi Pertanian." Vol. 14, No. 2, pp. 55-70.