



SUSTAINABILITY REPORT 2022-2023

UNIVERSITAS MUHAMMADIYAH MAKASSAR
2024

FOREWORD

With great gratitude, we present the 2022-2023 Sustainability Report of Universitas Muhammadiyah Makassar. This report highlights our commitment to realizing our vision of becoming a Leading, Excellent, Trusted, and Independent Islamic University. With the spirit of "Integrated Green Islamic Futuristic", we continue to integrate the principles of Islam, sustainability, and innovation toward a better future.

Aligned with our roadmap for 2024-2028, which envisions us becoming a Research and International Reputable University, this year, we have focused on making significant contributions to the United Nations Sustainable Development Goals (SDGs). Through research, community service, and the development of education, Universitas Muhammadiyah Makassar has actively played a role in enhancing economic well-being, promoting social equity, and ensuring environmental sustainability for both local and national communities.

In addressing poverty and supporting equitable economic growth, we have implemented various community empowerment programs, such as product diversification training for seaweed farmers in Takalar and salt production development in Pangkep. These initiatives not only increase income but also foster independence and sustainability, in line with SDG 1: No Poverty and SDG 8: Decent Work and Economic Growth. Education and health remain key priorities for us. Through community-based mental health programs and innovative online learning methods, we support SDG 4: Quality Education and SDG 3: Good Health and Well-being. These efforts demonstrate that education and health are essential to shaping resilient future generations.

Our commitment to environmental sustainability is reflected in our research on mangrove conservation, clean water management, and climate-resilient infrastructure. These projects support SDG 6: Clean Water and Sanitation, SDG 13: Climate Action, and SDG 15: Life on Land, and emphasize the importance of local and global collaborations for sustainable impact.

We invite all stakeholders to explore the achievements and progress detailed in this report, with the hope that it will inspire further collaboration, innovation, and commitment to sustainability. Together, we can realize the vision of Universitas Muhammadiyah Makassar as an outstanding, globally engaged institution that contributes to a sustainable, equitable, and prosperous future for all.

Makassar, 30 October 2024

Dr. Abd. Rakhim Nanda, ST., MT., IPU
Rector of Universitas Muhammadiyah Makassar

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Universitas Muhammadiyah Makassar supports SDG 1: No Poverty through impactful community empowerment initiatives. By training local farmers, including seaweed farmers in Takalar, salt producers in Pangkep, and candlenut farmers in Bone, in product diversification, financial management, and market access, the university uplifts livelihoods and fosters economic resilience. These programs not only enhance incomes but also empower communities toward independence and sustainable growth. Through collaboration with academics, government, and community partners, these efforts showcase the transformative power of local resource utilization. This approach embodies Indonesia's vision of reducing poverty by cultivating self-sustaining communities that thrive economically and socially

Earnings growth, marketability and the role of Islamic financial literacy and inclusion in Indonesia



The research conducted by Wa Ode Rayyani, S.E., M.Si., Ak.CA, and her team explores how profit growth in Islamic banks in Indonesia relates to marketability, as well as the effects of Islamic financial literacy and inclusion. Using a moderated mediation model, the study analyzes how Islamic financial literacy strengthens the link between financial inclusion and marketability, ultimately boosting profit growth. The findings indicate that from 2014 to 2021, Islamic banks in Indonesia experienced positive profit growth, primarily influenced by enhanced marketability, which serves as a measure of their market competitiveness.

This study demonstrates that financial inclusion, when enhanced by literacy, positively affects a bank's ability to attract customers, driving growth. Marketability, measured through the Lerner Index, reflects the bank's capacity to utilize its market position, impacting profit growth. The research highlights the critical role of financial literacy, which helps customers better understand Islamic financial products, increasing their engagement and inclusion within the Islamic banking sector. Consequently, as literacy increases, more people are inclined to utilize Islamic banking products, resulting in higher profits for these banks.

Table 1.1 Hypothesis testing results

Hypothesis	Result
<i>H1.</i> Islamic financial literacy has a moderating effect on the nexus between Islamic financial inclusion on marketability	Accepted
<i>H2.</i> Marketability has a mediating effect on the nexus between Islamic financial inclusion moderated by literacy and earnings growth	Accepted

From the perspective of the SDG, the study aligns with **SDG 1 (No Poverty)**, as financial inclusion facilitates broader access to financial services, enabling individuals to save, invest, and build financial security, thus helping to alleviate poverty. Additionally, **SDG 8 (Decent Work and Economic Growth)** is relevant, as inclusive finance contributes to economic growth and stability by promoting equal opportunities in financial services. This research underscores the importance for policymakers and banking institutions to invest in financial literacy and inclusion programs, which can help establish a more equitable and competitive Islamic banking sector, contributing to sustainable economic development.

Empowerment of Salt Farmers in Bulu Cindea Fostered Village, Pangkep Regency



The faculty teams from Universitas Muhammadiyah Makassar and Universitas Muhammadiyah Parepare have launched a collaborative initiative aimed at empowering the village of Bulu Cindea in Pangkep. This initiative, part of the "Program Pemberdayaan Desa Binaan", focuses on sustainable development and improving local livelihoods, especially through salt production technology enhancement. The Universitas Muhammadiyah Makassar team, led by Dr. Rahmi, alongside Dr. Juliani Ibrahim and Asriyanti Syarif, works closely with the Universitas Muhammadiyah Parepare team led by Fitri Indahyani. Together, they aim to optimize marginal ponds for productive salt farming, addressing both the technical and economic needs of this coastal community.

Bulu Cindea, a fertile coastal area, faces challenges in scaling salt production due to the high initial investments and the need for appropriate technology. The collaboration is addressing these issues by developing effective tools to increase the production of high-quality salt, which is essential to meet growing domestic industrial demands. Supported by the Pangkep Regency Government and funded by the Ministry of Education, Culture, Research, and Technology, the program is set to run for three years. Over this period, the teams will introduce technology for industrial salt production and provide equipment to support small and medium-sized enterprises engaged in salt farming.



Figure 1.1 Documentation of community empowerment activities in Bulu Cindea

In alignment with **SDG 1: No Poverty**, this initiative aims to improve economic conditions for local communities by enhancing salt production efficiency and enabling higher income potential for local farmers. Furthermore, it supports **SDG 8: Decent Work and Economic Growth** by fostering economic independence and sustainable industry practices in rural communities. In addition to salt production, the team organized a waste management workshop for Bulu Cindea residents. Dr. Ibrahim led a session on the environmental and health impacts of improper waste disposal. She emphasized sustainable waste practices, such as sorting, reducing, reusing, and recycling household waste, which are vital for community well-being. This program aligns with **SDG 11: Sustainable Cities and Communities**, promoting a healthier, cleaner environment and long-term community resilience. Through this ongoing initiative, the faculty teams aim to serve as catalysts for sustainable rural development, fostering environmental awareness and contributing to improved living standards for Bulu Cindea's residents.

Enhancing the Economic Prosperity of Seaweed Farmers in Takalar through a Seaweed Product Diversification Program



The program, led by A. Nur Fitrianti and her team from Universitas Muhammadiyah Makassar, aims to enhance the knowledge and skills of seaweed farmers in creating value-added products, including seaweed chips, sushi, and soap. This initiative not only targets product diversification but also emphasizes business management and marketing, which are crucial for farmers to succeed in a competitive market. The program, in collaboration with Muhammadiyah Takalar Youth and local community partners, involves structured sessions featuring lectures, demonstrations, and hands-on mentoring. Preparations include setting up appropriate locations, gathering tools and materials, and conducting counseling and training on product manufacturing processes. An evaluation follows to gauge the effectiveness of these activities.

The program has demonstrated significant success, with 90% of participants expressing satisfaction and noting improvements in their skills. Through training, participants learned to transform seaweed into high-fiber chips, visually appealing sushi, and soap that supports skin health. These sessions not only provided technical skills in processing seaweed but also soft skills in business and marketing, helping participants better understand the market benefits of product diversification and gain the confidence to manage their businesses independently.



Figure 1.2 Documentation of community empowerment activities in Takalar

Aligned with **SDG 1: No Poverty**, this program offers a sustainable income pathway for seaweed farmers, enabling them to maximize the economic potential of locally available resources. Additionally, the initiative supports **SDG 8: Decent Work and Economic Growth** by fostering entrepreneurship, creating local employment opportunities, and building a skilled workforce. By encouraging the efficient use of resources, the program also resonates with **SDG 12: Responsible Consumption and Production**. The results highlight the value of collaboration among academics, community members, and local organizations in unlocking economic potential based on local resources. Through continued support and mentorship, the seaweed farmers of Takalar are expected to thrive in their businesses, strengthening both their economic resilience and competitiveness in an increasingly dynamic market.

Supporting Economic Growth in Sinjai Through Product Mentorship and Financial Management Training



The Community Service Team (PKM) from the Faculty of Economics and Business (FEB) at Universitas Muhammadiyah Makassar has held a mentoring program at the Sinjai Institute of Islamic Religion, aimed at enhancing the business capabilities of Nasyiatul Aisyiyah Charitable Enterprises (BUANA Sinjai). Held on September 24, 2022, the program focused on providing training and support to boost the sales and market presence of MINAS, a traditional Sinjai beverage made from cassava tape, as well as guidance in preparing simple financial reports. Led by Agusdiwana Suarni, S.E., M.Acc., with contributions from Dr. Andi Jam'an and Dr. Sulaeman Masnan, the program taught 16 BUANA Sinjai representatives fundamental business management skills, including financial record-keeping and marketing strategies.

The program aimed to strengthen BUANA Sinjai's product development and financial accountability, using practical tools such as Microsoft Excel to implement simple bookkeeping. By creating structured financial records, BUANA Sinjai can better manage its finances, potentially gaining access to funding opportunities from banks or government sources. This structured financial approach also supports the organization's mission of community welfare, aligning with **SDG 1: No Poverty** by promoting sustainable income generation.



Figure 1.3 Documentation of community empowerment activities in Sinjai

Agusdiwana Suarni emphasized that financial management is key to increasing profitability, starting with basic household financial practices. Meanwhile, Dr. Sulaeman highlighted the dual role of businesses like BUANA Sinjai in generating profit and contributing to community welfare. This approach aligns with **SDG 8: Decent Work and Economic Growth**, as it supports job creation and sustainable business growth. Further, by promoting online marketing and social media outreach, the program contributes to **SDG 9: Industry, Innovation, and Infrastructure**, enabling BUANA Sinjai to reach a broader audience and increase product visibility.

Conducted in 16 sessions involving training, mentorship, and pre- and post-program evaluations, the PKM team observed significant improvements in MINAS product quality, bookkeeping practices, and marketing reach. Social media promotion and e-marketing have expanded BUANA Sinjai's visibility and strengthened its community impact, increasing turnover, creating jobs, and reducing poverty. Through ongoing community support, this program demonstrates how collaboration between academia, local organizations, and community partners can foster economic growth in Sinjai.

Empowering Candlenut Farmers in Bone District through Product Diversification



A community service carried out by Muhammad Wajdi S.Pd., M.Pd and his team from Universitas Muhammadiyah Makassar, aims to improve the economic potential of candlenut (*Aleurites moluccanus*) farmers through product diversification in Bone District. The project, located in Pammusureng Village, Bontocani Subdistrict, focuses on empowering local farmers to process candlenuts into value-added products, thereby enhancing their income. Traditionally used in Indonesian cuisine and for various health benefits, candlenut production in Bone has faced challenges in processing efficiency, market access, and product diversity. With local demand for spices and traditional medicines growing, the initiative capitalizes on candlenut's unique qualities, such as high oil content, which has applications in cooking, cosmetics, and herbal remedies.

This community empowerment program, involving practical training sessions and direct participation from farmers, introduced appropriate technology, including tools for efficiently cracking candlenuts. Participants received hands-on training in producing and packaging candlenut powder as a spice, thereby improving product hygiene, quality, and shelf life. Through diversification into products like candlenut-based seasonings, this program aims to expand farmers' market reach beyond the local area, which traditionally relies on direct sales to middlemen.

Aligned with **SDG 1: No Poverty**, this initiative offers farmers a sustainable path to higher income by transforming a widely grown but underutilized resource into valuable market products. Additionally, it supports **SDG 8: Decent Work and Economic Growth**

by fostering local entrepreneurship and expanding employment opportunities, especially for women who engage in post-harvest processing. This approach also addresses **SDG 12: Responsible Consumption and Production**, as it encourages sustainable agricultural practices and efficient use of local resources.

The program's success demonstrates the impact of collaborative efforts between academia, local communities, and industries in promoting sustainable economic growth. By empowering candlenut farmers with skills and tools to diversify and improve product quality, this initiative enhances the local economy, reduces poverty, and lays the foundation for a more resilient agricultural sector in Bone District.



Figure 1.4 Documentation of community empowerment activities in Bone



Food security is a crucial component of enhancing people's overall well-being and is fundamental to achieving Sustainable Development Goal 2 (Zero Hunger). At Universitas Muhammadiyah Makassar, ensuring food security is a core part of its commitment to sustainable development. The university actively works to prevent hunger, improve nutrition, and foster sustainable agriculture on campus. By providing reliable access to sufficient, safe, and nutritious food for students, faculty, and staff, Universitas Muhammadiyah Makassar promotes better health outcomes, boosts economic productivity, and empowers its community. These efforts not only support healthier and more resilient campus life but also contribute to a more sustainable and equitable world.

Social Capital and Community Empowerment: Towards Sustainable Agriculture



Syafiuddin Saleh and his team conducted research on the role of social capital in community empowerment toward sustainable agriculture. Using qualitative research methods with tools like Nvivo 12 Plus, the study identifies how different forms of social capital—bonding, bridging, and linking—are mobilized by bureaucratic and entrepreneurial actors to support the transformation toward organic farming. Their study highlights that both essential and supporting forms of social capital are crucial in empowering organic farmers, with bureaucratic and entrepreneurial actors playing key roles. Essential social capital drives bonding among farmers, strengthened by knowledge exchange and work motivation, while supporting social capital aids through linking, facilitated by price certainty and product certification. Bridging social capital is further enhanced through consistent problem-solving. Collectively, these forms of social capital foster community empowerment, improve agricultural productivity, ensure fair market access, and strengthen institutional partnerships, making social capital both foundational and catalytic for sustainable agricultural development. The study underscores that building strong networks and collaborative efforts is essential for achieving sustainable practices and long-term development across agricultural sectors.

This study's contributions align with several SDGs. It directly supports **SDG 2: Zero Hunger** by promoting sustainable food production practices that improve soil fertility and crop resilience without relying on synthetic chemicals. This approach enhances food security and contributes to healthier food systems, which are essential for reducing hunger and supporting community resilience. In addition, by improving the market viability of organic farming, the study contributes to **SDG 8: Decent Work and**

Economic Growth. The emphasis on high-value organic products provides farmers with sustainable income sources, fostering economic empowerment and decent work in rural areas.

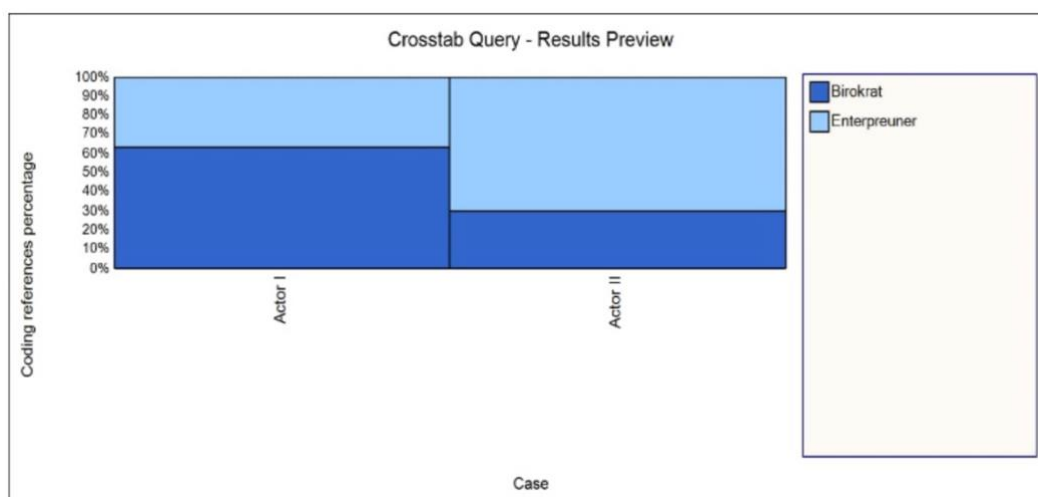


Figure 2.1. Percentage of Bureaucrat Actors and Entrepreneurial Actors

The study's focus on organic farming also supports **SDG 12**, encouraging agricultural practices that minimize environmental impact through reduced chemical dependency. This sustainable approach promotes resource efficiency and aligns with responsible production goals. Furthermore, through its collaboration with government agencies and agricultural extension services, the research advances **SDG 16** by building robust community networks and reinforcing governance structures that ensure fair access to resources and information for farmers. Finally, the study highlights the significance of partnerships in achieving sustainable agriculture, aligning with **SDG 17**: Partnerships for the Goals. The cooperation between government entities, local communities, and entrepreneurs exemplifies the collective effort needed to support sustainable agricultural transformation. By demonstrating the power of social capital in empowering organic farmers, the study provides valuable insights into the role of community-driven initiatives in achieving sustainable development goals.

Nutritional therapy in post laparotomy exploration and omental flap due to gastric perforation with nasoduodenal tube: a case report



Suryani As'ad and her team conducted a case study on nutritional therapy in post-laparotomy exploration and omental flap due to gastric perforation, emphasizing its significance for sustainable health outcomes as part of **SDG 2**, which focuses on eradicating hunger and promoting nutrition. Gastric perforation, a full-thickness injury to the stomach wall, requires urgent surgical intervention. This study aimed to demonstrate the impact of nutritional therapy in improving recovery for a 71-year-old male patient with moderate malnutrition, who was admitted following gastric

perforation surgery. The patient presented with subcutaneous fat loss, muscle wasting, anemia, leukocytosis, hypoalbuminemia, and moderate immune depletion. Nutritional therapy, delivered via a nasoduodenal tube, provided 1,800 kcal/day with high protein content, low-fiber blenderized food, and special oral supplements. After 12 days, significant improvements were observed in hemoglobin, leukocyte count, immune status, and albumin levels, with successful wound healing and adequate oral nutrition upon discharge. This case illustrates that targeted nutritional therapy can significantly enhance the recovery and nutritional status of patients with complex surgical conditions, supporting SDG 2's goals of improved nutrition and health.



Figure 2.2. Patient before clinical nutrition consultation



Figure 2.3. Wound of patient before discharge

Optimising Empowerment of Fostered Villages for Increased Income of Tambak Farmers in Bulu Cindea Village



Rahmi and her team conducted research on optimizing village empowerment to increase the income of tambak (salt pond) farmers in Bulu Cindea Village. In response to rising salt imports in Indonesia, coastal communities with vast marine resources are encouraged to enhance local salt production to meet industrial demand. This study aimed to evaluate the impact of implementing geomembrane technology on boosting the income of salt farmers in Bulu Cindea Village, Pangkep Regency. Using descriptive and income analysis methodologies, the study provided insights into local

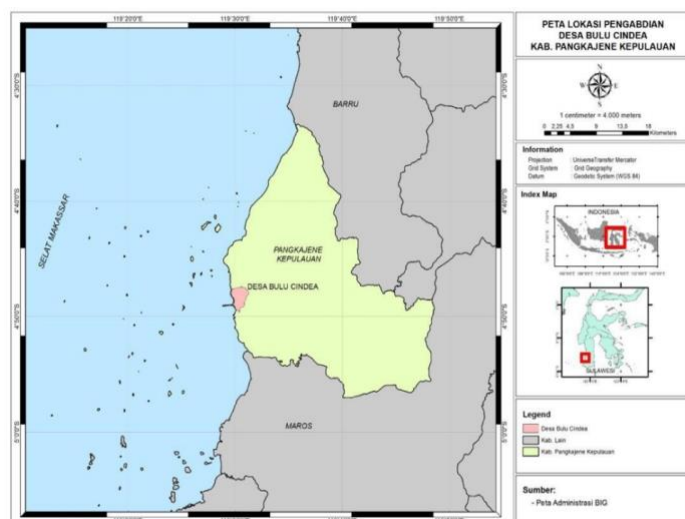


Figure 2.4 The map of location research at Bulu Cindea

salt production practices and the effectiveness of the Pond Development for Brackish Water (PDB) program. Analysis of variance and a t-test revealed a statistically significant improvement ($p < 0.05$) in farmers' income after adopting geomembrane technology, compared to before its implementation. The findings suggest that the PDB program, through geomembrane technology, can effectively enhance the socioeconomic conditions of salt producers, demonstrating its potential to improve local food security and income generation.



Figure 2.5 Salt ponds in Bulu Cindea Village, Bungoro sub-district, Pangkep Regency: (a) Use of geomembrane technology; (b) Salt production using geomembrane technology

Adaptation From Maladaptation: A Case study of Community-Based Initiatives of the Saddang Watershed



Naufal and his team conducted a study titled "Adaptation From Maladaptation: A Case Study of Community-Based Initiatives of the Saddang Watershed". They stated that over recent decades, countries have heavily invested in climate adaptation and mitigation efforts; however, some measures have resulted in maladaptation, particularly within watershed communities. This study focused on the Saddang watershed, a priority area in Indonesia, analyzing primary data from observations and in-depth interviews with villagers impacted by extreme weather (droughts and floods) between 2009 and 2020. Secondary data from satellite imagery revealed land cover changes, sedimentation, and river flow alterations. Findings showed that adaptation strategies in the upstream area, such as deforestation to combat prolonged drought, inadvertently triggered maladaptation, worsening the effects of climate change for both upstream and downstream communities. This maladaptation created new

hazards and vulnerabilities downstream, despite efforts labeled as "climate resilience" and aimed at enhancing food security. The study underscores the need for consolidated adaptation measures that consider the watershed as an integrated landscape, reinforcing the importance of partnerships for effective climate action and sustainable food security

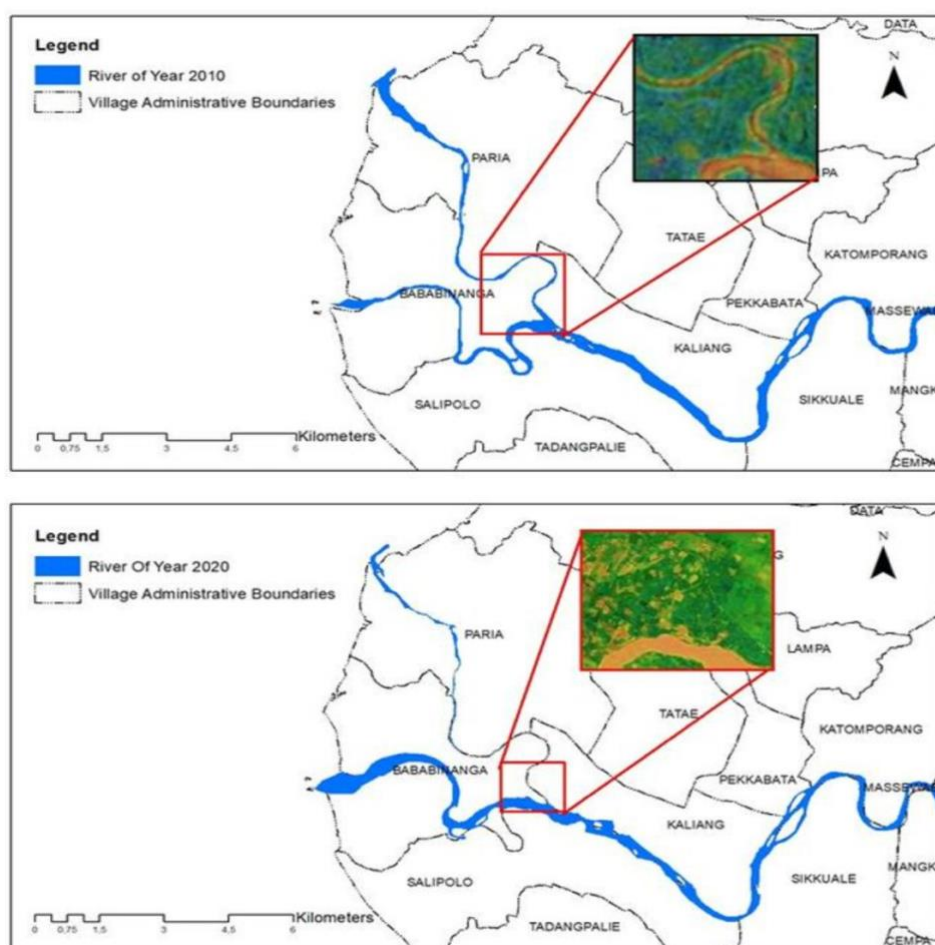


Figure 2.6 Comparison of rivers in Paria and Bababinaga villages in 2009 and 2020 at the Downstream Saddang River Basin

This research contributes to **SDG 2: Zero Hunger** by emphasizing the interconnectedness of climate adaptation and food security. It highlights the importance of sustainable farming practices, as the adoption of drought-resistant crops in unsuitable terrains leads to soil degradation, which could undermine long-term food security goals. In relation to **SDG 13: Climate Action**, the study underscores the need for adaptation measures that do not worsen environmental conditions. By pointing out the unintended impacts of current practices, it calls for climate action strategies that enhance resilience without increasing emissions or environmental risks.

Furthermore, the study aligns with **SDG 16: Peace, Justice, and Strong Institutions** by fostering inclusive decision-making. Involving community perspectives in the assessment of adaptation strategies promotes fair governance, enabling policies that reflect local needs and bolster community resilience. Finally, supporting **SDG 17:**

Partnerships for the Goals, the study exemplifies the value of collaborative approaches. By bridging research insights with local government and community actions, it highlights how partnerships and knowledge-sharing can guide communities toward more sustainable climate adaptation.

Determinants of Household Food Security in Tamalate District Makassar City



Hastuti Nustari and her team conducted a study on the determinants of household food security in Barombong Village, Tamalate District, Makassar City, aligning with SDG 2 (Zero Hunger) and 17 (Partnerships for the Goals). The research examined food security dynamics among farmer and non-farmer households, using purposive sampling to select 40 respondents and analyzing the data with multiple linear regression and quantitative descriptive statistics. Findings revealed significant differences in food and non-food expenditures between the two groups, with farmer households allocating 72% of their budget to food, compared to 65.26% among non-farmer households. While high expenses were observed in side dishes, rice, and cigarettes for both groups, farmers also faced added costs for education, donations, and fuel oil. Notably, only 10% of farmer households were food-secure, compared to 40% of non-farmer households. Key factors influencing household food security included income, family size, formal education, and sugar prices, with higher income and education correlating positively with food security, whereas larger family sizes and rising sugar prices had adverse effects. This study underscores the paradoxical vulnerability of farmer households regarding food security and emphasizes the need for collaborative agricultural and social interventions to enhance resilience and sustainability.

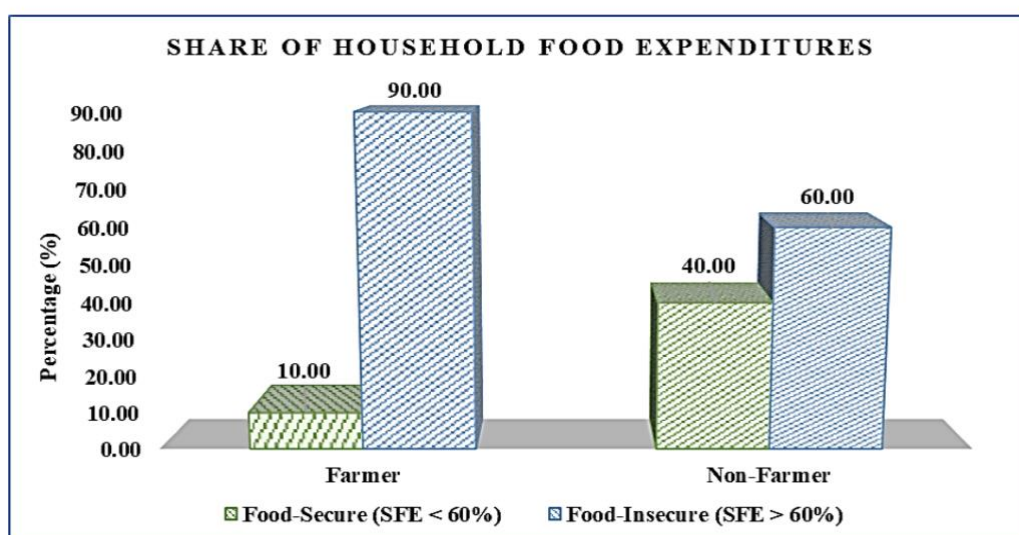


Figure 2.7 Farmer and Non-Farmer Household Food Expenditures

Determinants of Animal Food Demand in The Urban Region South Sulawesi

2 ZERO HUNGER



8 DECENT WORK AND ECONOMIC GROWTH



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



The study titled "Determinants of Animal Food Demand in the Urban Region of South Sulawesi" by Darmawaty, Sri Mardiyati, and Mohammad Natsir examines the factors influencing demand for animal-based food products, including beef, chicken, eggs, and fish, in urban areas of South Sulawesi. Using secondary time-series data from 2005 to 2020, the researchers analyzed trends in animal food consumption and identified economic determinants that impact demand. The results showed that animal food consumption in urban areas increased by 9.78 grams per capita per month over the study period, with fish being the most consumed product. Key determinants affecting demand included per capita expenditure, chicken meat prices, and fish prices. Specifically, a 1% increase in per capita expenditure led to a 1.58% increase in demand, while increases in the prices of chicken meat and fish resulted in decreases in demand by 0.43% and 2.12%, respectively.

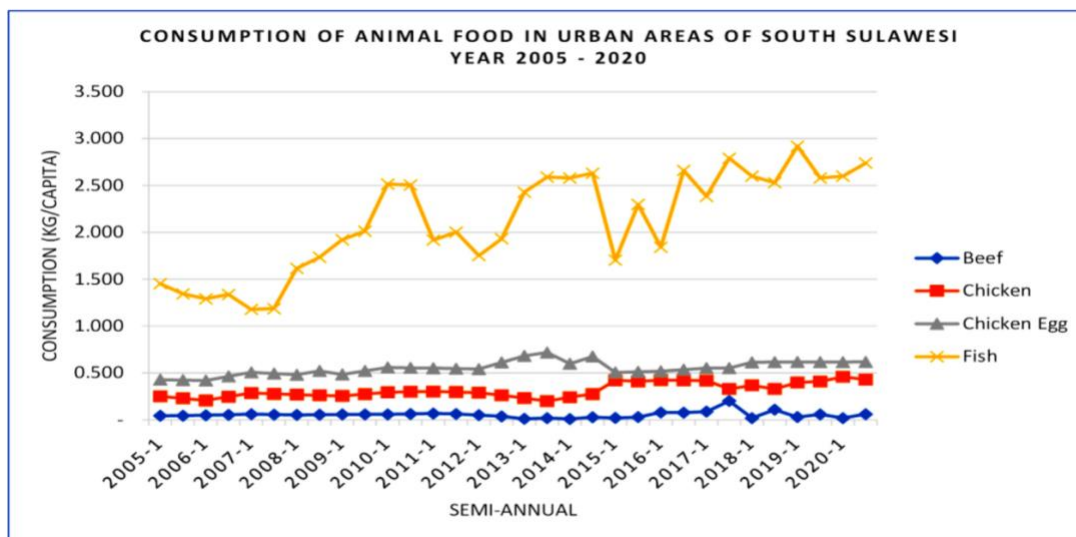


Figure 2.8 Animal Food Consumption in South Sulawesi Urban Areas

This research contributes to **SDG 2: Zero Hunger** by offering insights into food security dynamics in urban areas. Understanding the economic determinants of demand for nutrient-rich animal foods helps policymakers create strategies that ensure access to essential protein sources, which are critical for addressing malnutrition and hunger. In relation to **SDG 8: Decent Work and Economic Growth**, the study's analysis of consumer spending on animal foods highlights opportunities to strengthen food accessibility and affordability. Rising demand for animal-based protein not only fosters a healthier population but also creates potential economic benefits across supply chains, from agriculture to retail.

Moreover, the study supports **SDG 12: Responsible Consumption and Production** by examining how price fluctuations impact consumption. This information is valuable for producers seeking to align their output with consumer demand, minimizing waste and promoting sustainable practices in the production of animal food products.



Universitas Muhammadiyah Makassar's health-related initiatives align with SDG 3, promoting well-being for all ages. Through community service and research, the university supports mental health, medical education, and disease prevention. Programs like peer empowerment to address adolescent mental health involve awareness and education, reducing anxiety and depression. Research on medical education during the pandemic addresses challenges, improving online learning and access. Studies on natural remedies for obesity, like *Nigella sativa*, and advanced cancer therapies with lipid-based nanomaterials further enhance health outcomes. These efforts underscore the university's commitment to SDG 3, fostering healthy communities and advancing sustainable health innovations.

Peer Empowerment in the Community to Prevent Stress, Anxiety and Depression



Community Service Activities carried out by A. Nur Anna, et al in 2023. It focuses on peer empowerment as an effort to prevent stress, anxiety, and depression among adolescents.

As a first step, the team conducted a survey to measure the level of stress, anxiety, and depression among participants using a DASS (Depression Anxiety Stress Scale) questionnaire. The survey revealed a high prevalence of anxiety and depression in the adolescent group, with the majority of participants experiencing moderate to severe levels of anxiety. The service program is carried out through three main stages: preparation, implementation, and evaluation. In the preparation stage, the team compiled educational materials and formed peer groups as supporting media. During the implementation, material on the impact and prevention of stress, anxiety, and depression was delivered through a seminar which was attended by 87 respondents in a hybrid manner. The delivery of the material involved professional speakers and health practitioners. After the education, evaluations were carried out in the form of pretest and post-test to assess the improvement of participants' knowledge and understanding.

Results showed a decrease in anxiety and mild depression in participants who received peer intervention. The outcomes of this program include the formation of peer cadres who are ready to become role models. The program focuses on improving adolescent coping skills through education and peer counselling, in order to reduce the incidence of mental health problems in the future. **SDG 3**, which focuses on health and well-being, is directly related to these initiatives because peer support can help reduce stress, anxiety, and depression, thereby improving the mental health of individuals in the community. Peer empowerment is also in line with **SDG 4**, quality education, because it involves education about mental health and social skills that are beneficial for individuals in supporting each other, raising awareness, and providing

knowledge that can be applied in daily life. **SDG 11**, which highlights sustainable cities and communities, is reflected in this initiative as it strengthens social bonds and creates a safe and supportive environment, thus making communities more resilient and inclusive for all its members. Finally, SDG 17, a partnership to achieve the goals, underpins this approach, as successful peer empowerment requires collaboration between individuals, community organizations, educational institutions, and governments to create sustainable and accessible programs. Through this empowerment, communities can jointly overcome mental health problems and build better collective well-being.



Figure 3.1 Health socialization

Impact on Medical Education and Medical Students' Attitudes, Practices, and Mental Health After One Year of the Covid-19 Pandemic in Indonesia



Research conducted by Turana Y, et al in 2022 examined the impact of the COVID-19 pandemic on medical education in Indonesia, especially after one year of the pandemic. This research focuses on how the pandemic has changed the

way medical students learn, mental health, and attitudes and practices. Using a survey method, this study involved 7,949 medical students from 49 medical faculties who are members of the Indonesian Association of Private Medical Faculties. The online questionnaire used in this study covers various aspects, such as educational status, experience in tele-education, ownership of electronic devices, availability of technology, educational methods, career plans, attitudes towards the pandemic, and mental health of respondents. The results obtained provide a comprehensive overview of the condition of medical education during the pandemic as well as the challenges faced by students.



Readiness and Obstacles in Online Learning

The study also identifies a number of important challenges faced during the online learning process. One of the main challenges is internet access. The uneven quality of the internet network in various regions of Indonesia is one of the barriers to the success of online learning. In addition, the type of supporting devices used by students is also a problem. Not all students have adequate devices to take online classes, which affects the quality of their learning. In addition to infrastructure, the pandemic also has an impact on the overall education program. This study found that 28.1% of students experienced financial problems during the pandemic. These financial difficulties not only affect the daily lives of students, but also cause 2.1% of them to postpone their education. This problem is quite significant, considering that many college students have to work part-time to support their education costs, especially during the pandemic when family sources of income may be affected.

Mental Health and Its Impact

The pandemic not only affects education technically, but also has an impact on students' mental health. The study showed that about 40% of college students experienced symptoms of anxiety related to various problems over the course of several days, such as fear of contracting the virus, social isolation, and increasing academic pressure. In addition to anxiety, about one-third of college students admitted to feeling sad, depressed, and hopeless for some time day. This mental health condition is very worrying, heavy and considering the academic burden and uncertain environmental conditions due to the pandemic. The pandemic has also affected the career plans of students. A total of 34% of students reported that the pandemic had affected their interest in the medical profession, and the majority of them (52.2%) were worried that the pandemic would limit their opportunities to pursue a specialised education. These concerns are justified, given changes in the medical education system during the pandemic, including the delay of clinical education and restrictions on access to specialty training in hospitals.



SDG 3, which emphasizes health and well-being, is particularly relevant as the pandemic puts a huge strain on the mental health of medical students, who face academic burdens, psychological pressures, as well as changes in clinical education practices. **SDG 4**, quality education, is also closely related as the pandemic necessitates a drastic shift in the medical education system, with reduced hours of

hands-on practice and the adoption of digital technologies for learning. This shift poses a challenge to the quality and completeness of medical student training which needs to be adjusted to high standards even though it is online. **SDG 9**, which focuses on innovation and infrastructure, is reflected in the rapid adaptation to digital learning technologies and medical simulations, which support the sustainability of medical education amid physical limitations. These innovations not only facilitate the continuity of medical training but also allow students to develop relevant skills in the context of increasingly advanced medical technology

A Review of the Potential Health Benefits of *Nigella sativa* on Obesity and Its Associated Complications

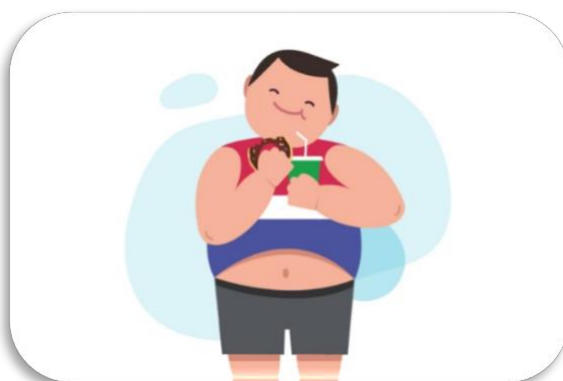


Research by Adam S.H, et al. in 2023 discusses obesity which is currently a global health problem and continues to increase with a very alarming prevalence rate. Obesity is not only an aesthetic disorder, but a serious condition that contributes

greatly to the emergence of various comorbidities, such as type 2 diabetes, stroke, cardiovascular disease, and even cancer. This condition leads to higher morbidity and mortality rates, making it a top priority in the world of health.

Obesity and Its Complications

Obesity is considered one of the main risk factors for the development of various metabolic diseases. In this study, Adam S.H, et al. highlighted that the prevalence of obesity continues to increase globally, which ultimately increases the risk of other comorbidities. Although efforts to manage obesity through conventional methods such as dietary changes, increased physical activity, and the use of certain medications have been pursued for a long time, the results obtained are often unsatisfactory. The study noted that conventional methods for treating obesity are often limited in their effectiveness and often cause unwanted side effects. For example, strict dietary interventions are often difficult to adhere to in the long term, while weight loss medications sometimes have side effects such as indigestion, increased heart rate, and insomnia.



Nigella sativa as an Alternative Therapy

Nigella sativa (NS), also known by the name black cumin, is a medicinal plant that has been used in traditional medicine for centuries. In recent decades, NS has begun to gain scientific attention due to its various pharmacological properties, including antidiabetic, anti-inflammatory, antimicrobial, and antioxidant activities. This study

highlights the potential of NS as a supportive or complementary therapy in the treatment of obesity and its associated complications.

Mechanism of Action of *Nigella sativa* in the Treatment of Obesity

Some of the active components in NS, such as **thymoquinone**, have excellent potential in helping regulate fat and glucose metabolism, which is especially important in the context of obesity. Thymoquinone is known to have powerful antioxidant effects, which can reduce oxidative stress and chronic inflammation, two of the main mechanisms underlying the development of obesity and its complications. The study further discusses the mechanism behind the potential of *Nigella sativa* in the treatment of obesity. Thymoquinone, as one of the main components in NS, has been shown



Figure 3.2. *Nigella* Images

to act on several metabolic pathways related to fat regulation and energy metabolism. Some of these mechanisms include regulating the expression of genes involved in fat formation and energy use, as well as a reduction in the production of free radicals that can damage tissues and worsen obesity. Thymoquinone also plays a role in lowering the production of pro-inflammatory cytokines, such as TNF- α and IL-6, which are often increased in obese people. By lowering levels of these cytokines, NS may help reduce chronic inflammation associated with obesity and other metabolic diseases.

SDG 2, which focuses on ending hunger and improving nutrition, is relevant because *Nigella sativa* (black cumin) can play a role in the treatment of obesity and support healthier diets, helping to prevent health complications arising from malnutrition and overweight. **SDG 3**, health and well-being, is directly related because research on *Nigella sativa* offers a more natural and potentially low-side treatment alternative for people with obesity, helping to improve public health and reduce the risk of chronic diseases such as diabetes and hypertension. In addition, **SDG 12**, responsible consumption and production, is also relevant in this context because the use of *Nigella sativa* as a natural ingredient can support a more sustainable and environmentally friendly treatment approach than synthetic drugs, by reducing dependence on chemically intensive resources. The potential of *Nigella sativa* as a natural solution to obesity not only supports individual health but also contributes to food security, resource management, and health system sustainability.

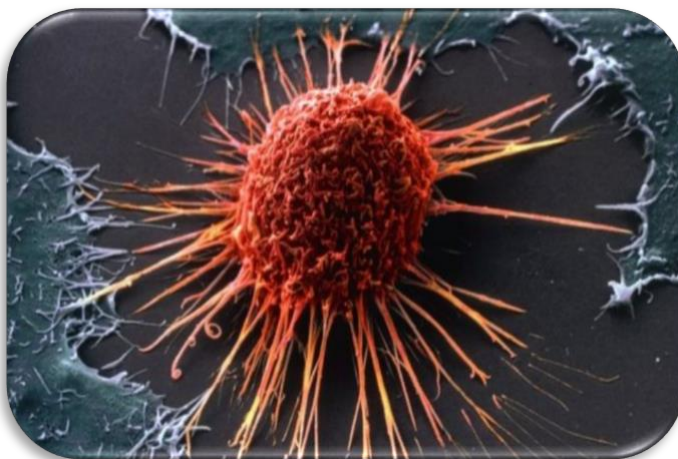
Lipid-Based Nanomaterials for Drug Delivery Systems in Breast Cancer Therapy

Research by Rethi L, et al. in 2022 discussed the potential of lipid-based nanomaterials as drug delivery systems in breast cancer therapy. Breast cancer is one of the most common diseases worldwide, and poses a serious threat to human health, especially for women. Although many therapies have been developed for breast cancer, these

treatments are often faced with challenges such as adverse side effects, lack of specificity against cancer cells, and inability to achieve effective optimal doses. Therefore, research on lipid nanomaterial-based drug delivery systems is the main focus in efforts to overcome this problem and improve the effectiveness of breast cancer treatment.

Breast Cancer and Its Challenges in Therapy

Breast cancer is the most common type of cancer among women and is the leading cause of cancer death in women worldwide. This cancer occurs when breast cells begin to grow out of control and can spread to surrounding tissues or even to other parts of the body (metastasis). Different types of therapies have been developed to treat breast cancer, including surgery, chemotherapy, radiation therapy, and hormone therapy.



Lipid-Based Nanomaterials as Drug Delivery Systems

Lipid-based nanomaterials have a variety of advantages that make them ideal candidates as drug delivery systems in cancer therapy. Lipids are biological molecules that can be found naturally in the body, so they are biocompatible and have **low toxicity**. This allows lipids to be used as drug delivery without triggering an adverse immune response or causing serious side effects.

Lipid-Based Drug Delivery Mechanism

Lipid-based nanomaterials work by combining drug molecules into lipids, which then form tiny particles called liposomes or solid lipid nanoparticles (SLNs). Liposomes have the ability to fuse with the target cell membrane and release the drug directly into the cell, increasing the concentration of the drug on the desired area. In addition, liposomes can be modified with ligands that allow them to recognize and target cancer cells specifically. The study also highlights the role of **conjugation** in lipid-based drug delivery systems. Conjugation is the process of binding an active molecule (such as an antibody or peptide) to the surface of a liposome, so that liposomes can actively target specific receptors that are only present in cancer cells. Thus, these modified liposomes can be directed directly at the tumour and release the drug in a controlled



Figure 3.3 Lipids

manner. **SDG 3**, which emphasizes health and well-being, is relevant because lipid-based nanomaterial technology enables more effective and targeted drug delivery in breast cancer therapy, reducing side effects as well as improving patients' quality of life. This innovation promises to improve the results of more personalized and efficient therapy, supporting women's health in particular. **SDG 12**, responsible consumption and production, is reflected in the use of lipid-based materials that are more environmentally friendly compared to synthetic chemicals, and this approach can reduce pharmaceutical waste and carbon emissions in the drug production process. Lastly, **SDG 17**, a partnership to achieve the goals, is an important cornerstone in the development and application of this drug delivery technology, which requires collaboration between scientists, the pharmaceutical industry, and health institutions. This collaboration allows scientific advances to be translated into health solutions that are widely accessible to the public. Thus, lipid-based nanomaterials for breast cancer therapy not only support patient health but also advance sustainability and collaboration in medical research.

4 QUALITY EDUCATION



ENSURE INCLUSIVE AND EQUITABLE QUALITY EDUCATION AND PROMOTE LIFELONG LEARNING OPPORTUNITIES FOR ALL

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" is a principle emphasized in the Sustainable Development Goals (SDG 4), which aims to make quality education accessible to everyone, regardless of background. This goal focuses on creating educational systems that welcome diversity and address various needs to provide fair, high-quality learning opportunities. Additionally, it highlights the importance of supporting ongoing education throughout an individual's life, encouraging continuous skill development and knowledge advancement. Universitas Muhammadiyah Makassar is committed to contributing to achieving SDG Goal 4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. The university opens access to education for all levels of society, especially the younger generation, through both formal and non-formal education pathways. Formal education includes Diploma (D3), Bachelor (S1), Professional, Master (S2), and Doctoral (S3) programs, while non-formal education is delivered through various community service activities engaging diverse groups. As part of these efforts, Universitas Muhammadiyah Makassar implements an admissions policy that supports inclusivity and diversity. This policy ensures that factors such as religion, ethnicity, race, gender, age, social status, place of origin, physical condition, and economic background do not become barriers to higher education access. In the admissions process, the university also considers applicants' potential, academic and non-academic achievements, and the unique characteristics of each program of study, with the goal of supporting sustainable, fair, and high-quality education for all students.

A PLS-SEM approach to understand ARCS, McClelland's, and SDT for the motivational design of online learning system usage in higher education

4

QUALITY EDUCATION



8

DECENT WORK AND ECONOMIC GROWTH



9

INDUSTRY, INNOVATION AND INFRASTRUCTURE



10

REDUCED INEQUALITIES



The school garden initiative at the Indonesian School of the Hague (SIDH) strongly aligns with the objectives of SDG 4 as highlighted in the Times Higher Education Impact Rankings. This program, by incorporating natural and social sciences education within a practical garden setting, provides students with a holistic and active learning experience, moving beyond traditional classroom boundaries. Through hands-on gardening activities—such as planting, cultivating, and harvesting crops—students engage directly with concepts in biology, environmental science, and sustainable agriculture, thus deepening their understanding of natural sciences. Social science learning is enhanced as students interact, cooperate, and

accessible, sustainable, and inclusive educational models that support societal progress and economic resilience.

Design Model for Team-Based Projects Based on Digital Litigation in Learning Speaking



The study presented in the document develops a Team-Based Project model grounded in digital literacy to enhance students' speaking abilities in Indonesian Language and Literature Education. This aligns well with **SDG 4 (Quality Education)**, which emphasizes inclusive, equitable education and lifelong learning opportunities. By incorporating digital tools, the model equips students with skills essential in the 21st century, including digital literacy, critical thinking, collaboration, and effective communication. The integration of technology fosters a dynamic learning environment where students actively engage in discussions, problem-solving, and interactive presentations, thereby improving their academic performance and self-confidence. Furthermore, the team-based approach fosters an inclusive classroom, encouraging interaction and cooperation among diverse learners. This model not only responds to the increasing demand for digital competence in education but also prepares students for future professional roles that require effective communication and collaboration in digitally mediated environments. Hence, this educational model contributes significantly to SDG 4 by promoting quality education through innovative and inclusive teaching methodologies that prepare students for active participation in a digitalized world.

Table 4.1 Result of the study

Aspects of the Quality of the Learning Process Team Based Projects	Very good	Well	Enough
Asking activity	21,1%	47,4%	31,5%
Activeness in answering questions	21,1%	47,4%	31,5%
Liveliness responds to responses	23,7%	68,4%	8,9%
Activity doing tasks	23,7%	65,8%	15,5%
Activeness in presentations	15%	68,8%	17,2%
Active discussion in groups	34,2%	42,1%	26,7%
Student interaction in groups	18,5%	47,9%	33,6%
Ability to explain problem solving	21,1%	47,4%	31,5%
Active attention to explanations	18,4%	81,6%	0%
Timeliness in discussions	10,5%	86,8%	3,7%
Respect other people's opinions	21,1%	47,4%	31,5%

Apart from SDG 4, the article aligns closely with **SDG 9 (Industry, Innovation, and Infrastructure)** and **SDG 10 (Reduced Inequalities)**. The focus on digital literacy and technology integration in educational models reflects SDG 9's emphasis on fostering innovation and building resilient infrastructure, particularly in education. By leveraging digital tools for learning, the model enhances students' technological adaptability, preparing them to participate effectively in a technology-driven world. Additionally, the

team-based learning model encourages equal participation, addressing SDG 10 by fostering an inclusive environment where students from diverse backgrounds collaborate and benefit from equal learning opportunities. This inclusivity reduces educational disparities and supports equal access to quality learning resources, especially relevant in digital literacy contexts. Therefore, this model not only advances education quality but also promotes technological empowerment and equal opportunities, contributing significantly to broader social and economic resilience.

Designing Worksheets to Improve Reflective Thinking for Elementary School Students on the Solid Figure Subject



The study in the provided document aligns with the **SDG 4**, which advocates for inclusive and equitable quality education and lifelong learning opportunities for all. The research focuses on developing student worksheets to enhance reflective thinking among fifth-grade elementary students on the topic of solid figures in mathematics. By integrating reflective thinking into problem-solving exercises, the worksheets aim to improve students' cognitive and analytical skills. This approach not only supports the acquisition of essential mathematical concepts but also cultivates critical thinking, a key skill for lifelong learning. The study's development methodology follows a systematic design, involving curriculum analysis and iterative testing to ensure the worksheets are effective and practical for classroom use. Validated by experts, the worksheets show promising results in increasing student engagement and reflective thinking abilities, as evidenced by improved scores in student assessments. Such educational innovations contribute to SDG 4 by providing tools that foster higher-order thinking and adaptability, preparing young learners for complex problem-solving and decision-making tasks in real-life scenarios. By targeting early education, this study supports a foundation for continuous intellectual growth and development, essential for sustainable societal progress.

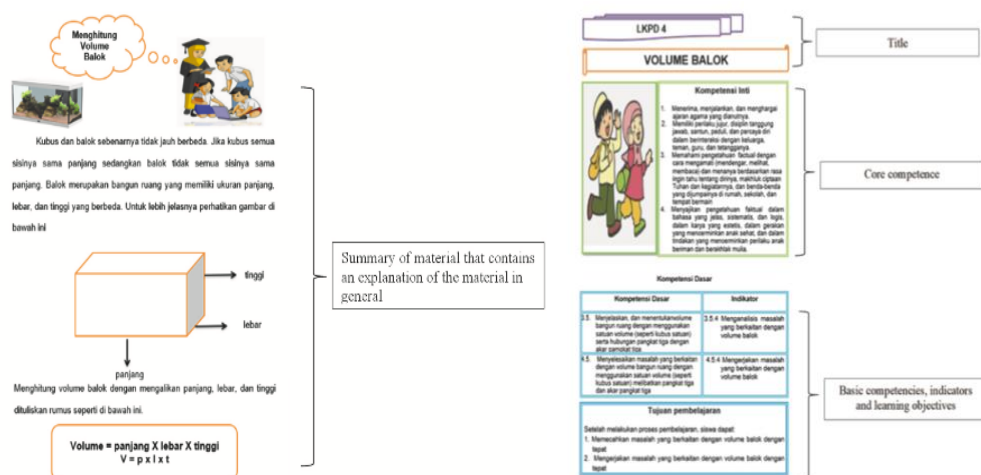


Figure 4.2 Result of the study

Apart from SDG 4, this study aligns well with **SDG 9**, which focuses on building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. The development of problem-solving-based worksheets reflects a commitment to educational innovation by creating tools that facilitate skill development in reflective thinking and problem-solving for young students. Additionally, **SDG 17**, which emphasizes partnerships to achieve the goals, is relevant, as this research involves collaboration among education experts, school practitioners, and the community. The study's approach to developing worksheets through validation and feedback from educational experts showcases an effective partnership model that supports resource sharing and expertise in creating impactful educational materials. This collaboration contributes to building a solid foundation for quality education through innovative materials, making SDGs 9 and 17 complementary to the study's objective of fostering a sustainable learning environment.

Do Gender and Regional Differences Affect Students' Reading Literacy? A Case Study in Indonesia



The study on gender and regional differences in students' reading literacy in Indonesia offers significant insights for advancing **SDG 4 (Quality Education)**. By examining the disparities in literacy across genders and regions, the research highlights areas needing targeted intervention, aligning closely with SDG 4's mission to ensure inclusive and equitable quality education. Addressing these disparities is crucial for promoting lifelong learning opportunities for all, as literacy skills are foundational to personal and academic growth. Furthermore, the findings of this study suggest the importance of policy adjustments and resource allocation in underperforming regions to bridge literacy gaps. Such actions can empower marginalized communities, contributing to a more inclusive educational landscape in Indonesia. Moreover, the gender analysis within the study emphasizes the need for gender-sensitive educational strategies that cater to the distinct learning needs of both male and female students. By focusing on these dimensions, the research not only addresses immediate literacy challenges but also underscores the long-term societal benefits of an educated and literate population. In line with the Times Higher Education (THE) Impact Rankings, which measure universities' progress toward SDGs, this study provides data-driven insights that universities can use to support initiatives and partnerships aimed at improving educational quality and accessibility.

Apart from SDG 4, the study on gender and regional differences in students' reading literacy in Indonesia also aligns with **SDG 5 (Gender Equality)** and **SDG 10 (Reduced Inequalities)**. The exploration of gender disparities directly speaks to SDG 5's goal of achieving gender equality by highlighting specific educational needs and challenges faced by male and female students, fostering awareness and actions that ensure

gender-responsive teaching strategies. Additionally, the focus on regional disparities links closely with SDG 10, which seeks to reduce inequality within and among countries. By revealing literacy gaps across different regions, the study underscores the need for balanced educational resource distribution and tailored support for underrepresented areas. Addressing these inequalities through policy reform and community-based initiatives can empower marginalized groups, promoting a more inclusive society where educational outcomes do not depend on location or gender, ultimately advancing these interconnected SDGs.

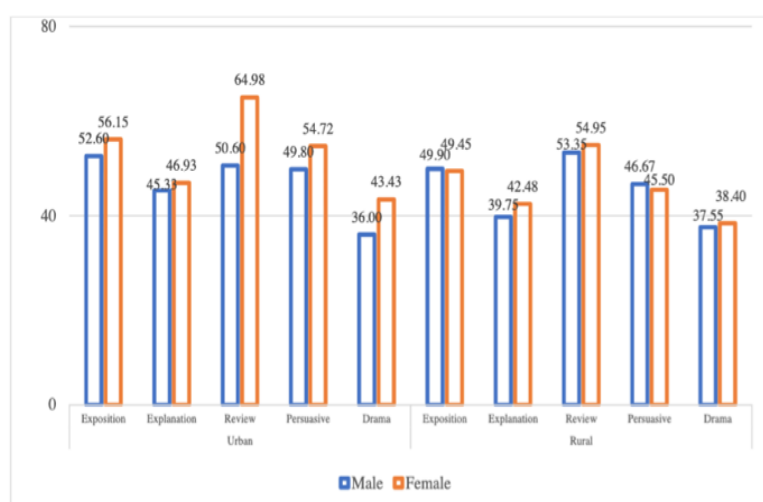


Figure 4.3 Students' reading literacy scores by gender

Investigating Grade Five Teachers' Integration of Technology in Teaching Reading Comprehension Using the TPACK Framework



The study on integrating technology in teaching reading comprehension among fifth-grade teachers in South Sulawesi relates to Sustainable Development Goal 4 (Quality Education), aligning with the SDG's goal of ensuring inclusive, equitable, and quality education while promoting lifelong learning. The research highlights the critical role of the Technological Pedagogical Content Knowledge (TPACK) framework, which combines content, pedagogy, and technology, to enhance the teaching and learning process. Teachers in the study utilized basic technologies, such as PowerPoint and LCD projectors, to display reading materials and facilitate classroom activities. However, the study reveals that their technology use often focuses on simplifying teaching tasks rather than fully engaging students or achieving learning outcomes through interactive or student-centered approaches. This observation underscores a need for professional development initiatives aimed at deepening teachers' understanding of TPACK, equipping them with skills to incorporate technology effectively for meaningful learning. By addressing such gaps, this research

underscores the broader impact of technology on improving educational quality, fostering innovation, and enhancing students' comprehension skills, which aligns with SDG 4's objective of promoting quality education through improved learning environments and teaching methods. Empowering teachers with TPACK-based training could thus support efforts toward achieving **SDG 4**, particularly by fostering an adaptable and technology-enhanced approach to primary education that prepares students for the complexities of the 21st century.

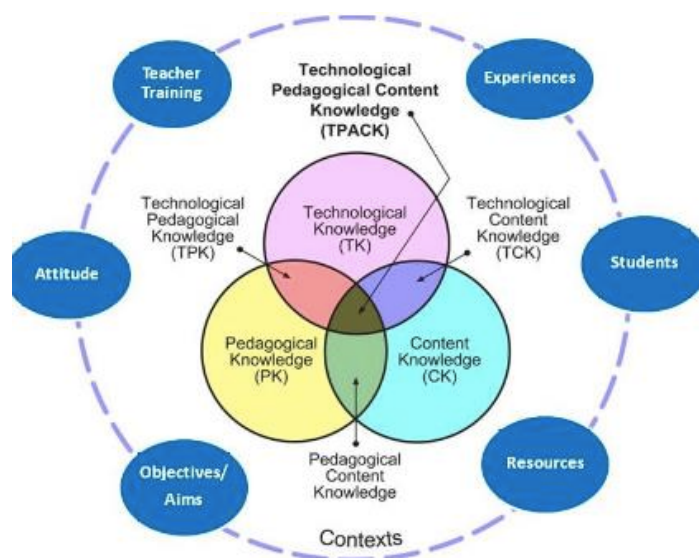


Figure 4.4 TPACK-based training

Beyond SDG 4, the study aligns with **SDG 9 (Industry, Innovation, and Infrastructure)** by promoting the use of technology in education, enhancing educational infrastructure, and fostering innovation in teaching practices. The TPACK framework's application supports a modern educational model, encouraging the integration of digital tools to enhance students' learning experiences. This focus on technology in classrooms resonates with SDG 9's goal to promote inclusive and sustainable industrialization and foster innovation by equipping teachers with the skills needed for a technology-driven future. Additionally, the study indirectly supports **SDG 10 (Reduced Inequalities)**, as it seeks to bridge educational gaps by providing rural students with access to technology-based learning. Empowering teachers with effective technology integration skills can help create more equitable learning opportunities, offering students in various regions, especially those in underserved areas, similar access to quality education resources and experiences. This approach supports building a fairer, more inclusive educational landscape.

Nature of Science: A Comparative Analysis of the High School Physics Textbooks in Indonesia and Korea



The study, "Nature of Science: A Comparative Analysis of the High School Physics Textbooks in Indonesia and Korea," examines how the Nature of Science (NoS) is represented in physics textbooks from these two countries, emphasizing its role in enhancing scientific literacy and aligning with SDG 4, Quality Education. The study found that Indonesian textbooks have 71 NoS elements, mainly focusing on cognitive-epistemic aspects (66.2%) like scientific knowledge, while Korean textbooks have 84 elements with a more balanced emphasis on cognitive-epistemic (64.3%) and socio-institutional (35.7%) aspects. The analysis shows that Korean textbooks address scientific practices, methods, and professional activities more thoroughly, potentially offering students a richer educational experience. The way NoS content is presented also differs, with 59% of NoS content in Indonesian textbooks located in the main text, compared to 48% in Korean textbooks, which integrate more supplementary text. This approach in Korean textbooks may foster a deeper understanding of science's social roles, enhancing students' critical thinking skills and global scientific literacy. Figure 4 in the article illustrates the varied approaches in presenting NoS, highlighting the potential impact of integrating socio-institutional elements to prepare students with a well-rounded understanding of science in both social and cognitive contexts. This study underscores the need for curriculum reform in Indonesian education to align with global standards, supporting SDG 4 by promoting inclusive and equitable quality education that prepares students for scientific engagement.

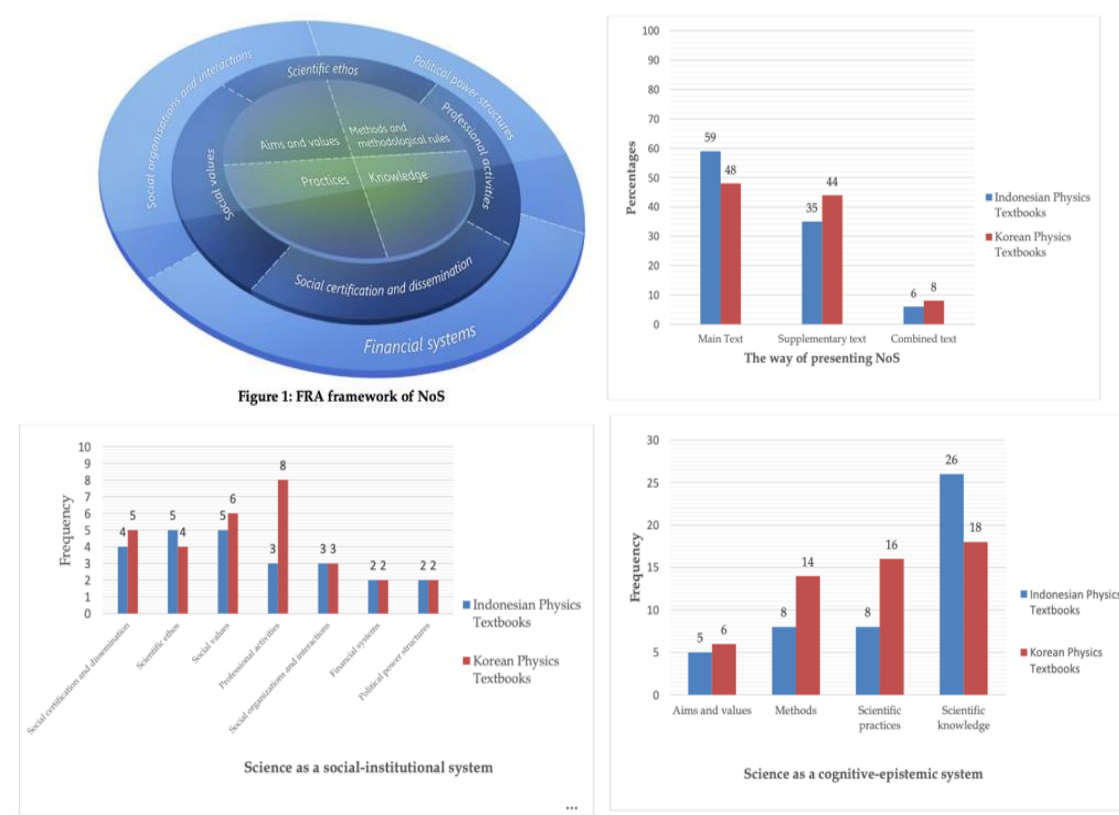


Figure 4.5 Result of the study

The article addresses several SDGs beyond **SDG 4 (Quality Education)**, aligning with **SDG 9 (Industry, Innovation, and Infrastructure)** and **SDG 10 (Reduced Inequalities)** in educational access and content equity. The analysis of Indonesian and Korean

physics textbooks highlights the gaps and variances in science education materials, which directly affect students' scientific literacy. SDG 9 is reflected in the recommendation to improve educational infrastructure through balanced, science-rich content that supports innovative learning methods and aligns with global standards. This is particularly relevant as Korea's textbooks display more comprehensive NoS (Nature of Science) elements, supporting an inclusive, high-quality curriculum that fosters scientific innovation. In contrast, SDG 10 is implicated as the study suggests curricular updates for Indonesia to reduce educational inequities between the two countries, thereby providing students with equal opportunities to access quality scientific content and fostering a broader, balanced perspective on science. These insights imply the need for systemic curriculum reform and development in Indonesian education to achieve a more equitable and robust scientific literacy aligned with international standards.

Natural sciences and social sciences learning in school garden, Indonesian School of the Hague, Netherlands



The school garden initiative at the Indonesian School of the Hague (SIDH) strongly aligns with the objectives **of SDG 4 (Quality Education)** as highlighted in the Times Higher Education Impact Rankings. This program, by incorporating natural and social sciences education within a practical garden setting, provides students with a holistic and active learning experience, moving beyond traditional classroom boundaries. Through hands-on gardening activities—such as planting, cultivating, and harvesting crops—students engage directly with concepts in biology, environmental science, and sustainable agriculture, thus deepening their understanding of natural sciences. Social science learning is enhanced as students interact, cooperate, and communicate, fostering essential life skills like teamwork, social responsibility, and respect for nature. This approach to education not only supports academic growth but also nurtures personal and social development, encouraging students to appreciate and contribute to sustainable practices. Furthermore, by emphasizing the role of sustainable food production and the economic value of agricultural practices, the garden project installs an early understanding of responsible consumption and environmental stewardship. SIDH's initiative exemplifies how integrating sustainable practices within educational programs can lead to a more inclusive, engaging, and impactful learning environment. By fostering critical thinking, environmental consciousness, and practical life skills, this school garden project directly supports the core principles of SDG 4, particularly in ensuring inclusive, equitable, and quality education that promotes lifelong learning. Through such initiatives, SIDH not only enhances its students' academic capabilities but also prepares them as environmentally aware citizens, aligned with the global educational impact goals set forth in the Times Higher Education Impact Rankings.

The school garden program at the Indonesian School of the Hague (SIDH) aligns with several key SDGs. By providing quality education through hands-on learning in the garden, this program supports SDG 4 as it actively engages students in exploring natural and social sciences in an engaging and immersive way. The program also promotes **SDG 2 (Zero Hunger)** by introducing sustainable agriculture practices and raising awareness of food security and nutrition, teaching students the value of responsible food production. Gardening activities contribute to **SDG 3 (Good Health and Well-being)** by enhancing students' physical and mental well-being through outdoor activities and a deeper understanding of the importance of nutritious food. Additionally, the program supports **SDG 12 (Responsible Consumption and Production)** by instilling sustainable consumption practices and reducing food waste, which students can apply in their daily lives. Finally, the program aligns with **SDG 15 (Life on Land)** as students learn about biodiversity and the importance of environmental conservation through plant care and ecosystem observation. This school garden program not only enriches academic knowledge but also fosters environmental awareness and a commitment to sustainability among students.



Figure 4.6 The school garden initiative at the Indonesian School of the Hague

5 GENDER
EQUALITY



ACHIEVE GENDER EQUALITY AND EMPOWER ALL WOMEN AND GIRLS

Universitas Muhammadiyah Makassar is committed to SDG 5: Gender Equality, fostering an inclusive and equitable environment. Employee Regulations Number 060/1442H guarantee fair compensation, benefits, and professional growth opportunities, ensuring all employees are treated equally regardless of gender. This policy promotes a supportive workplace that values diversity. Additionally, research by Faculty member in Universitas Muhammadiyah Makassar highlights gender imbalances in junior high school textbooks, where male representation dominates. Addressing these biases in educational materials supports gender equality by promoting balanced portrayals, helping counter traditional stereotypes. Through these initiatives, Universitas Muhammadiyah Makassar actively advances SDG 5, championing a culture of fairness and inclusion across the academic and local community.

Employee Regulations Number 060 of 1442H/2021 AD at Universitas Muhammadiyah Makassar

5 GENDER
EQUALITY



8 DECENT WORK AND
ECONOMIC GROWTH



Universitas Muhammadiyah Makassar is dedicated to promoting gender equality and fair treatment for all employees, ensuring a balanced, inclusive workplace as outlined in Employee Regulations Number 060 of 1442H/2021 AD. A key part of this commitment is in Article 5, which details employees' rights, emphasizing equal pay and benefits. Regardless of gender, every employee is entitled to fair compensation, aligning with **SDG 5 on Gender Equality**. This policy ensures that salaries and benefits are distributed equitably, fostering a workplace where both men and women are valued equally.

The regulation also provides comprehensive support for employee welfare, granting leave rights, medical assistance, and social protection measures for all. If an employee faces a physical or mental disability, the university provides an allowance for support within a specified timeframe. These policies, which offer inclusive health and well-being protections, support **SDG 8 on Decent Work and Economic Growth** by promoting a safe and supportive environment where all employees, regardless of gender or health status, can thrive.

Furthermore, Universitas Muhammadiyah Makassar prioritizes continuous learning by enabling employees to pursue educational opportunities and relevant training aligned

with university needs. This policy allows all employees, irrespective of gender, to grow professionally and develop their skills, supporting a progressive workplace culture. Additionally, the university recognizes the right of employees to form associations or unions within the institution, reinforcing freedom of association and fostering an inclusive work atmosphere.



Figure 5.1 Employee Regulations Number 060 of 1442H/2021 AD

By integrating these principles, Universitas Muhammadiyah Makassar not only supports gender equality but also upholds decent work standards. This approach, aligned with both SDG 5 and SDG 8, highlights the university's commitment to academic excellence and a fair, diverse, and empowering workplace culture. The policies ensure that all employees feel valued, respected, and supported, contributing to an equitable and inclusive community.

Gender Equality in the Foreign Language Textbooks of Indonesian Junior High Schools



A study by Suwadah Rimang from Universitas Muhammadiyah Makassar and her team from Universitas Negeri Makassar on gender equality in Indonesian junior high school foreign language textbooks reveals an imbalance in gender representation, with male references dominating. Content analysis of textbooks for grades VII to IX shows that terms referring to male characters (e.g., "he," "him") are significantly more frequent than female counterparts (e.g., "she," "her"). This disparity highlights underlying cultural biases that reinforce gender stereotypes, often depicting men as more central or active in various social contexts. This imbalance raises concerns, as

language in educational materials plays a formative role in shaping students' perceptions of gender roles.

In relation to **SDG 5 on Gender Equality**, this research underscores the need to promote equal representation in educational materials to combat gender stereotypes. Achieving SDG 5 requires consistent portrayal of men and women in ways that encourage equal value and opportunity. By addressing gender bias in textbooks, educational policymakers can work toward fostering a balanced view of gender roles among young learners, helping to counteract traditional stereotypes.

Table 5.1 Lexical items associated with Gender found in three books

Gender category	Lexical representation
Female	She (her), Mrs, Woman (women), Miss (Ms), lady (ies), Girl (s), Daughter (s), mother, widow, Dame (female knight).
Male	He (him, his), Mr, Man (Men), boy (boys), son (s), father, dad, gentleman (gentlemen), knight, Widower.

Additionally, the study's findings contribute to **SDG 10 on Reduced Inequalities**. Gender disparities in educational materials reflect and reinforce broader social inequalities, limiting opportunities for certain groups. Equal representation in textbooks can help break down these barriers by promoting respect for diversity and equality across genders. Reducing inequality through fair representation in learning resources is essential in building inclusive societies where everyone can participate fully, regardless of gender.

Do Gender and Regional Differences Affect Students' Reading Literacy? A Case Study in Indonesia



The study on gender and regional differences in students' reading literacy in Indonesia offers significant insights for advancing **SDG 4 (Quality Education)**. By examining the disparities in literacy across genders and regions, the research highlights areas needing targeted intervention, aligning closely with SDG 4's mission to ensure inclusive and equitable quality education. Addressing these disparities is crucial for promoting lifelong learning opportunities for all, as literacy skills are foundational to personal and academic growth. Furthermore, the findings of this study suggest the importance of policy adjustments and resource allocation in underperforming regions to bridge literacy gaps. Such actions can empower marginalized communities, contributing to a more inclusive educational landscape in Indonesia. Moreover, the gender analysis within the study emphasizes the need for gender-sensitive educational strategies that cater to the distinct learning needs of both male and female students. By focusing on these dimensions, the research not only addresses

immediate literacy challenges but also underscores the long-term societal benefits of an educated and literate population. In line with the Times Higher Education (THE) Impact Rankings, which measure universities' progress toward SDGs, this study provides data-driven insights that universities can use to support initiatives and partnerships aimed at improving educational quality and accessibility.

Apart from SDG 4, the study on gender and regional differences in students' reading literacy in Indonesia also aligns with **SDG 5 (Gender Equality)** and **SDG 10 (Reduced Inequalities)**. The exploration of gender disparities directly speaks to SDG 5's goal of achieving gender equality by highlighting specific educational needs and challenges faced by male and female students, fostering awareness and actions that ensure gender-responsive teaching strategies. Additionally, the focus on regional disparities links closely with SDG 10, which seeks to reduce inequality within and among countries. By revealing literacy gaps across different regions, the study underscores the need for balanced educational resource distribution and tailored support for underrepresented areas. Addressing these inequalities through policy reform and community-based initiatives can empower marginalized groups, promoting a more inclusive society where educational outcomes do not depend on location or gender, ultimately advancing these interconnected SDGs.

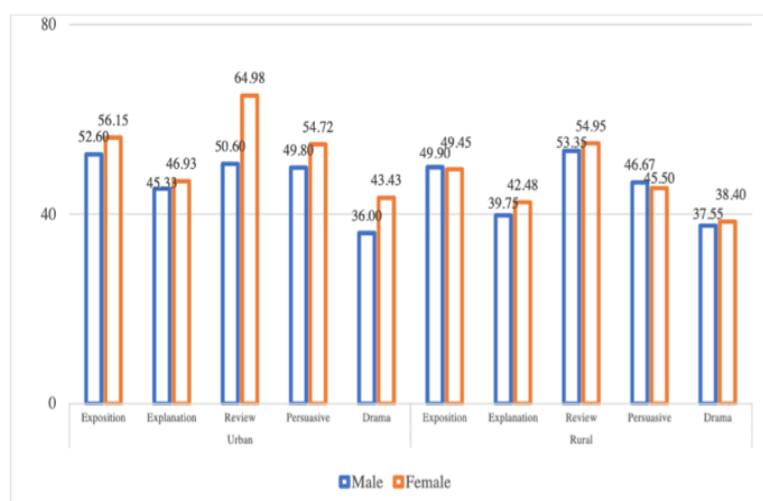


Figure 5.2 Students' reading literacy scores by gender

6

CLEAN WATER
AND SANITATION

ENSURING THE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL

Universitas Muhammadiyah Makassar actively supports SDG 6: Clean Water and Sanitation through various initiatives in research, community service, and collaboration. Research by Yunus highlights the critical role of mangrove ecosystems in filtering water and maintaining coastal health, essential for water quality and sustainability. Additionally, studies on Makassar's waterfront settlements address challenges in water access and sanitation for vulnerable communities, supporting efforts to create inclusive and sustainable environments. Further research on scouring reduction in bridge structures emphasizes the importance of resilient infrastructure to maintain water quality and ecosystem health. Through these projects, the university contributes to cleaner water access and improved sanitation, advancing sustainable development in local communities.

Analysis of Mangrove Ecosystem Sustainability in Biringkassi Mangrove Area, Pangkep Regency, Indonesia



A research conducted by Yunus, S, in 2023, highlights the importance of mangrove forest ecosystems in tropical and subtropical coastal areas. Mangrove forests, with their unique tree roots and some visible above water, have an important role as coastal habitats, nurseries for many species, as well as coastal protection from erosion. Mangroves play a significant ecological, social, and economic role for coastal areas. In addition to providing refuge for various marine species, mangroves also help improve the welfare of the surrounding community through abundant marine resources. This research focuses on the analysis of the sustainability of mangrove ecosystems in the Biringkassi mangrove area, Pangkep Regency, Indonesia. With coastal conditions that are often threatened by human activities, determining the sustainability status of



Figure 6.1 Mangrove Forest

mangrove ecosystems is an important basis for formulating future management policies.

The results of the analysis of the four dimensions show that the ecological and institutional aspects of the mangrove ecosystem in Biringkassi are in a moderate or moderate status in terms of sustainability. This shows that the condition of mangroves still has the potential to be sustainable, but needs better management to achieve higher sustainability. On the other hand, economic and social aspects are considered to have a low level of sustainability. These results suggest that economic activities related to mangroves, such as fisheries or timber extraction, have not been managed sustainably and require more serious interventions to improve these conditions.

The results of this study can be a guide in the formulation of mangrove management policies in the future, so that the sustainability of coastal ecosystems can be maintained. **SDG 6**, which focuses on access to clean water and sanitation, is relevant because mangrove ecosystems act as natural filters that maintain water quality, helping to control waste and pollution that enter the waters. **SDG 14**, which emphasizes the protection of marine ecosystems, is reflected in efforts to conserve mangroves, which are important habitats for diverse marine species and play a role in preventing coastal erosion and protecting local fisheries that sustain the economies of local communities. **SDG 15**, which focuses on protecting terrestrial ecosystems, is also directly related to mangroves as they are an integral part of biodiversity that helps prevent land degradation and maintain the balance of coastal ecosystems. Lastly, **SDG 17**, a partnership to achieve the goals, is particularly relevant because the sustainability of mangrove ecosystems requires collaboration between governments, communities, researchers, and non-profit organizations in planning, monitoring, and preserving the area. This analysis of the sustainability of mangrove ecosystems not only supports environmental quality and biodiversity, but also creates a collaborative framework that strengthens conservation efforts at the local and national levels.

Synchronization of SDGs in the Concept of Waterfront Settlements in Makassar City



This research conducted by Amalia A.A in 2023, highlights major challenges in achieving sustainable development goals in Makassar City, especially related to waterfront settlements. Along with the global agenda of the SDGs 2030 which prioritizes universal, integrated, and inclusive principles to ensure that no one is left behind, Makassar City is faced with the problem of slum areas that are still quite significant. Based on 2018 data, there are around 650.74 hectares of slum areas that have not been addressed, with the majority of the concentration being

Figure 6.3 Waterfront Concept

along the coastline or waterfront. The main problems found in settlements on the waterfront of Makassar City include seawater intrusion and sedimentation that occurs in household rainwater drains, as well as the lack of access to drinking water and sanitation for low-income people (MBR). In addition, uninhabitable housing conditions are also a concern. This phenomenon is a big challenge for Makassar City to be able to meet the SDGs targets, especially in terms of access to clean water, sanitation, and decent housing for the entire community. The results of the study show that the distribution of slums in Makassar City which are located in waterfront settlements has a certain pattern that is closely related to the economic condition of the surrounding community, accessibility to basic infrastructure, and environmental quality. These slums tend to suffer from problems of low building resilience, inadequate building area, and insufficient access to drinking water and sanitation. In addition, seawater intrusion that occurs due to the geographical location of settlements located on the coastline adds to the challenge in creating decent and safe housing for the community.

The concept of waterfront villages based on the achievement of the SDGs must meet the criteria for decent housing, ranging from building resilience, adequacy of residential area, to access to sanitation and drinking water. **SDG 6**, which focuses on access to clean water and sanitation, is relevant in the development of waterfront settlements because the region must ensure sustainable water management, including the provision of clean water and environmentally friendly sanitation systems. The concept of this waterfront settlement is also in line with **SDG 11**, namely inclusive, safe, resilient, and sustainable cities and settlements. Settlement designs that are integrated with coastal ecosystems support sustainability, by minimizing flood risk, maintaining environmental quality, and providing inclusive access for all community groups. **SDG 17**, a partnership to achieve the goals, is an important foundation in realizing this concept, as sustainable waterfront development requires collaboration between governments, the private sector, local communities, and international institutions to share knowledge, technology, and resources. With this synchronization, the concept of waterfront settlements in Makassar City not only supports water and sanitation management and coastal area security, but also strengthens the partnership network for sustainable development.

Effect of Flow Speed on Concrete Wings on Bridge Pillars Using iRIC Nays2HD 3.0 Software



The research entitled "Effect of Flow Speed on Concrete Wings on Bridge Pillars Using iRIC Nays2HD 3.0 Software" conducted by Nenny in 2022. This study examines the influence of flow velocity around concrete wings on bridge pillars to reduce erosion or scouring. Scouring, or erosion that occurs around the bridge pillars due to water flow, is a serious problem that can threaten the stability of the bridge structure. Therefore, this study uses the Nays2HD 3.0 version of iRIC (International River Interface

Cooperative) software to analyze the flow velocity around the bridge pillars before and after the installation of concrete wing curtains as an effort to mitigate scouring.

Ground Channel Model

This study uses a soil channel model with a trapezoidal cross-section that includes a cylindrical pillar model and concrete wings as simulation objects. The observed parameters include flow discharge (Q), flow velocity (v), flow depth (h), and erosion depth elevation (ds) at each time interval. Through this simulation, the results were

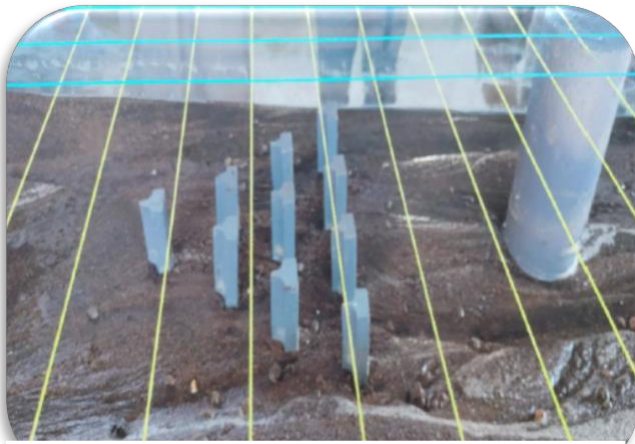


Figure 6.4 Ground Channel Model

obtained that the lowest and highest flow velocities recorded were 0.000 m/s and 0.998 m/s, respectively. The flow velocity around the bridge pillars and concrete wings is relatively small after the change in flow direction caused by the presence of concrete wings. This suggests that the presence of concrete wings has a significant effect in reducing flow velocity, which in turn helps to reduce the rate of scouring around the bridge pillars.

One of the key findings of this simulation is that the scouring or erosion around the bridge pillars tends to be smaller after the presence of concrete wings placed in front of the pillars. The change in direction and decrease in flow speed caused by concrete wing curtains provide additional protection to the bridge pillars from the erosive impact of water flow. This shows that the method of using concrete wing curtains can be an effective solution in the management of erosion around the bridge structure.

iRIC Nays2HD 3.0 software

In the validation stage, the results of the analysis of the iRIC Nays2DH 3.0 software simulation are compared with the physical model at the flow rate output (ms^{-1}). The validation results showed a relatively small difference, namely 4.61%, which was considered insignificant. This indicates that the iRIC Nays2HD 3.0 software is able to provide simulation results that are close to the actual physical conditions, making it reliable in the study or analysis of flow velocity and scouring around the bridge pillars.

Through the use of these simulation technologies, we can support the development of safe. This study shows that the application of concrete wing curtains on bridge pillars is effective in reducing the speed of flow passing through the pillar area, so that it can significantly reduce the level of erosion or scouring around the structure. The use of iRIC Nays2HD 3.0 in this analysis also provides adequate accuracy, making it an effective tool in studies related to scouring mitigation in the bridge pillar area. With

this study, it is hoped that the method of using concrete wing curtains can be applied more widely to extend the life and improve the stability of bridges in areas with high erosion potential. **SDG 6**, which supports access to clean water and sanitation, is relevant because understanding the influence of flow velocity on bridge structures helps ensure the stability of bridges in maintaining the quality of the waters that cross the area and preventing sedimentation or erosion that can damage aquatic ecosystems. **SDG 9**, which focuses on infrastructure and innovation, is closely related because the simulation of iRIC Nays2HD 3.0 software allows for more precise engineering in designing resilient bridges, with a better understanding of the interaction of water flows and structures. **SDG 11**, which leads to sustainable cities and settlements, is connected through efforts to create safe and resilient infrastructure in urban environments, so that bridges are able to withstand extreme currents and maintain connectivity and safety of the surrounding community. Finally, **SDG 13**, action on climate change, is critical because climate change affects increasingly unpredictable river flow patterns, so understanding the interaction of streams and bridge structures allows for more climate-responsive infrastructure adaptation efficient, and sustainable infrastructure, which adapts to increasingly complex environmental and climate challenges.

7

AFFORDABLE AND
CLEAN ENERGY



ENSURING THE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL

The SDG 7 emphasizes ensuring access to affordable, reliable, sustainable, and modern energy for all. Sustainable economic development is essential for alleviating poverty and improving global welfare. Achieving economic growth depends on modern energy systems that are reliable and competitively priced. It is imperative that energy production and consumption processes are efficient, sustainable, and based on renewable sources. Universitas Muhammadiyah Makassar actively contributes to this goal through its teaching, research, and community service initiatives. These efforts include advancements in renewable energy technology, energy efficiency solutions, innovative building design, and projects such as renewable rooftop technology and zero net energy buildings. The university is dedicated to promoting research and solutions that advance energy sustainability, particularly within the context of affordable and clean energy. Through these initiatives, the institution supports the global shift toward more sustainable energy practices, fostering both economic resilience and environmental responsibility.

Autonomous Energy Management by Applying Deep Q-Learning to Enhance Sustainability in Smart Tourism Cities



Jermisittiparsert and his team conducted a study titled “Autonomous Energy Management by Applying Deep Q-Learning to Enhance Sustainability in Smart Tourism Cities.” This research focuses on optimizing energy efficiency in microgrids, particularly those supporting tourism industries in remote areas where access to main power grids is limited. The study introduces a deep reinforcement learning approach (Deep Q-Learning) to optimize the production, storage, and distribution of energy within microgrids composed of renewable sources such as solar panels, energy storage systems, and generators. This system dynamically manages energy flows to ensure cost efficiency and sustainability, thereby supporting energy goals in off-grid tourism destinations. Figure 1 illustrates the application of a deep reinforcement learning-based energy management system.

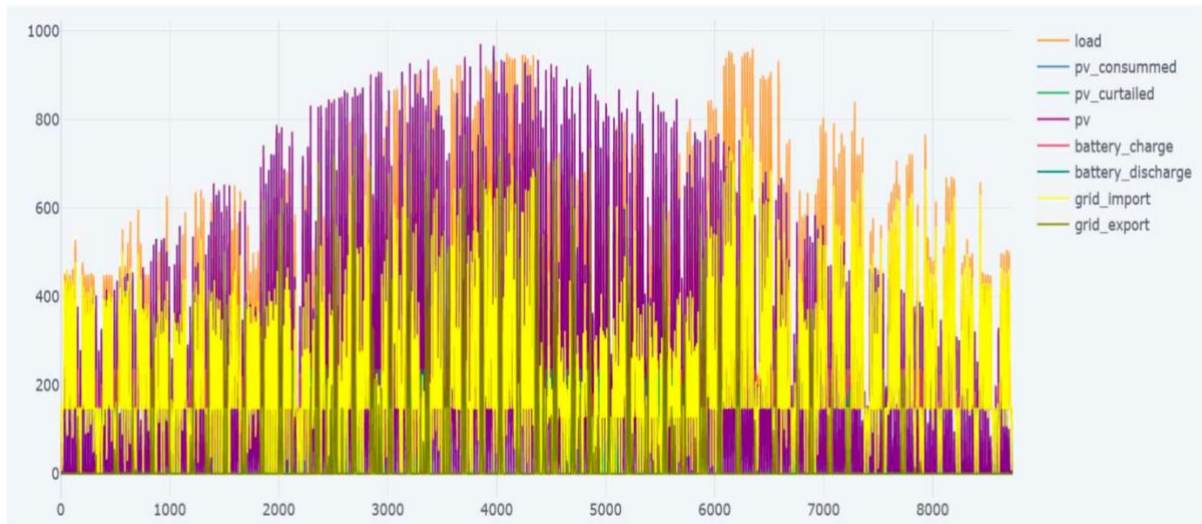


Figure 7.1 Energy management system applied by deep reinforcement learning

This study contributes to several SDGs, particularly **SDG 7: Affordable and Clean Energy**, by improving energy efficiency and reducing costs by 13.19%. The autonomous management of renewable energy sources provides a sustainable and reliable energy supply, meeting the objective of providing affordable, clean energy for all. Additionally, aligning with **SDG 11: Sustainable Cities and Communities**, the integration of autonomous energy management promotes sustainable urban development by ensuring that tourism destinations operate more efficiently, reduce their environmental impact, and enhance the quality of life for both tourists and local communities. This approach supports the creation of sustainable tourism cities that utilize resources responsibly.

Furthermore, this research supports **SDG 12: Responsible Consumption and Production** by using deep reinforcement learning to optimize energy utilization. The system dynamically adjusts to energy demands, preventing overuse and encouraging efficient production and consumption practices, which minimizes environmental impact while maintaining operational efficiency. Consistent with **SDG 13: Climate Action**, the integration of renewable energy and smart energy management contributes to reducing greenhouse gas emissions and supports global climate action initiatives. The system enhances the efficiency of energy distribution, particularly in environmentally sensitive areas with high tourism activity, thereby reducing carbon footprints.

Finally, the study also aligns with **SDG 17: Partnerships for the Goals** by fostering collaborations among local governments, tourism operators, and energy providers. This partnership-driven approach is essential for developing effective energy solutions that support sustainable growth in tourism and energy efficiency. The collaborative efforts exemplify the impact of multi-stakeholder engagements on achieving SDGs, highlighting the role of intelligent energy management in establishing sustainable, resilient tourism cities.

Short-Term PV Power Forecasting Using A Regression-Based Ensemble Method



Andi A. H. Lateko, Hong-Tzer Yang, and Chao-Ming Huang conducted a study titled “Short-Term PV Power Forecasting Using a Regression-Based Ensemble Method.” The research aims to improve the accuracy of photovoltaic (PV) power forecasting, which is essential for integrating renewable energy into smart grids and supports SDG 7: Affordable and Clean Energy. The study introduces a regression-based ensemble method that combines multiple forecasting models, including Random Forest (RF) and Support Vector Machine (SVM), to enhance the precision of day-ahead PV power predictions. By adjusting model weighting based on weather conditions, the method achieved a 20% improvement in mean relative error (MRE) compared to the best-performing individual RF model and a 2% improvement over a benchmark stacking RNN model. Figure 2 presents one-day-ahead PV power forecasting results under sunny conditions, showcasing the performance of various models.

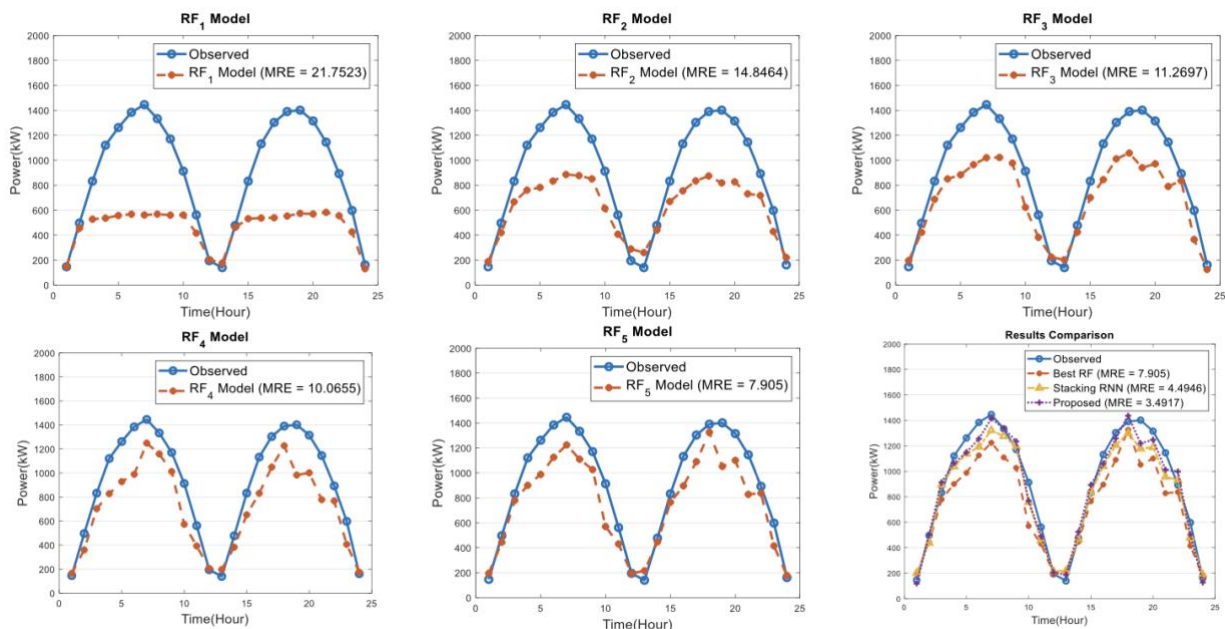


Figure 7.2 Results for one-day-ahead PV power forecasting for sunny weather conditions

The study contributes directly to **SDG 7: Affordable and Clean Energy** by improving the efficiency of integrating solar energy into the grid. Accurate PV power forecasting enables better management and planning of energy distribution, reducing operational costs and complexities associated with balancing supply and demand. This improvement enhances the reliability of renewable energy sources, ensuring a stable and cost-effective energy supply. By minimizing forecasting errors, this research

supports the viability of solar energy as an affordable and reliable energy solution, which is crucial for expanding access to clean energy in diverse regions.

The enhanced accuracy of PV power predictions not only optimizes energy management but also contributes to **SDG 13: Climate Action** by facilitating increased reliance on renewable energy, thereby reducing the need for fossil fuel-based power generation. The ability to accurately predict solar power output plays a pivotal role in maximizing the utilization of clean energy resources, ultimately reducing greenhouse gas emissions and supporting climate action efforts globally. Therefore, this study highlights the effectiveness of a regression-based ensemble method in improving PV power forecasting. The enhanced prediction accuracy is essential for integrating renewable energy sources into smart grids, promoting a more sustainable and resilient energy infrastructure that aligns with global sustainable development goals.

An Intelligent Recommendation for Intelligently Accessible Charging Stations: Electronic Vehicle Charging to Support a Sustainable Smart Tourism City



A research team led by Jermstittiparsert at Universitas Muhammadiyah Makassar conducted a study titled “An Intelligent Recommendation for Intelligently Accessible Charging Stations: Electronic Vehicle Charging to Support a Sustainable Smart Tourism City.” This research addresses significant challenges, including inadequate electric vehicle (EV) charging infrastructure and the imbalanced spatial and temporal demand for charging. Utilizing the Spatio-Temporal Multi-Agent Reinforcement Learning (STMARL) framework, the study enhances the efficiency of public-accessible EV charging stations by significantly reducing wait times, costs, and failure rates compared to traditional random selection approaches. Figure 3 illustrates the implementation of an EV charging recommendation system based on the study's findings.

This research makes substantial contributions to multiple SDGs. First, it supports **SDG 7: Affordable and Clean Energy** by enhancing EV charging system efficiency, making clean energy solutions more accessible and cost-effective for urban and tourist transportation. The optimization of EV charging station locations and operations minimizes energy wastage and encourages renewable energy utilization in the transportation sector. In alignment with **SDG 11: Sustainable Cities and Communities**, this study contributes to the development of smart and sustainable urban areas. By integrating intelligent EV charging infrastructure, particularly in tourist cities like Chiang Mai, the research reduces pollution and traffic congestion, enhancing the sustainability and attractiveness of these cities for residents and visitors alike.

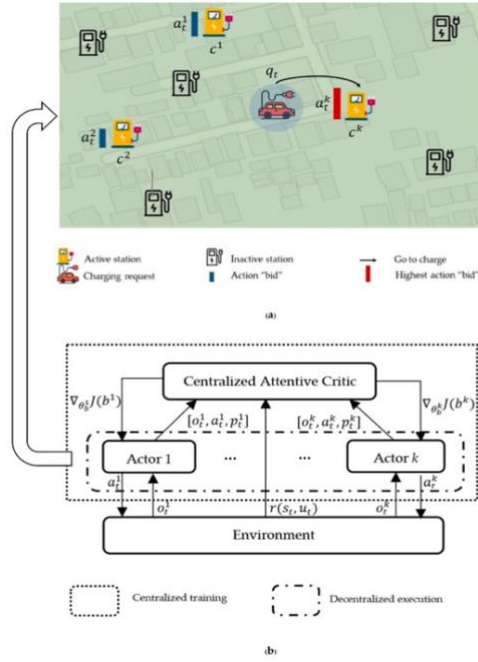


Figure 7.3 The implementation of electric vehicle (EV) charging recommendation systems. (a) EV Charging Station (b) EV Charging Framework.

Moreover, this research supports **SDG 12: Responsible Consumption and Production** by advocating for responsible and efficient energy consumption. The intelligent charging system ensures optimal use of energy resources, reducing overconsumption and advancing sustainability in urban energy production and consumption cycles. Aligning with **SDG 13: Climate Action**, the study contributes to efforts in mitigating climate change by promoting EV adoption, which decreases greenhouse gas emissions and air pollution. The STMARL framework optimizes charging station operations, minimizing energy loss and reducing carbon emissions. Additionally, this work aligns with **SDG 17: Partnerships for the Goals** by emphasizing collaboration among local governments, tourism authorities, and energy providers. These partnerships are essential for advancing clean energy initiatives and establishing resilient urban systems that support long-term sustainability.

In conclusion, Jermisittiparsert and his team's research underscores the vital role of innovation in developing EV infrastructure to support sustainable mobility and smart city growth. By implementing the STMARL framework, the study not only enhances EV charging system efficiency but also contributes to achieving SDGs 7, 11, 12, 13, and 17. This research promotes clean energy usage and highlights the importance of collaborative efforts in establishing sustainable, climate-resilient urban environments.

Electronic Load Controller based on Dimmer Circuit and Stepper Motor for 5 kW Micro-Hydro Power Plant

7 AFFORDABLE AND CLEAN ENERGY



Abdul Hafid and his team at Universitas Muhammadiyah Makassar conducted a study on an “Electronic Load Controller based on Dimmer Circuit and Stepper Motor for a 5 kW Micro-Hydro Power Plant.” This research focuses on optimizing energy management for small-scale micro-hydro power plants, emphasizing cost-effectiveness and efficiency in load control. The proposed system supports SDG 7: Affordable and Clean Energy by optimizing power distribution in micro-hydro systems, which is particularly beneficial for remote rural areas in Indonesia.

The study introduces an innovative Electronic Load Controller (ELC) design that combines a dimmer circuit with a stepper motor to regulate power distribution efficiently. The system incorporates components such as diac, triac, and a variable resistor, which are controlled using Matlab software and a PPI 8255 interface. Tested on a 5 kW micro-hydro generator in Katimbang Village, Bulukumba, the ELC demonstrated its effectiveness by maintaining a stable frequency of 50 Hz and a nominal voltage of 220 volts, even under fluctuating load conditions. Figure 4a illustrates the generator load controller's performance in regulating the load to ensure the generator remains at full capacity despite changes in consumer demand. Figure 4b provides the new schematic for the generator load controller simulation.

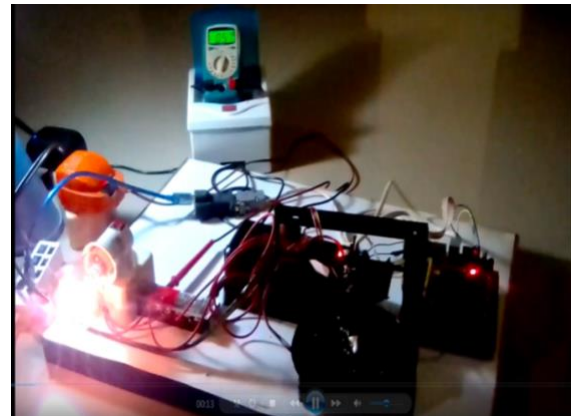
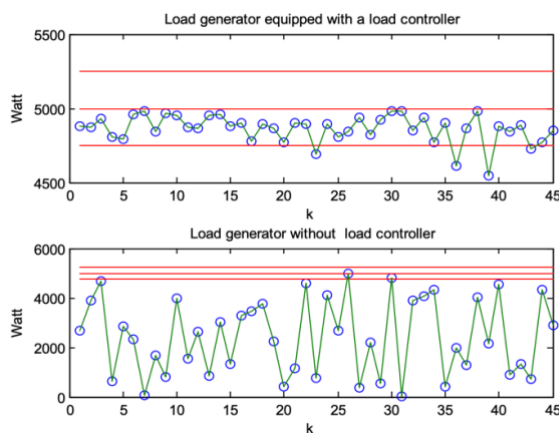


Figure 7.4 (a) Generator load controller simulation results for various consumer loads (b) new schematic generator load controller simulation

By enhancing the stability and efficiency of micro-hydro power systems, this research contributes to reliable, clean energy solutions for off-grid communities, thereby reducing dependence on conventional fossil fuels. The use of affordable components for the ELC further supports the affordability goals of **SDG 7**, making renewable energy solutions accessible and viable for rural electrification. The study demonstrates that the ELC design is a feasible and cost-effective approach to

improving the performance and reliability of micro-hydro power plants, ultimately supporting the sustainable energy access needed for remote and underserved areas.

Integration of Kouprey-Inspired Optimization Algorithms with Smart Energy Nodes for Sustainable Energy Management of Agricultural Orchards



Kittisak Jermsittiparsert and his team conducted a study titled “Integration of Kouprey-Inspired Optimization Algorithms with Smart Energy Nodes for Sustainable Energy Management of Agricultural Orchards.” This research addresses energy management challenges within agricultural orchards, specifically targeting volcanic durian cultivation in Sisaket Province, Thailand. The study employs Kouprey-Inspired Optimization (KIO) algorithms alongside smart energy nodes to enhance energy efficiency by integrating renewable solar energy with traditional power sources. This system significantly reduces labor and energy costs by approximately 30% and 50%, respectively, contributing to both sustainable agriculture and community-based tourism.

The study directly supports **SDG 7: Affordable and Clean Energy** by optimizing energy use in rural and agricultural settings. Smart energy nodes within the system facilitate the use of clean solar power, reducing reliance on conventional energy sources and lowering energy expenses for farmers and tourism operators. Figure 5 presents the theoretical framework of the smart energy system, illustrating its application in both durian plantations and tourist accommodations. In addition to energy goals, this study contributes to **SDG 2: Zero Hunger** by improving agricultural productivity. Reduced energy and labor costs allow farmers to reinvest savings into enhancing crop yields, thereby supporting food security and income stability. This system benefits the local agricultural economy, ensuring stable food sources and sustainable livelihoods. Moreover, consistent with **SDG 8: Decent Work and Economic Growth**, the integration of smart technology within agriculture and tourism not only lowers operational costs but also enhances profitability. This sustainable model fosters economic growth and creates employment opportunities within rural communities.

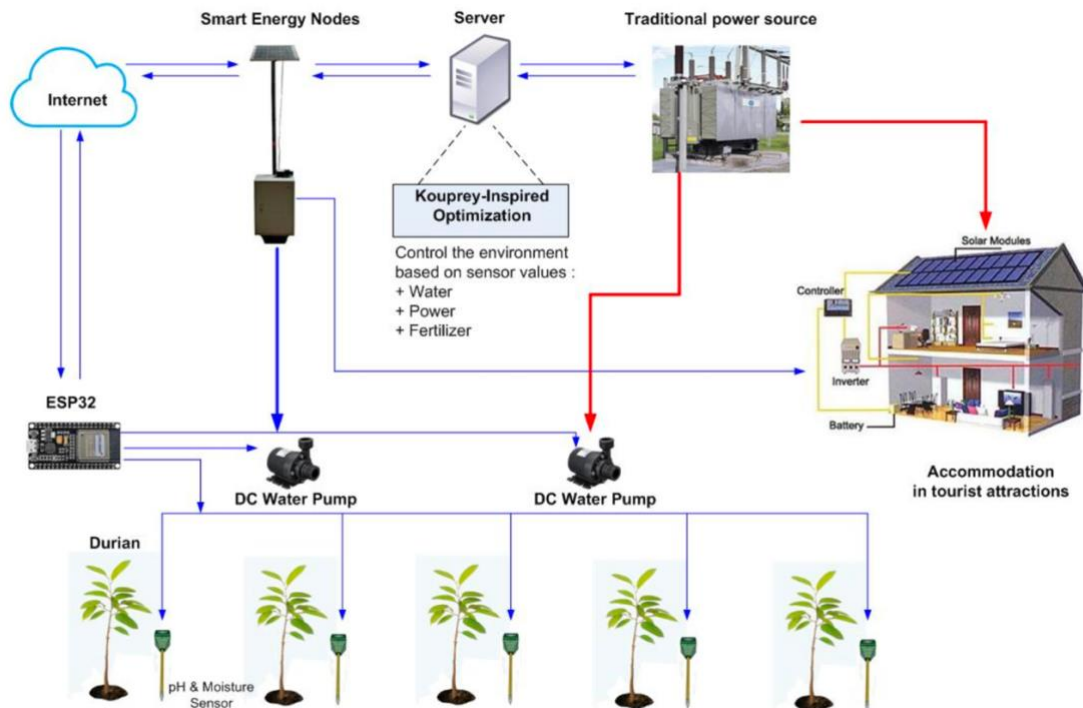


Figure 7.5 Theoretical framework of smart energy

The study also advances **SDG 12: Responsible Consumption and Production** by promoting efficient energy management practices. The smart energy nodes regulate energy usage sustainably, minimizing waste and ensuring resources are used responsibly. This approach reduces environmental impacts and enhances the sustainability of production systems. Lastly, the research supports **SDG 17: Partnerships for the Goals** by demonstrating the importance of collaboration between local governments, academic institutions, and private sectors. The success of the energy management system highlights the effectiveness of partnerships in driving sustainable development within the agricultural and tourism industries. These collaborations ensure that innovative energy solutions are developed and effectively implemented, fostering economic and environmental resilience in the long term.

Public Response on Twitter: The Urgency of Government Policy on Electric Vehicles



Luth, Kismartini, Dyah Lituhayu, Rani Maswati, and Tawakkal Baharuddin conducted a study titled “Public Response on Twitter: The Urgency of Government Policy on Electric Vehicles,” examining public perceptions of electric vehicle (EV) policies in Indonesia through Twitter sentiment analysis. This research aims to assess the urgency of EV policies in addressing pressing environmental issues, such as air pollution, dependency on imported fuels, and climate change, while promoting energy efficiency and reducing greenhouse gas emissions. Using Nvivo 12 Plus software, the researchers analyzed 5,789 tweets, capturing public reactions and sentiment toward

EV policies. The findings reveal substantial negative public sentiment despite government incentives, such as fiscal benefits and tax exemptions for EVs. Key concerns include limited EV mileage, high costs, and inadequate charging infrastructure, all of which pose challenges to widespread adoption. Figure 6 shows the primary factors influencing negative sentiment and public acceptance regarding EV adoption in Indonesia.

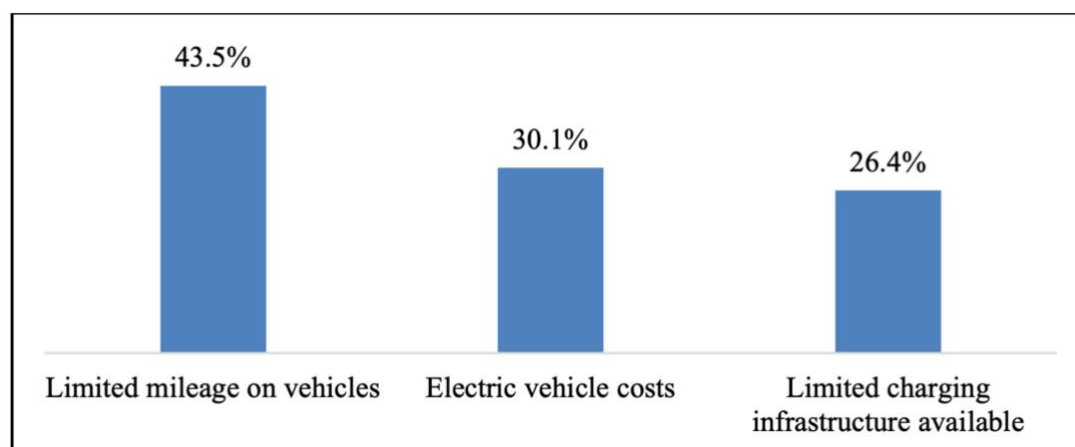
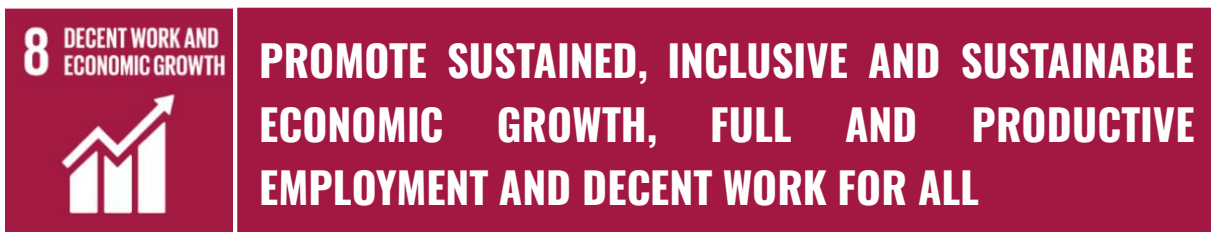


Figure 7.6 Dominant factors influencing negative sentiment and public acceptance

The study contributes to **SDG 7: Affordable and Clean Energy** by highlighting the need for comprehensive government policies to facilitate the shift toward cleaner transportation alternatives. The findings emphasize that effective policy frameworks and infrastructure development are crucial for making EVs accessible and affordable, thus promoting energy efficiency in Indonesia's transportation sector. By addressing infrastructure and cost barriers, government efforts can significantly improve public access to clean and sustainable energy options.

In alignment with **SDG 13: Climate Action**, the study underscores the importance of EV policies in reducing carbon emissions and enhancing air quality, especially in urban centers. The push for EV adoption is seen as a strategic initiative to reduce the transportation sector's dependence on fossil fuels, supporting broader climate goals. The research highlights that robust policy interventions are needed to fully realize the environmental advantages of EVs.

Furthermore, this study aligns with **SDG 17: Partnerships for the Goals** by underscoring the critical role of collaboration among government bodies, the automotive industry, and the public. It emphasizes that partnerships are essential for building the necessary infrastructure, providing subsidies, and conducting public awareness campaigns to boost EV adoption. The research suggests that establishing such alliances is vital to creating a supportive environment for EVs, thereby contributing to sustainable development on both national and global levels.



Universitas Muhammadiyah Makassar's dedication to SDG 8: Decent Work and Economic Growth is evident through its initiatives supporting sustainable economic development and quality employment. Collaborative projects, such as mangrove ecosystem management and urban animal food demand studies, promote sustainable economic practices and community resilience. Research in Islamic banking highlights the role of financial literacy in economic inclusion, fostering growth in financial services. Additionally, community programs empower local farmers and entrepreneurs, providing skills and resources for economic independence. The university's employee policies ensure fair treatment, continuous learning, and inclusivity. Through these initiatives, Universitas Muhammadiyah Makassar strengthens regional economies and enhances work standards, advancing sustainable development.

Analysis of mangrove ecosystem sustainability in the Biringkassi mangrove area, Pangkep District, Indonesia



A study by Zulkifli Mappasomba from Universitas Muhammadiyah Makassar, Sattar Yunus from Universitas Muslim Indonesia, and Muh Haidir from Universitas Teknologi Sulawesi investigates the sustainability of the Biringkassi mangrove ecosystem in Pangkep District, Indonesia. Using Rapid Assessment for Fisheries (RAPFISH) software and a Multidimensional Scaling (MDS) approach, the research assesses ecological, economic, social, and institutional dimensions. Findings indicate that, while ecological and institutional aspects show moderate sustainability, economic and social dimensions fall short, highlighting an overall less sustainable state. Key challenges include limited financial resources and inadequate alternative income sources, which undermine both local livelihoods and ecosystem resilience.

This study aligns with **SDG 8 on Decent Work and Economic Growth** by emphasizing sustainable economic activities within the mangrove ecosystem. Enabling local communities to earn sustainable income through mangrove resources can alleviate poverty and support coastal economies. Furthermore, **SDG 14 (Life Below Water)** is addressed, as mangrove ecosystems play a vital role in protecting marine biodiversity, serving as nurseries, stabilizing coastlines, and filtering pollutants, essential for sustainable fisheries and coastal protection.

Aligned with **SDG 15 (Life on Land)**, the research focuses on sustainable land use and biodiversity conservation through mangrove regeneration and erosion control. Additionally, the study underscores **SDG 17 (Partnerships for the Goals)**, emphasizing the importance of collaboration between local communities, government agencies, and NGOs. Strengthened partnerships are critical for shared resource management and successful conservation efforts.

In conclusion, this research, conducted by Yunus, Mappasomba, and Haidir, highlights that a balanced approach to mangrove management requires economic support and strong partnerships. By fostering economic growth, conserving biodiversity, and encouraging collaborative action, sustainable mangrove management can enhance local resilience and contribute meaningfully to global sustainability targets.

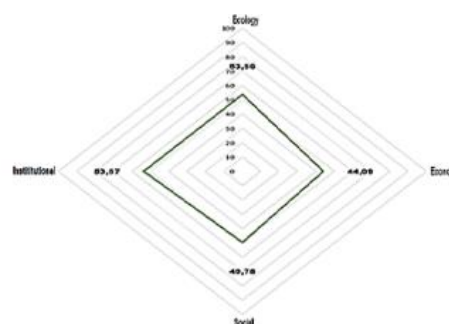


Figure 8.1 Mangrove Ecosystem sustainability

Determinants of Animal Food Demand in The Urban Region South Sulawesi



The study titled "**Determinants of Animal Food Demand in the Urban Region of South Sulawesi**" by Darmawaty, Sri Mardiyati, and Mohammad Natsir examines the factors influencing demand for animal-based food products, including beef, chicken, eggs, and fish, in urban areas of South Sulawesi. Using secondary time-series data from 2005 to 2020, the researchers analyzed trends in animal food consumption and identified economic determinants that impact demand. The results showed that animal food consumption in urban areas increased by 9.78 grams per capita per month over the study period, with fish being the most consumed product. Key determinants affecting demand included per capita expenditure, chicken meat prices, and fish prices. Specifically, a 1% increase in per capita expenditure led to a 1.58% increase in demand, while increases in the prices of chicken meat and fish resulted in decreases in demand by 0.43% and 2.12%, respectively.

This research contributes to **SDG 2: Zero Hunger** by offering insights into food security dynamics in urban areas. Understanding the economic determinants of demand for nutrient-rich animal foods helps policymakers create strategies that ensure access to essential protein sources, which are critical for addressing

malnutrition and hunger. In relation to **SDG 8: Decent Work and Economic Growth**, the study's analysis of consumer spending on animal foods highlights opportunities to strengthen food accessibility and affordability. Rising demand for animal-based protein not only fosters a healthier population but also creates potential economic benefits across supply chains, from agriculture to retail.

Moreover, the study supports **SDG 12: Responsible Consumption and Production** by examining how price fluctuations impact consumption. This information is valuable for producers seeking to align their output with consumer demand, minimizing waste and promoting sustainable practices in the production of animal food products.

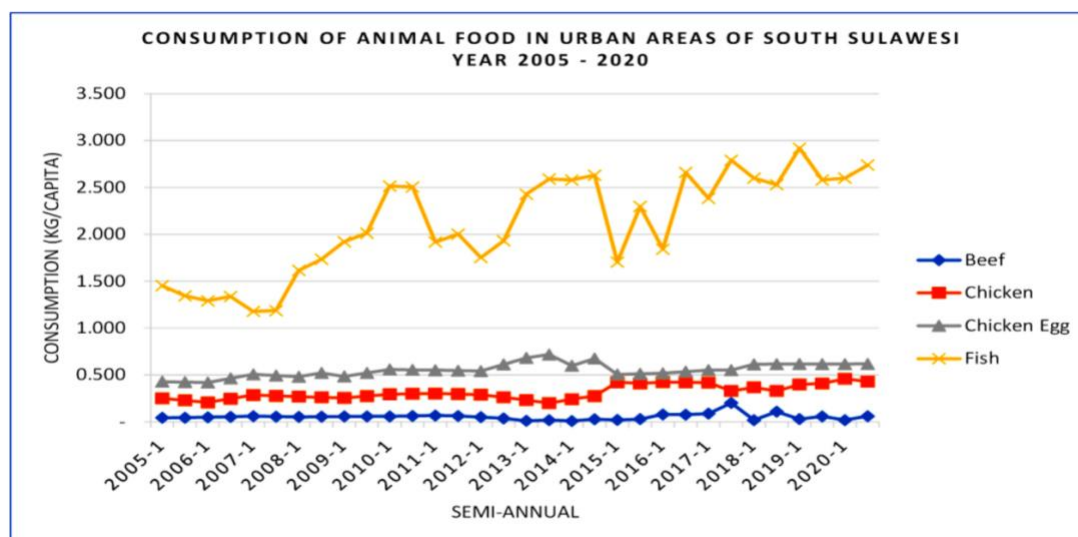


Figure 8.2 Animal Food Consumption in South Sulawesi Urban Areas

Earnings growth, marketability and the role of Islamic financial literacy and inclusion in Indonesia



The research conducted by Wa Ode Rayyani, S.E., M.Si., Ak.CA, and her team explores how profit growth in Islamic banks in Indonesia relates to marketability, as well as the effects of Islamic financial literacy and inclusion. Using a moderated mediation model, the study analyzes how Islamic financial literacy strengthens the link between financial inclusion and marketability, ultimately boosting profit growth. The findings indicate that from 2014 to 2021, Islamic banks in Indonesia experienced positive profit growth, primarily influenced by enhanced marketability, which serves as a measure of their market competitiveness.

This study demonstrates that financial inclusion, when enhanced by literacy, positively affects a bank's ability to attract customers, driving growth. Marketability, measured through the Lerner Index, reflects the bank's capacity to utilize its market position,

impacting profit growth. The research highlights the critical role of financial literacy, which helps customers better understand Islamic financial products, increasing their engagement and inclusion within the Islamic banking sector. Consequently, as literacy increases, more people are inclined to utilize Islamic banking products, resulting in higher profits for these banks.

Table 8.1 Hypothesis testing results

Hypothesis	Result
<i>H1. Islamic financial literacy has a moderating effect on the nexus between Islamic financial inclusion on marketability</i>	Accepted
<i>H2. Marketability has a mediating effect on the nexus between Islamic financial inclusion moderated by literacy and earnings growth</i>	Accepted

From the perspective of the SDG, the study aligns with **SDG 1 (No Poverty)**, as financial inclusion facilitates broader access to financial services, enabling individuals to save, invest, and build financial security, thus helping to alleviate poverty. Additionally, **SDG 8 (Decent Work and Economic Growth)** is relevant, as inclusive finance contributes to economic growth and stability by promoting equal opportunities in financial services. This research underscores the importance for policymakers and banking institutions to invest in financial literacy and inclusion programs, which can help establish a more equitable and competitive Islamic banking sector, contributing to sustainable economic development.

Empowerment of Salt Farmers in Bulu Cindea Fostered Village, Pangkep Regency



The faculty teams from Universitas Muhammadiyah Makassar and Universitas Muhammadiyah Parepare have launched a collaborative initiative aimed at empowering the village of Bulu Cindea in Pangkep. This initiative, part of the "Program Pemberdayaan Desa Binaan", focuses on sustainable development and improving local livelihoods, especially through salt production technology enhancement. The Universitas Muhammadiyah Makassar team, led by Dr. Rahmi, alongside Dr. Juliani Ibrahim and Asriyanti Syarif, works closely with the Universitas Muhammadiyah Parepare team led by Fitri Indahyani. Together, they aim to optimize marginal ponds for productive salt farming, addressing both the technical and economic needs of this coastal community.

Bulu Cindea, a fertile coastal area, faces challenges in scaling salt production due to the high initial investments and the need for appropriate technology. The collaboration is addressing these issues by developing effective tools to increase the production of high-quality salt, which is essential to meet growing domestic industrial demands. Supported by the Pangkep Regency Government and funded by the Ministry of Education, Culture, Research, and Technology, the program is set to run for three years.

Over this period, the teams will introduce technology for industrial salt production and provide equipment to support small and medium-sized enterprises engaged in salt farming.



Figure 8.3 Documentation of community empowerment activities in Bulu Cindea

In alignment with **SDG 1: No Poverty**, this initiative aims to improve economic conditions for local communities by enhancing salt production efficiency and enabling higher income potential for local farmers. Furthermore, it supports **SDG 8: Decent Work and Economic Growth** by fostering economic independence and sustainable industry practices in rural communities. In addition to salt production, the team organized a waste management workshop for Bulu Cindea residents. Dr. Ibrahim led a session on the environmental and health impacts of improper waste disposal. She emphasized sustainable waste practices, such as sorting, reducing, reusing, and recycling household waste, which are vital for community well-being. This program aligns with **SDG 11: Sustainable Cities and Communities**, promoting a healthier, cleaner environment and long-term community resilience. Through this ongoing initiative, the faculty teams aim to serve as catalysts for sustainable rural development, fostering environmental awareness and contributing to improved living standards for Bulu Cindea's residents.

Enhancing the Economic Prosperity of Seaweed Farmers in Takalar through a Seaweed Product Diversification Program



The program, led by A. Nur Fitrianti and her team from Universitas Muhammadiyah Makassar, aims to enhance the knowledge and skills of seaweed farmers in creating value-added products, including seaweed chips, sushi, and soap. This initiative not only targets product diversification but also emphasizes business management and marketing, which are crucial for farmers to succeed in a competitive market. The program, in collaboration with Muhammadiyah Takalar Youth and local community partners, involves structured sessions featuring lectures, demonstrations, and hands-on mentoring. Preparations include setting up appropriate locations, gathering tools

and materials, and conducting counseling and training on product manufacturing processes. An evaluation follows to gauge the effectiveness of these activities.

The program has demonstrated significant success, with 90% of participants expressing satisfaction and noting improvements in their skills. Through training, participants learned to transform seaweed into high-fiber chips, visually appealing sushi, and soap that supports skin health. These sessions not only provided technical skills in processing seaweed but also soft skills in business and marketing, helping participants better understand the market benefits of product diversification and gain the confidence to manage their businesses independently.



Figure 8.4 Documentation of community empowerment activities in Takalar

Aligned with **SDG 1: No Poverty**, this program offers a sustainable income pathway for seaweed farmers, enabling them to maximize the economic potential of locally available resources. Additionally, the initiative supports **SDG 8: Decent Work and Economic Growth** by fostering entrepreneurship, creating local employment opportunities, and building a skilled workforce. By encouraging the efficient use of resources, the program also resonates with **SDG 12: Responsible Consumption and Production**. The results highlight the value of collaboration among academics, community members, and local organizations in unlocking economic potential based on local resources. Through continued support and mentorship, the seaweed farmers of Takalar are expected to thrive in their businesses, strengthening both their economic resilience and competitiveness in an increasingly dynamic market.

Supporting Economic Growth in Sinjai Through Product Mentorship and Financial Management Training



The Community Service Team (PKM) from the Faculty of Economics and Business (FEB) at Universitas Muhammadiyah Makassar has held a mentoring program at the Sinjai Institute of Islamic Religion, aimed at enhancing the business capabilities of Nasyiatul Aisyiyah Charitable Enterprises (BUANA Sinjai). Held on September 24, 2022, the program focused on providing training and support to boost the sales and market presence of MINAS, a traditional Sinjai beverage made from cassava tape, as well as guidance in preparing simple financial reports. Led by Agusdiwana Suarni, S.E., M.Acc., with contributions from Dr. Andi Jam'an and Dr. Sulaeman Masnan, the program taught 16 BUANA Sinjai representatives fundamental business management skills, including financial record-keeping and marketing strategies.

The program aimed to strengthen BUANA Sinjai's product development and financial accountability, using practical tools such as Microsoft Excel to implement simple bookkeeping. By creating structured financial records, BUANA Sinjai can better manage its finances, potentially gaining access to funding opportunities from banks or government sources. This structured financial approach also supports the organization's mission of community welfare, aligning with **SDG 1: No Poverty** by promoting sustainable income generation.

Agusdiwana Suarni emphasized that financial management is key to increasing profitability, starting with basic household financial practices. Meanwhile, Dr. Sulaeman highlighted the dual role of businesses like BUANA Sinjai in generating profit and contributing to community welfare. This approach aligns with **SDG 8: Decent Work and Economic Growth**, as it supports job creation and sustainable business growth. Further, by promoting online marketing and social media outreach, the program contributes to **SDG 9: Industry, Innovation, and Infrastructure**, enabling BUANA Sinjai to reach a broader audience and increase product visibility.

Conducted in 16 sessions involving training, mentorship, and pre- and post-program evaluations, the PKM team observed significant improvements in MINAS product quality, bookkeeping practices, and marketing reach. Social media promotion and e-marketing have expanded BUANA Sinjai's visibility and strengthened its community impact, increasing turnover, creating jobs, and reducing poverty. Through ongoing community support, this program demonstrates how collaboration between academia, local organizations, and community partners can foster economic growth in Sinjai.



Figure 8.5 Documentation of community empowerment activities in Sinjai

Employee Regulations Number 060 of 1442H/2021 AD at Universitas Muhammadiyah Makassar



Universitas Muhammadiyah Makassar is dedicated to promoting gender equality and fair treatment for all employees, ensuring a balanced, inclusive workplace as outlined in Employee Regulations Number 060 of 1442H/2021 AD. A key part of this commitment is in Article 5, which details employees' rights, emphasizing equal pay and benefits. Regardless of gender, every employee is entitled to fair compensation, aligning with **SDG 5 on Gender Equality**. This policy ensures that salaries and benefits are distributed equitably, fostering a workplace where both men and women are valued equally.

The regulation also provides comprehensive support for employee welfare, granting leave rights, medical assistance, and social protection measures for all. If an employee faces a physical or mental disability, the university provides an allowance for support within a specified timeframe. These policies, which offer inclusive health and well-being protections, support **SDG 8 on Decent Work and Economic Growth** by promoting a safe and supportive environment where all employees, regardless of gender or health status, can thrive.

Furthermore, Universitas Muhammadiyah Makassar prioritizes continuous learning by enabling employees to pursue educational opportunities and relevant training aligned with university needs. This policy allows all employees, irrespective of gender, to grow professionally and develop their skills, supporting a progressive workplace culture. Additionally, the university recognizes the right of employees to form associations or unions within the institution, reinforcing freedom of association and fostering an inclusive work atmosphere.



Figure 8.6 Employee Regulations Number 060 of 1442H/2021 AD

By integrating these principles, Universitas Muhammadiyah Makassar not only supports gender equality but also upholds decent work standards. This approach, aligned with both SDG 5 and SDG 8, highlights the university's commitment to academic excellence and a fair, diverse, and empowering workplace culture. The policies ensure that all employees feel valued, respected, and supported, contributing to an equitable and inclusive community.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION

Universitas Muhammadiyah Makassar contributes to SDG 9: Industry, Innovation, and Infrastructure through initiatives that drive technological advancement and resilient infrastructure. Research on Indonesian migrant worker governance in Malaysia highlights digital innovations, like the "one channel system," to improve labor protection. Additionally, the study on investment paradiplomacy illustrates local governments' role in building regulatory frameworks to attract sustainable investment. Community programs, such as the business mentoring in Sinjai, strengthen local economic infrastructures through training and digital marketing, fostering economic resilience. Furthermore, digital adaptations in medical education emphasize innovative learning models, supporting accessible and sustainable education. These efforts demonstrate the university's commitment to sustainable development through innovation and infrastructure.

Governance and Protection of Indonesian Migrant Workers in Malaysia: A Study on Policy and Innovation Network

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



17 PARTNERSHIPS FOR THE GOALS



The study titled "Governance and Protection of Indonesian Migrant Workers in Malaysia: A Study on Policy and Innovation Network" by Andi Luhur Prianto, Aqmal Reza Amri, and Mohd Na'eim Ajis explores the collaborative efforts between Indonesia and Malaysia to improve the governance and protection of Indonesian migrant workers (IMWs) in Malaysia. The research investigates the role of policy networks and digital innovations, such as the "one channel system," an official recruitment mechanism established through a Memorandum of Understanding (MoU) between the two countries. This system aims to streamline recruitment processes, reduce exploitation, and enhance protection measures for migrant workers. However, the study identifies ongoing challenges in the implementation of these innovations, particularly within Malaysia, underscoring the complexities of cross-border labor governance and the critical need for sustained collaboration to safeguard the rights and welfare of IMWs.

The study contributes to **SDG 9: Industry, Innovation, and Infrastructure** by highlighting the use of digital innovation in the recruitment and management of migrant labor through the "one channel system." This system advances the industrial and digital infrastructure necessary to modernize labor management, creating a more secure, efficient recruitment process that prioritizes worker protection and aligns with sustainable development goals. In support of **SDG 10: Reduced Inequalities**, the study addresses the vulnerabilities faced by Indonesian migrant workers and advocates for

equitable policies that protect them from exploitation and discrimination. This focus on fair treatment and protective measures is essential in reducing socioeconomic inequalities, particularly for marginalized migrant populations.



Figure 9.1 The collaborative efforts between Indonesia and Malaysia to improve the governance and protection of Indonesian migrant workers (IMWs)

The research also aligns with **SDG 16: Peace, Justice, and Strong Institutions** by emphasizing the importance of robust governance and institutional accountability. The bilateral agreements and regulatory frameworks discussed in the study foster justice, transparency, and inclusivity in the treatment of migrant workers, ensuring that their rights are upheld through strong institutional support.

Finally, the study underscores the significance of **SDG 17: Partnerships for the Goals** by showcasing the importance of international collaboration between Indonesia and Malaysia. This partnership facilitates the development of a supportive network dedicated to addressing the protection and governance needs of migrant workers, demonstrating how cross-border cooperation can effectively promote labor rights and human dignity. Through these contributions, the study highlights the transformative potential of policy innovation and collaborative governance in addressing complex issues surrounding migrant labor.

Opportunities and Challenges for Local Governments to Facilitate the Implementation of Investment Paradiplomacy



The study titled "Opportunities and Challenges for Local Governments to Facilitate the Implementation of Investment Paradiplomacy" by Ahmad Harakan from Muhammadiyah University of Makassar and Abel Alfred Kinyondo from the University of Dar es Salaam explores how local governments in South Sulawesi, Indonesia, and

Dar es Salaam, Tanzania, are leveraging investment paradiplomacy to promote regional development. With decentralization policies in place, local governments now have greater autonomy to build international relations, fostering investment and showcasing local potential on a global scale. Using a qualitative approach that includes comparative analysis, interviews, and field observations, the study highlights both the opportunities and obstacles that local governments encounter in this endeavor.

The research reveals that local governments in both South Sulawesi and Dar es Salaam have implemented practices such as establishing supportive regulations, enhancing service and information infrastructure, and participating in international exhibitions to attract investors. However, disparities in resources and infrastructure pose challenges, with South Sulawesi showing a more advanced capacity for paradiplomacy due to stronger facilities, infrastructure, and human resources compared to Dar es Salaam. This difference reflects how varying local capabilities impact the effectiveness of investment-focused paradiplomacy.



Figure 9.2 Research implementation

The study's contributions align with **SDG 9: Industry, Innovation, and Infrastructure** by encouraging the development of essential infrastructure, regulatory frameworks, and communication systems that support investment. Such modernization efforts equip local governments to create a competitive and attractive environment for industries, thus fostering regional innovation and sustainable economic growth. Additionally, the study embodies **SDG 17: Partnerships for the Goals** by showcasing the importance of international collaboration. Through paradiplomacy, local governments in Indonesia and Tanzania build strategic partnerships with global investors and institutions, facilitating sustainable development through shared knowledge and resources

Supporting Economic Growth in Sinjai Through Product Mentorship and Financial Management Training



The Community Service Team (PKM) from the Faculty of Economics and Business (FEB) at Universitas Muhammadiyah Makassar has held a mentoring program at the Sinjai Institute of Islamic Religion, aimed at enhancing the business capabilities of Nasyiatul Aisyiyah Charitable Enterprises (BUANA Sinjai). Held on September 24, 2022, the program focused on providing training and support to boost the sales and market presence of MINAS, a traditional Sinjai beverage made from cassava tape, as well as guidance in preparing simple financial reports. Led by Agusdiwana Suarni, S.E., M.Acc., with contributions from Dr. Andi Jam'an and Dr. Sulaeman Masnan, the program taught 16 BUANA Sinjai representatives fundamental business management skills, including financial record-keeping and marketing strategies.

The program aimed to strengthen BUANA Sinjai's product development and financial accountability, using practical tools such as Microsoft Excel to implement simple bookkeeping. By creating structured financial records, BUANA Sinjai can better manage its finances, potentially gaining access to funding opportunities from banks or government sources. This structured financial approach also supports the organization's mission of community welfare, aligning with **SDG 1: No Poverty** by promoting sustainable income generation.



Figure 9.3 Documentation of community empowerment activities in Sinjai

Agusdiwana Suarni emphasized that financial management is key to increasing profitability, starting with basic household financial practices. Meanwhile, Dr. Sulaeman highlighted the dual role of businesses like BUANA Sinjai in generating profit and contributing to community welfare. This approach aligns with **SDG 8: Decent Work and Economic Growth**, as it supports job creation and sustainable business growth. Further, by promoting online marketing and social media outreach, the program contributes to **SDG 9: Industry, Innovation, and Infrastructure**, enabling BUANA Sinjai to reach a broader audience and increase product visibility.

Conducted in 16 sessions involving training, mentorship, and pre- and post-program evaluations, the PKM team observed significant improvements in MINAS product quality, bookkeeping practices, and marketing reach. Social media promotion and e-marketing have expanded BUANA Sinjai's visibility and strengthened its community impact, increasing turnover, creating jobs, and reducing poverty. Through ongoing community support, this program demonstrates how collaboration between academia, local organizations, and community partners can foster economic growth in Sinjai.

Impact on Medical Education and Medical Students' Attitudes, Practices, and Mental Health After One Year of the Covid-19 Pandemic in Indonesia



Research conducted by Turana Y, et al in 2022 examined the impact of the COVID-19 pandemic on medical education in Indonesia, especially after one year of the pandemic. This research focuses on how the pandemic has changed the way

medical students learn, mental health, and attitudes and practices. Using a survey method, this study involved 7,949 medical students from 49 medical faculties who are members of the Indonesian Association of Private Medical Faculties. The online questionnaire used in this study covers various aspects, such as educational status, experience in tele-education, ownership of electronic devices, availability of technology, educational methods, career plans, attitudes towards the pandemic, and mental health of respondents. The results obtained provide a comprehensive overview of the condition of medical education during the pandemic as well as the challenges faced by students.



Readiness and Obstacles in Online Learning

The study also identifies a number of important challenges faced during the online learning process. One of the main challenges is internet access. The uneven quality of the internet network in various regions of Indonesia is one of the barriers to the success of online learning. In addition, the type of supporting devices used by students is also a problem. Not all students have adequate devices to take online classes, which affects the quality of their learning. In addition to infrastructure, the pandemic also has an impact on the overall education program. This study found that 28.1% of students experienced financial problems during the pandemic. These financial difficulties not only affect the daily lives of students, but also cause 2.1% of

them to postpone their education. This problem is quite significant, considering that many college students have to work part-time to support their education costs, especially during the pandemic when family sources of income may be affected.

Mental Health and Its Impact

The pandemic not only affects education technically, but also has an impact on students' mental health. The study showed that about 40% of college students experienced symptoms of anxiety related to various problems over the course of several days, such as fear of contracting the virus, social isolation, and increasing academic pressure. In addition to anxiety, about one-third of college students admitted to feeling sad, depressed, and hopeless for some time day. This mental condition is very worrying, heavy and considering the academic burden and uncertain environmental conditions due to the pandemic. The pandemic has also affected the career plans of students and interests and medical of 34% of students reported that the pandemic had affected their interest in the medical profession, and the majority of them (52.2%) were worried that the pandemic would limit their opportunities to pursue a specialised education. These concerns are justified, given changes in the medical education system during the pandemic, including the delay of clinical education and restrictions on access to specialty training in hospitals.



SDG 3, which emphasizes health and well-being, is particularly relevant as the pandemic puts a huge strain on the mental health of medical students, who face academic burdens, psychological pressures, as well as changes in clinical education practices. **SDG 4**, quality education, is also closely related as the pandemic necessitates a drastic shift in the medical education system, with reduced hours of hands-on practice and the adoption of digital technologies for learning. This shift poses a challenge to the quality and completeness of medical student training which needs to be adjusted to high standards even though it is online. **SDG 9**, which focuses on innovation and infrastructure, is reflected in the rapid adaptation to digital learning technologies and medical simulations, which support the sustainability of medical education amid physical limitations. These innovations not only facilitate the continuity of medical training but also allow students to develop relevant skills in the context of increasingly advanced medical technology.

A PLS-SEM approach to understand ARCS, McClellands, and SDT for the motivational design of online learning system usage in higher education



The school garden initiative at the Indonesian School of the Hague (SIDH) strongly aligns with the objectives of SDG 4 as highlighted in the Times Higher Education Impact Rankings. This program, by incorporating natural and social sciences education within a practical garden setting, provides students with a holistic and active learning experience, moving beyond traditional classroom boundaries. Through hands-on gardening activities—such as planting, cultivating, and harvesting crops—students engage directly with concepts in biology, environmental science, and sustainable agriculture, thus deepening their understanding of natural sciences. Social science learning is enhanced as students interact, cooperate, and communicate, fostering essential life skills like teamwork, social responsibility, and respect for nature. This approach to education not only supports academic growth but also nurtures personal and social development, encouraging students to appreciate and contribute to sustainable practices. Furthermore, by emphasizing the role of sustainable food production and the economic value of agricultural practices, the garden project instills an early understanding of responsible consumption and environmental stewardship. SIDH's initiative exemplifies how integrating sustainable practices within educational programs can lead to a more inclusive, engaging, and impactful learning environment. By fostering critical thinking, environmental consciousness, and practical life skills, this school garden project directly supports the core principles of **SDG 4 (Quality Education)**, particularly in ensuring inclusive, equitable, and quality education that promotes lifelong learning. Through such initiatives, SIDH not only enhances its students' academic capabilities but also prepares them as environmentally aware citizens, aligned with the global educational impact goals set forth in the Times Higher Education Impact Rankings.



Figure 9.4 Result of the study

Beyond SDG 4, the article's insights align significantly with **SDG 9 (Industry, Innovation, and Infrastructure)** by promoting sustainable and innovative digital learning frameworks. By focusing on motivational models that enhance the adoption of online learning, the study emphasizes the need for resilient digital infrastructure in higher education, preparing institutions to adapt and innovate with advancing technology. This approach fosters robust educational systems that can withstand shifts, such as the increased demand for remote learning. Additionally, **SDG 10 (Reduced Inequalities)** is addressed through the potential of online learning to bridge access gaps, providing high-quality education to individuals who might face geographical or financial barriers in traditional educational settings. The article supports inclusive learning experiences, which is essential for reducing social and economic disparities. Furthermore, by equipping students with digital competencies that are highly relevant to modern job markets, the study indirectly advances **SDG 8 (Decent Work and Economic Growth)**. Well-motivated online learners are more likely to gain skills that enhance their employability, driving productivity and economic growth. Together, these SDGs highlight the study's broader impact on developing accessible, sustainable, and inclusive educational models that support societal progress and economic resilience

10 REDUCED INEQUALITIES



REDUCE INEQUALITY WITHIN AND AMONG COUNTRIES

Universitas Muhammadiyah Makassar is dedicated to SDG 10: Reduced Inequalities through initiatives that address social and economic disparities. Research on tax compliance highlights how improved tax services can enhance equitable revenue distribution, supporting fairer resource allocation for social welfare. Additionally, studies on migrant worker protection emphasize collaborative frameworks and policies to safeguard vulnerable populations across borders, reducing socioeconomic inequality. Further, literacy research underscores the need for balanced educational resources across regions, ensuring equal access to quality education. Through these initiatives, Universitas Muhammadiyah Makassar actively promotes SDG 10, advancing inclusive policies and research that empower marginalized communities and foster social equity.

The Distribution of Tax Collectability, Quality of Tax Services, and Efforts to Improve the Tax Coverage Ratio

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



The study titled "The Distribution of Tax Collectability, Quality of Tax Services Efforts to Tax Coverage Ratio" by Muh. Rum, Muryani Aarsal, Ansarif Khalid, and Murtiadi Awaluddin delves into the factors affecting tax collectability and the effectiveness of tax services in Indonesia. Recognizing Indonesia's lower tax-to-GDP ratio compared to neighboring countries, the researchers examine how the quality of tax services, along with tax audits and collection efforts, influences tax compliance and revenue in West Makassar's Primary Tax Service Office. By employing multiple linear regression analysis, the study finds that high-quality tax services and rigorous audits significantly improve tax compliance, fostering a culture of cooperation and trust between taxpayers and the government. The study also notes that while direct tax collection efforts have a positive impact, the quality of tax services is more influential in encouraging compliance and increasing the tax coverage ratio.

The contributions of this study align with **SDG 9: Industry, Innovation, and Infrastructure** by promoting the modernization of Indonesia's tax infrastructure. By enhancing the quality and efficiency of tax services, including innovations in tax auditing and collection, the study supports the development of a more accountable and resilient financial system. Such improvements in tax infrastructure are vital for economic stability and growth, as they contribute to sustainable revenue generation. Additionally, the research aligns with **SDG 10: Reduced Inequalities** by addressing the role of tax compliance in equitable revenue distribution. Improved tax compliance enables the government to mobilize resources for social services and welfare

programs, helping to reduce economic disparities across the population. Through fairer tax practices, the study supports the government's broader goal of reducing inequality by ensuring tax contributions are directed towards national development and public welfare.

Governing Migrant Workers Post-COVID-19 in Southeast Asia: Vulnerability, Mitigation and Transformative Agenda



Dr. Andi Luhur Prianto from Muhammadiyah University of Makassar and his team are addressing the vulnerability faced by migrant workers during the COVID-19 pandemic is one of the crucial issues to be discussed and opens the agenda for discussing the political economy. Hence, this paper aims to investigate the role of Southeast Asian countries in governing migrant workers in the Southeast Asian region during the COVID-19 pandemic and to analyses Southeast Asian countries' cooperation to consolidate transnational mitigation strategies to ensure the rights of migrant workers during the COVID-19 pandemic era. This article considers primary literature as well as secondary sources, such as news articles, reports from international organizations, and scientific studies.

The research finding shows that in the early days of the pandemic, Southeast Asian countries were cut off and failed to build solidarity in the south. Each country only focuses on mitigation at the domestic level, so it is not regionally integrated. The efforts of ASEAN member countries to overcome the impact of the pandemic on migrant workers can only be seen at the end of 2020 with the convening of the 13th ASEAN Forum on Migrant Labor (AFML) and the presence of the ASEAN Comprehensive Recovery Framework (ACRF). The AFML and ACRF guidelines serve as guidelines and frameworks for transnational mitigation strategies for the recovery of conditions in the Southeast Asian region in the post-COVID era.

A PLS-SEM approach to understand ARCS, McClellands, and SDT for the motivational design of online learning system usage in higher education



The school garden initiative at the Indonesian School of the Hague (SIDH) strongly aligns with the objectives of SDG 4 as highlighted in the Times Higher Education Impact Rankings. This program, by incorporating natural and social sciences education within a practical garden setting, provides students with a holistic and active learning experience, moving beyond traditional classroom boundaries. Through

hands-on gardening activities—such as planting, cultivating, and harvesting crops—students engage directly with concepts in biology, environmental science, and sustainable agriculture, thus deepening their understanding of natural sciences. Social science learning is enhanced as students interact, cooperate, and communicate, fostering essential life skills like teamwork, social responsibility, and respect for nature. This approach to education not only supports academic growth but also nurtures personal and social development, encouraging students to appreciate and contribute to sustainable practices. Furthermore, by emphasizing the role of sustainable food production and the economic value of agricultural practices, the garden project instills an early understanding of responsible consumption and environmental stewardship. SIDH's initiative exemplifies how integrating sustainable practices within educational programs can lead to a more inclusive, engaging, and impactful learning environment. By fostering critical thinking, environmental consciousness, and practical life skills, this school garden project directly supports the core principles of **SDG 4 (Quality Education)**, particularly in ensuring inclusive, equitable, and quality education that promotes lifelong learning. Through such initiatives, SIDH not only enhances its students' academic capabilities but also prepares them as environmentally aware citizens, aligned with the global educational impact goals set forth in the Times Higher Education Impact Rankings.



Figure 10.1 Result of the study

Beyond SDG 4, the article's insights align significantly with **SDG 9 (Industry, Innovation, and Infrastructure)** by promoting sustainable and innovative digital learning frameworks. By focusing on motivational models that enhance the adoption of online learning, the study emphasizes the need for resilient digital infrastructure in higher education, preparing institutions to adapt and innovate with advancing technology. This approach fosters robust educational systems that can withstand shifts, such as the increased demand for remote learning. Additionally, **SDG 10 (Reduced Inequalities)** is addressed through the potential of online learning to bridge access gaps, providing high-quality education to individuals who might face geographical or financial barriers in traditional educational settings. The article supports inclusive learning experiences, which is essential for reducing social and economic disparities. Furthermore, by equipping students with digital competencies that are highly relevant to modern job markets, the study indirectly advances **SDG 8**

(Decent Work and Economic Growth). Well-motivated online learners are more likely to gain skills that enhance their employability, driving productivity and economic growth. Together, these SDGs highlight the study's broader impact on developing accessible, sustainable, and inclusive educational models that support societal progress and economic resilience.

Design Model for Team-Based Projects Based on Digital Litigation in Learning Speaking



The study presented in the document develops a Team-Based Project model grounded in digital literacy to enhance students' speaking abilities in Indonesian Language and Literature Education. This aligns well with **SDG 4 (Quality Education)**, which emphasizes inclusive, equitable education and lifelong learning opportunities. By incorporating digital tools, the model equips students with skills essential in the 21st century, including digital literacy, critical thinking, collaboration, and effective communication. The integration of technology fosters a dynamic learning environment where students actively engage in discussions, problem-solving, and interactive presentations, thereby improving their academic performance and self-confidence. Furthermore, the team-based approach fosters an inclusive classroom, encouraging interaction and cooperation among diverse learners. This model not only responds to the increasing demand for digital competence in education but also prepares students for future professional roles that require effective communication and collaboration in digitally mediated environments. Hence, this educational model contributes significantly to SDG 4 by promoting quality education through innovative and inclusive teaching methodologies that prepare students for active participation in a digitalized world.

Table 10.1 Result of the study

Aspects of the Quality of the Learning Process Team Based Projects	Very good	Well	Enough
Asking activity	21,1%	47,4%	31,5%
Activeness in answering questions	21,1%	47,4%	31,5%
Liveliness responds to responses	23,7%	68,4%	8,9%
Activity doing tasks	23,7%	65,8%	15,5%
Activeness in presentations	15%	68,8%	17,2%
Active discussion in groups	34,2%	42,1%	26,7%
Student interaction in groups	18,5%	47,9%	33,6%
Ability to explain problem solving	21,1%	47,4%	31,5%
Active attention to explanations	18,4%	81,6%	0%
Timeliness in discussions	10,5%	86,8%	3,7%
Respect other people's opinions	21,1%	47,4%	31,5%

Apart from SDG 4, the article aligns closely with **SDG 9 (Industry, Innovation, and Infrastructure)** and **SDG 10 (Reduced Inequalities)**. The focus on digital literacy and technology integration in educational models reflects SDG 9's emphasis on fostering

innovation and building resilient infrastructure, particularly in education. By leveraging digital tools for learning, the model enhances students' technological adaptability, preparing them to participate effectively in a technology-driven world. Additionally, the team-based learning model encourages equal participation, addressing SDG 10 by fostering an inclusive environment where students from diverse backgrounds collaborate and benefit from equal learning opportunities. This inclusivity reduces educational disparities and supports equal access to quality learning resources, especially relevant in digital literacy contexts. Therefore, this model not only advances education quality but also promotes technological empowerment and equal opportunities, contributing significantly to broader social and economic resilience.

Do Gender and Regional Differences Affect Students' Reading Literacy? A Case Study in Indonesia



The study on gender and regional differences in students' reading literacy in Indonesia offers significant insights for advancing **SDG 4 (Quality Education)**. By examining the disparities in literacy across genders and regions, the research highlights areas needing targeted intervention, aligning closely with SDG 4's mission to ensure inclusive and equitable quality education. Addressing these disparities is crucial for promoting lifelong learning opportunities for all, as literacy skills are foundational to personal and academic growth. Furthermore, the findings of this study suggest the importance of policy adjustments and resource allocation in underperforming regions to bridge literacy gaps. Such actions can empower marginalized communities, contributing to a more inclusive educational landscape in Indonesia. Moreover, the gender analysis within the study emphasizes the need for gender-sensitive educational strategies that cater to the distinct learning needs of both male and female students. By focusing on these dimensions, the research not only addresses immediate literacy challenges but also underscores the long-term societal benefits of an educated and literate population. In line with the Times Higher Education (THE) Impact Rankings, which measure universities' progress toward SDGs, this study provides data-driven insights that universities can use to support initiatives and partnerships aimed at improving educational quality and accessibility.

Apart from SDG 4, the study on gender and regional differences in students' reading literacy in Indonesia also aligns with **SDG 5 (Gender Equality)** and **SDG 10 (Reduced Inequalities)**. The exploration of gender disparities directly speaks to SDG 5's goal of achieving gender equality by highlighting specific educational needs and challenges faced by male and female students, fostering awareness and actions that ensure gender-responsive teaching strategies. Additionally, the focus on regional disparities links closely with SDG 10, which seeks to reduce inequality within and among countries. By revealing literacy gaps across different regions, the study underscores the need for balanced educational resource distribution and tailored support for underrepresented areas. Addressing these inequalities through policy reform and

community-based initiatives can empower marginalized groups, promoting a more inclusive society where educational outcomes do not depend on location or gender, ultimately advancing these interconnected SDGs.

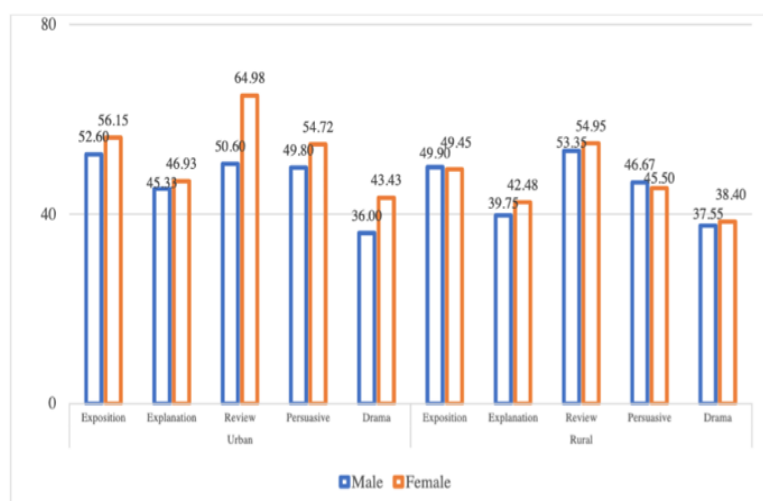


Figure 10.2 Students' reading literacy scores by gender

Governance and Protection of Indonesian Migrant Workers in Malaysia: A Study on Policy and Innovation Network



The study titled "Governance and Protection of Indonesian Migrant Workers in Malaysia: A Study on Policy and Innovation Network" by Andi Luhur Prianto, Aqmal Reza Amri, and Mohd Na'eim Ajis explores the collaborative efforts between Indonesia and Malaysia to improve the governance and protection of Indonesian migrant workers (IMWs) in Malaysia. The research investigates the role of policy networks and digital innovations, such as the "one channel system," an official recruitment mechanism established through a Memorandum of Understanding (MoU) between the two countries. This system aims to streamline recruitment processes, reduce exploitation, and enhance protection measures for migrant workers. However, the study identifies ongoing challenges in the implementation of these innovations, particularly within Malaysia, underscoring the complexities of cross-border labor governance and the critical need for sustained collaboration to safeguard the rights and welfare of IMWs.

The study contributes to **SDG 9: Industry, Innovation, and Infrastructure** by highlighting the use of digital innovation in the recruitment and management of migrant labor through the "one channel system." This system advances the industrial and digital infrastructure necessary to modernize labor management, creating a more secure, efficient recruitment process that prioritizes worker protection and aligns with

sustainable development goals. In support of **SDG 10: Reduced Inequalities**, the study addresses the vulnerabilities faced by Indonesian migrant workers and advocates for equitable policies that protect them from exploitation and discrimination. This focus on fair treatment and protective measures is essential in reducing socioeconomic inequalities, particularly for marginalized migrant populations.



Figure 10.3 The collaborative efforts between Indonesia and Malaysia to improve the governance and protection of Indonesian migrant workers (IMWs)

The research also aligns with **SDG 16: Peace, Justice, and Strong Institutions** by emphasizing the importance of robust governance and institutional accountability. The bilateral agreements and regulatory frameworks discussed in the study foster justice, transparency, and inclusivity in the treatment of migrant workers, ensuring that their rights are upheld through strong institutional support.

Finally, the study underscores the significance of **SDG 17: Partnerships for the Goals** by showcasing the importance of international collaboration between Indonesia and Malaysia. This partnership facilitates the development of a supportive network dedicated to addressing the protection and governance needs of migrant workers, demonstrating how cross-border cooperation can effectively promote labor rights and human dignity. Through these contributions, the study highlights the transformative potential of policy innovation and collaborative governance in addressing complex issues surrounding migrant labor.



Universitas Muhammadiyah Makassar actively supports SDG 11: Sustainable Cities and Communities through innovative research and community engagement. Studies on urban air quality, disaster management, and waste management demonstrate the university's commitment to creating resilient, livable cities. Research on particulate pollution in Makassar identifies key pollution sources, informing targeted interventions for cleaner urban air. Additionally, research on disaster-related traumatic brain injury (TBI) highlights the need for robust healthcare preparedness to improve community resilience. Community initiatives, such as waste bank programs in Makassar and Bantaeng, showcase collaborative efforts in sustainable waste management, fostering environmental awareness. Through these efforts, Universitas Muhammadiyah Makassar advances SDG 11, promoting inclusive, safe, and sustainable urban development.

An Intelligent Recommendation for Intelligently Accessible Charging Stations: Electronic Vehicle Charging to Support a Sustainable Smart Tourism City



A research team led by Jermsittiparsert at Universitas Muhammadiyah Makassar conducted a study titled “An Intelligent Recommendation for Intelligently Accessible Charging Stations: Electronic Vehicle Charging to Support a Sustainable Smart Tourism City.” This research addresses significant challenges, including inadequate electric vehicle (EV) charging infrastructure and the imbalanced spatial and temporal demand for charging. Utilizing the Spatio-Temporal Multi-Agent Reinforcement Learning (STMARL) framework, the study enhances the efficiency of public-accessible EV charging stations by significantly reducing wait times, costs, and failure rates compared to traditional random selection approaches. Figure 3 illustrates the implementation of an EV charging recommendation system based on the study's findings.

This research makes substantial contributions to multiple SDGs. First, it supports **SDG 7: Affordable and Clean Energy** by enhancing EV charging system efficiency, making clean energy solutions more accessible and cost-effective for urban and tourist transportation. The optimization of EV charging station locations and operations minimizes energy wastage and encourages renewable energy utilization in the transportation sector. In alignment with **SDG 11: Sustainable Cities and Communities**, this study contributes to the development of smart and sustainable urban areas. By integrating intelligent EV charging infrastructure, particularly in tourist cities like

(a)

(b)

Moreover, this research supports **SDG 12: Responsible Consumption and Production** by advocating for responsible and efficient energy consumption. The intelligent charging system ensures optimal use of energy resources, reducing overconsumption and advancing sustainability in urban energy production and consumption cycles. Aligning with **SDG 13: Climate Action**, the study contributes to efforts in mitigating climate change by promoting EV adoption, which decreases greenhouse gas emissions and air pollution. The STMARL framework optimizes charging station operations, minimizing energy loss and reducing carbon emissions. Additionally, this work aligns with **SDG 17: Partnerships for the Goals** by emphasizing collaboration among local governments, tourism authorities, and energy providers. These partnerships are essential for advancing clean energy initiatives and establishing resilient urban systems that support long-term sustainability.

Implementation of PM10 Source Apportionment using Positive Matrix Factorization in Urban Area of Makassar



Zulkifli M and his team conducted a study titled “Implementation of PM10 Source Apportionment using Positive Matrix Factorization in the Urban Area of Makassar”. The study focused on airborne particulate matter (PM10) collected bi-monthly from October 2021 to July 2022 in the Andi Pangeran Pettarani area, a mixed commercial and residential zone in Makassar, South Sulawesi. Using a size-selective high-volume air sampler, the research analyzed 15 elements, including black carbon, aluminum, chromium, and zinc. Applying the Positive Matrix Factorization (PMF) technique, the study identified six key sources of air pollution: marine (25%), motor vehicles (24%), road dust (16%), soil dust (13%), industry (12%), and biomass burning (10%). The findings emphasize the need for effective air quality management, pollution control measures, and multi-sectoral collaboration to enhance urban air quality, ensuring a healthier environment and sustainable urban development.

This research directly supports **SDG 11: Sustainable Cities and Communities** by providing critical insights into air pollution sources in Makassar, highlighting the need for targeted air quality management and pollution control. Understanding the specific sources of PM10 allows for tailored interventions to reduce pollution levels, contributing to cleaner, healthier urban environments. By identifying high-impact sources like motor vehicles and industrial emissions, the study underscores the importance of multi-sectoral collaboration and policy intervention in urban planning and environmental management. This approach aligns with the goals of SDG 11, which seeks to make cities inclusive, safe, resilient, and sustainable. The study’s findings can guide local authorities in implementing strategic pollution reduction measures to improve urban air quality and public health.

Mapping the Environmental Education Policies for the Youth to Encourage Rural Development and to Reduce Urbanisation: Econometric Approach



Hasan and his team conducted a study titled “Mapping the Environmental Education Policies for the Youth to Encourage Rural Development and to Reduce Urbanisation: An Econometric Approach”. The study addresses the significant environmental impacts of urbanisation, rural development, climate change, and population growth on sustainability, especially in rural areas of Indonesia. It emphasizes the role of environmental education in encouraging youth to focus on rural development and sustainable practices as a strategy to slow down urban migration. Using a knowledge-based framework, the research applied regression and bootstrap analysis to data from 227 provinces in Indonesia and Malaysia. Results indicate that ecologically friendly education among young executives fosters environmental awareness and sustainable managerial practices, mediating the relationship between education and urbanisation.

while positively moderating the impact of ecological challenges. This research underscores the importance of youth-centered environmental education as a critical driver for promoting rural sustainability, reducing urbanisation, and achieving broader sustainable development.

The contributions of this study are closely aligned with **SDG 11: Sustainable Cities and Communities**, as it promotes environmental education to encourage youth to support rural development. This focus reduces migration pressures on urban centers, promoting balanced, sustainable communities across urban and rural settings. Additionally, the study aligns with **SDG 12: Responsible Consumption and Production** by encouraging environmentally responsible practices among young people, fostering rural resilience through sustainable approaches to resource use.

The study also supports **SDG 13: Climate Action** by advocating for climate-conscious education policies that equip youth with the knowledge and motivation to address environmental challenges. By empowering young people to adopt sustainable practices, the study highlights a proactive approach to reducing the ecological footprint associated with urban migration. Furthermore, by collecting data from Indonesia and Malaysia, this research exemplifies **SDG 17: Partnerships for the Goals** through cross-border collaboration in tackling shared environmental issues. The study underscores how cooperative policy efforts between nations can drive sustainable development, demonstrating the power of regional partnerships in achieving environmental goals. Through these insights, the research offers a comprehensive approach to enhancing rural development and sustainability through youth-driven, knowledge-based policies.

Mitigation and adaptation of landslip disasters



Darwis Panguriseng from Universitas Muhammadiyah Makassar conducted research on "Mitigation and Adaptation of Landslip Disasters." He emphasizes that contrary to common belief, mitigation is not limited to post-disaster efforts, while adaptation is often overlooked altogether. In his view, disaster mitigation aims to minimize risk, whereas adaptation seeks to enhance the resilience of communities and the environment in disaster-prone areas, thereby preventing disasters. Landslides, a frequent occurrence in Indonesia during the rainy season, cause substantial property damage and sometimes result in casualties. The study underscores the need for consistent government-led mitigation measures, with the guiding principle that "prevention is better than counteraction," as it is more cost-effective and prevents casualties. Simultaneously, community-led adaptation efforts should focus on maintaining and improving slope stability. Effective adaptation requires widespread community understanding of factors affecting slopes, fostering awareness, participation, and proactive actions that enhance resilience and prevent landslides.

This research contributes to **SDG 11: Sustainable Cities and Communities** by promoting strategies that enhance the safety and resilience of communities prone to landslides. By advocating for preventive and adaptive actions, the study aligns with the goal of building cities and communities that are prepared to handle environmental risks. Additionally, the study supports **SDG 17: Partnerships for the Goals** by highlighting the need for collaborative efforts between government agencies and local communities. Panguriseng's work emphasizes that effective landslide management depends on strong partnerships, with both governmental support and active community involvement playing essential roles in sustainable disaster preparedness and response.

Synchronization of SDGs in the Concept of Waterfront Settlements in Makassar City

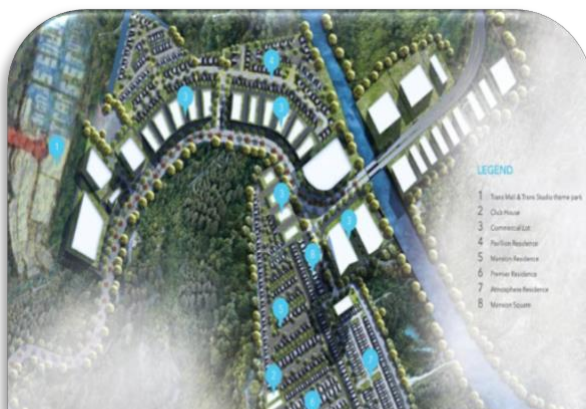


Figure 11.2 Waterfront Concept

This research conducted by Amalia A.A in 2023, highlights major challenges in achieving sustainable development goals in Makassar City, especially related to waterfront settlements. Along with the global agenda of the SDGs 2030 which prioritizes universal, integrated, and inclusive principles to ensure that no one is left behind, Makassar City is faced with the problem of slum areas that are still quite significant. Based on 2018 data, there are around 650.74 hectares of slum areas that have not been addressed, with the majority of the concentration being along the coastline or waterfront. The main problems found in settlements on the waterfront of Makassar City include seawater intrusion and sedimentation that occurs in household rainwater drains, as well

as the lack of access to drinking water and sanitation for low-income people (MBR). In addition, uninhabitable housing conditions are also a concern. This phenomenon is a big challenge for Makassar City to be able to meet the SDGs targets, especially in terms of access to clean water, sanitation, and decent housing for the entire community. The results of the study show that the distribution of slums in Makassar City which are located in waterfront settlements has a certain pattern that is closely related to the economic condition of the surrounding community, accessibility to basic infrastructure, and environmental quality. These slums tend to suffer from problems of low building resilience, inadequate building area, and insufficient access to drinking water and sanitation. In addition, seawater intrusion that occurs due to the geographical location of settlements located on the coastline adds to the challenge in creating decent and safe housing for the community.

The concept of waterfront villages based on the achievement of the SDGs must meet the criteria for decent housing, ranging from building resilience, adequacy of residential area, to access to sanitation and drinking water. **SDG 6**, which focuses on

access to clean water and sanitation, is relevant in the development of waterfront settlements because the region must ensure sustainable water management, including the provision of clean water and environmentally friendly sanitation systems. The concept of this waterfront settlement is also in line with **SDG 11**, namely inclusive, safe, resilient, and sustainable cities and settlements. Settlement designs that are integrated with coastal ecosystems support sustainability, by minimizing flood risk, maintaining environmental quality, and providing inclusive access for all community groups. **SDG 17**, a partnership to achieve the goals, is an important foundation in realizing this concept, as sustainable waterfront development requires collaboration between governments, the private sector, local communities, and international institutions to share knowledge, technology, and resources. With this synchronization, the concept of waterfront settlements in Makassar City not only supports water and sanitation management and coastal area security, but also strengthens the partnership network for sustainable development.

Effect of Flow Speed on Concrete Wings on Bridge Pillars Using iRIC Nays2HD 3.0 Software



The research entitled "Effect of Flow Speed on Concrete Wings on Bridge Pillars Using iRIC Nays2HD 3.0 Software" conducted by Nenny in 2022. This study examines the influence of flow velocity around concrete wings on bridge pillars to reduce erosion or scouring. Scouring, or erosion that occurs around the bridge pillars due to water flow, is a serious problem that can threaten the stability of the bridge structure. Therefore, this study uses the Nays2HD 3.0 version of iRIC (International River Interface Cooperative) software to analyze the flow velocity around the bridge pillars before and after the installation of concrete wing curtains as an effort to mitigate scouring.

Ground Channel Model

This study uses a soil channel model with a trapezoidal cross-section that includes a cylindrical pillar model and concrete wings as simulation objects. The observed parameters include flow discharge (Q), flow velocity (v), flow depth (h), and erosion depth elevation (ds) at each time interval. Through this simulation, the results were obtained that the lowest and highest flow velocities recorded were 0.000 m/s and 0.998 m/s, respectively. The flow velocity around the bridge pillars and concrete wings is relatively small after the change in flow direction caused by the presence of concrete wings. This suggests that the presence of concrete wings has a significant effect in reducing flow velocity, which in turn helps to reduce the rate of scouring around the bridge pillars.

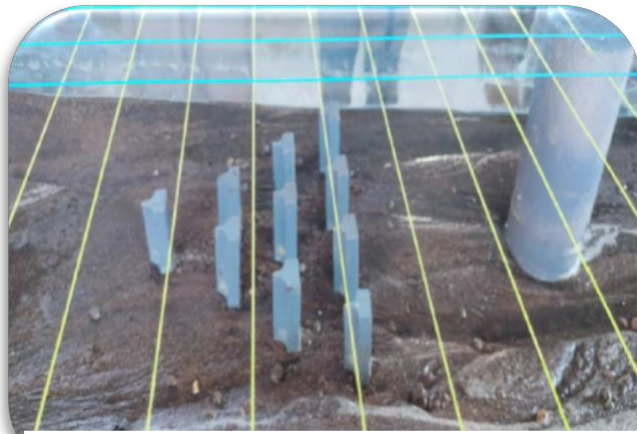


Figure 11.3 Ground Channel Model

One of the key findings of this simulation is that the scouring or erosion around the bridge pillars tends to be smaller after the presence of concrete wings placed in front of the pillars. The change in direction and decrease in flow speed caused by concrete wing curtains provide additional protection to the bridge pillars from the erosive impact of water flow. This shows that the method of using concrete wing curtains can be an effective solution in the management of erosion around the bridge structure.

iRIC Nays2HD 3.0 software

In the validation stage, the results of the analysis of the iRIC Nays2DH 3.0 software simulation are compared with the physical model at the flow rate output (ms^{-1}). The validation results showed a relatively small difference, namely 4.61%, which was considered insignificant. This indicates that the iRIC Nays2HD 3.0 software is able to provide simulation results that are close to the actual physical conditions, making it reliable in the study or analysis of flow velocity and scouring around the bridge pillars.

Through the use of these simulation technologies, we can support the development of safe, This study shows that the application of concrete wing curtains on bridge pillars is effective in reducing the speed of flow passing through the pillar area, so that it can significantly reduce the level of erosion or scouring around the structure. The use of iRIC Nays2HD 3.0 in this analysis also provides adequate accuracy, making it an effective tool in studies related to scouring mitigation in the bridge pillar area. With this study, it is hoped that the method of using concrete wing curtains can be applied more widely to extend the life and improve the stability of bridges in areas with high erosion potential. **SDG 6**, which supports access to clean water and sanitation, is relevant because understanding the influence of flow velocity on bridge structures helps ensure the stability of bridges in maintaining the quality of the waters that cross the area and preventing sedimentation or erosion that can damage aquatic ecosystems. **SDG 9**, which focuses on infrastructure and innovation, is closely related because the simulation of iRIC Nays2HD 3.0 software allows for more precise engineering in designing resilient bridges, with a better understanding of the interaction of water flows and structures. **SDG 11**, which leads to sustainable cities and settlements, is connected through efforts to create safe and resilient infrastructure in urban environments, so that bridges are able to withstand extreme currents and maintain connectivity and safety of the surrounding community. Finally, **SDG 13**, action on climate change, is critical because climate change affects increasingly unpredictable river flow patterns, so understanding the interaction of streams and bridge structures allows for more climate-responsive infrastructure adaptation efficient, and sustainable infrastructure, which adapts to increasingly complex environmental and climate challenges.

The epidemiology, management, and outcomes of traumatic brain injury in man-made and natural disasters: A systematic review



Wahyudi and his team conducted a systematic review on "The Epidemiology, Management, and Outcomes of Traumatic Brain Injury (TBI) in Man-Made and Natural Disasters.". This review emphasizes the critical need for effective acute management and post-hospital rehabilitation of TBI in disaster settings. Adhering to PRISMA guidelines, the study reviewed literature on the epidemiology, prevention, management, and rehabilitation of TBI in single-event disasters. Out of 275 identified studies, six met the criteria, with four addressing natural disasters and two focusing on man-made events, accounting for 5,461 TBI cases. Mild TBI constituted the majority (42.62%), while severe TBIs were associated with 11 fatalities (7.59%). However, only 13.16% of TBI patients received rehabilitation services, highlighting a critical gap in post-disaster care. The findings underscore the urgent need for integrated trauma care systems that include early rehabilitation planning to improve long-term outcomes for disaster-related TBI. This study reveals the significant medical, economic, and societal burdens of TBI, emphasizing the importance of preparedness and awareness among healthcare professionals and communities to effectively manage TBIs in disaster scenarios.

This study supports **SDG 11** by advocating for improved disaster preparedness and resilient healthcare systems that can manage TBIs effectively. It stresses the importance of a structured approach to trauma care that integrates acute treatment and rehabilitation, ensuring that communities are better equipped to handle health impacts from disasters. By addressing critical gaps in TBI care, this research promotes safer, more resilient urban and rural communities, aligning with SDG 11's goal of building sustainable and disaster-prepared cities.

Waste Bank Policy Implementation through Collaborative Approach: Comparative Study in Makassar and Bantaeng, Indonesia



The study "Waste Bank Policy Implementation through Collaborative Approach: Comparative Study in Makassar and Bantaeng, Indonesia" examines the dynamics and challenges of waste management through waste banks, a community-based waste management initiative. Authors Fatmawati, Mustari, Haerana, Niswaty, and Abdillah from Universitas Muhammadiyah Makassar conducted a qualitative analysis comparing Makassar City and Bantaeng Regency. This research focuses on collaborative governance and policy implementation involving local

governments, private sectors, and community members. Data was collected via interviews, field observations, and analyzed with NVivo software, identifying key factors that affect waste bank effectiveness, such as stakeholder communication and community engagement.

Findings indicate that while the waste bank programs provide economic and environmental benefits by converting waste into reusable resources, they face challenges like insufficient community participation and communication gaps among stakeholders. In Makassar, the waste bank program has been more established, yet Bantaeng's initiatives are gaining traction through support from government and private partnerships. The study recommends strengthening collaborative efforts and enhancing public awareness to optimize waste management systems, encouraging a culture of sustainability in urban and rural areas alike.

This study contributes to **SDG 11** by showing how waste banks create cleaner, more sustainable urban environments. Through efficient waste management, these programs help reduce landfill dependency, fostering healthier and more livable communities. Waste banks also support **SDG 12** by encouraging recycling and resource efficiency, turning waste into valuable resources and promoting sustainable consumption habits within the community. The collaborative approach of the waste bank program aligns with **SDG 16**, advancing transparency and inclusivity in waste management policies. By involving local governments, private sectors, and community members, the program builds trust and accountability within public institutions. Emphasizing the role of partnerships, the study supports **SDG 17** by demonstrating how multi-stakeholder collaboration can drive environmental sustainability. By uniting efforts across government, business, and NGOs, the waste bank model showcases how effective partnerships can address complex environmental challenges.

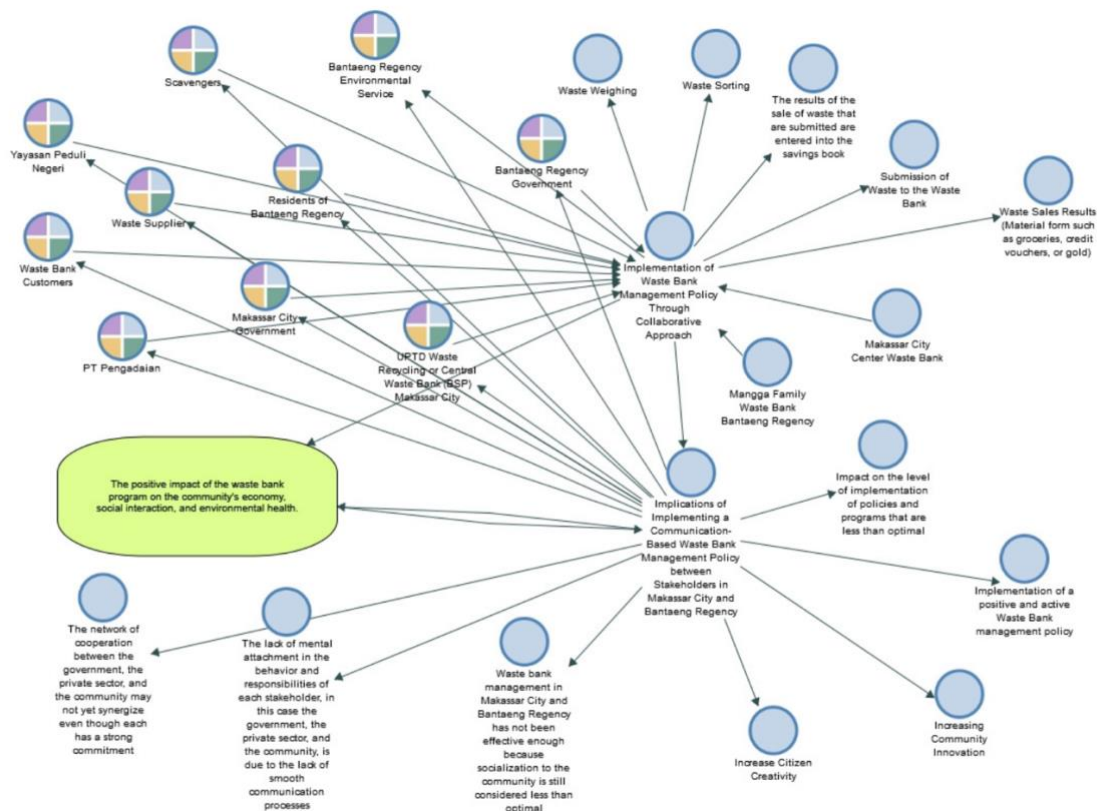


Figure 11.4 Implications of implementing waste bank policy in Makassar City and Bantaeng Regency



ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS

The 12th goal of the SDGs is to ensure sustainable consumption and production patterns. To achieve economic growth and sustainable development, production and consumption efforts that align with the SDGs must be prioritized. Efficient management of shared natural resources and safe methods for disposing of toxic waste and pollutants are key focuses of this goal. Universitas Muhammadiyah Makassar plays an important role in achieving SDG 12 through its research activities, community service, and collaboration with various stakeholders. The university's programs aim to promote responsible resource utilization, reduce negative environmental impacts, and increase public awareness of the importance of environmental sustainability. Through this collaborative approach, Universitas Muhammadiyah Makassar contributes to sustainable development that emphasizes not only economic growth but also environmental preservation.

Determinants of Animal Food Demand in The Urban Region South Sulawesi



The study titled "**Determinants of Animal Food Demand in the Urban Region of South Sulawesi**" by Darmawaty, Sri Mardiyati, and Mohammad Natsir examines the factors influencing demand for animal-based food products, including beef, chicken, eggs, and fish, in urban areas of South Sulawesi. Using secondary time-series data from 2005 to 2020, the researchers analyzed trends in animal food consumption and identified economic determinants that impact demand. The results showed that animal food consumption in urban areas increased by 9.78 grams per capita per month over the study period, with fish being the most consumed product. Key determinants affecting demand included per capita expenditure, chicken meat prices, and fish prices. Specifically, a 1% increase in per capita expenditure led to a 1.58% increase in demand, while increases in the prices of chicken meat and fish resulted in decreases in demand by 0.43% and 2.12%, respectively.

This research contributes to **SDG 2: Zero Hunger** by offering insights into food security dynamics in urban areas. Understanding the economic determinants of demand for nutrient-rich animal foods helps policymakers create strategies that ensure access to essential protein sources, which are critical for addressing malnutrition and hunger. In relation to **SDG 8: Decent Work and Economic Growth**, the study's analysis of consumer spending on animal foods highlights opportunities to strengthen food accessibility and affordability. Rising demand for animal-based protein not only fosters a healthier population but also creates potential economic benefits across supply chains, from agriculture to retail.

Moreover, the study supports **SDG 12: Responsible Consumption and Production** by examining how price fluctuations impact consumption. This information is valuable for producers seeking to align their output with consumer demand, minimizing waste and promoting sustainable practices in the production of animal food products.

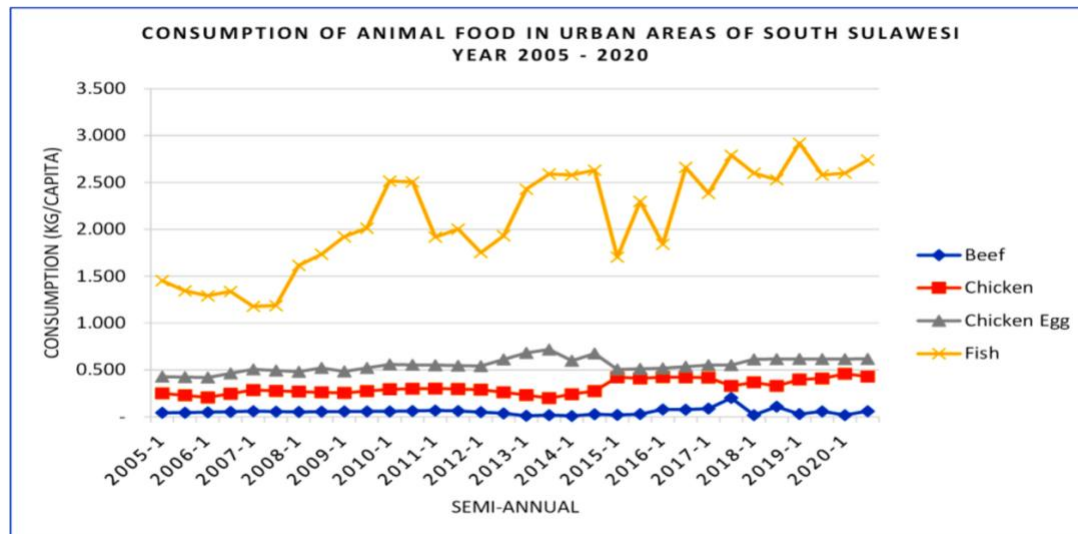


Figure 12.1 Animal Food Consumption in South Sulawesi Urban Areas

Social Capital and Community Empowerment: Towards Sustainable Agriculture



Syafiuddin Saleh and his team conducted research on the role of social capital in community empowerment toward sustainable agriculture. Using qualitative research methods with tools like Nvivo 12 Plus, the study identifies how different forms of social capital—bonding, bridging, and linking—are mobilized by bureaucratic and entrepreneurial actors to support the transformation toward organic farming. Their study highlights that both essential and supporting forms of social capital are crucial in empowering organic farmers, with bureaucratic and entrepreneurial actors playing key roles. Essential social capital drives bonding among farmers, strengthened by knowledge exchange and work motivation, while supporting social capital aids through linking, facilitated by price certainty and product certification. Bridging social capital is further enhanced through consistent problem-solving. Collectively, these forms of social capital foster community empowerment, improve agricultural productivity, ensure fair market access, and strengthen institutional partnerships, making social capital both foundational and catalytic for sustainable agricultural development. The study underscores that building strong networks and collaborative efforts is essential for achieving sustainable practices and long-term development across agricultural sectors.

This study's contributions align with several SDGs. It directly supports **SDG 2: Zero Hunger** by promoting sustainable food production practices that improve soil fertility and crop resilience without relying on synthetic chemicals. This approach enhances food security and contributes to healthier food systems, which are essential for reducing hunger and supporting community resilience. In addition, by improving the market viability of organic farming, the study contributes to **SDG 8: Decent Work and Economic Growth**. The emphasis on high-value organic products provides farmers with sustainable income sources, fostering economic empowerment and decent work in rural areas.

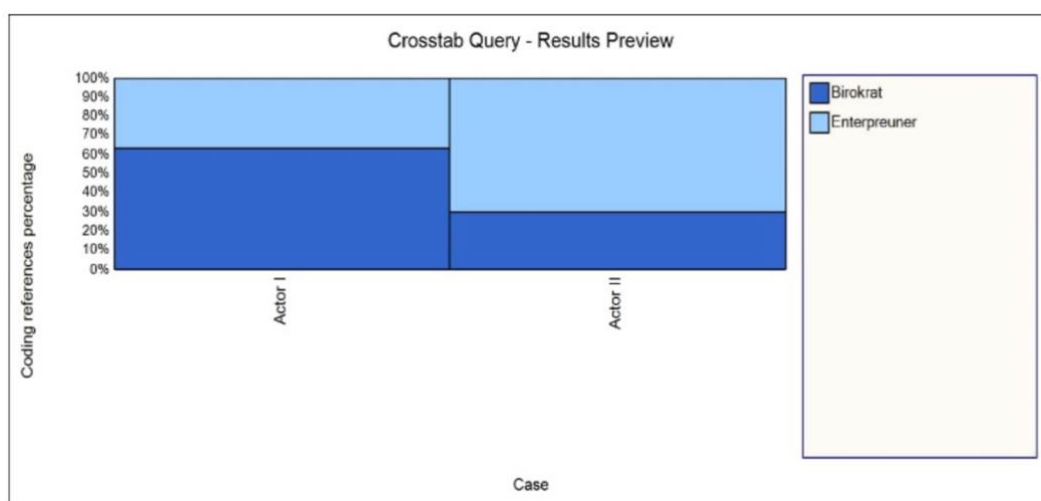


Figure 12.2. Percentage of Bureaucrat Actors and Entrepreneurial Actors

The study's focus on organic farming also supports **SDG 12**, encouraging agricultural practices that minimize environmental impact through reduced chemical dependency. This sustainable approach promotes resource efficiency and aligns with responsible production goals. Furthermore, through its collaboration with government agencies and agricultural extension services, the research advances **SDG 16** by building robust community networks and reinforcing governance structures that ensure fair access to resources and information for farmers. Finally, the study highlights the significance of partnerships in achieving sustainable agriculture, aligning with **SDG 17: Partnerships for the Goals**. The cooperation between government entities, local communities, and entrepreneurs exemplifies the collective effort needed to support sustainable agricultural transformation. By demonstrating the power of social capital in empowering organic farmers, the study provides valuable insights into the role of community-driven initiatives in achieving sustainable development goals.

Enhancing the Economic Prosperity of Seaweed Farmers in Takalar through a Seaweed Product Diversification Program



The program, led by A. Nur Fitrianti and her team from Universitas Muhammadiyah Makassar, aims to enhance the knowledge and skills of seaweed farmers in creating value-added products, including seaweed chips, sushi, and soap. This initiative not only targets product diversification but also emphasizes business management and marketing, which are crucial for farmers to succeed in a competitive market. The program, in collaboration with Muhammadiyah Takalar Youth and local community partners, involves structured sessions featuring lectures, demonstrations, and hands-on mentoring. Preparations include setting up appropriate locations, gathering tools and materials, and conducting counseling and training on product manufacturing processes. An evaluation follows to gauge the effectiveness of these activities.

The program has demonstrated significant success, with 90% of participants expressing satisfaction and noting improvements in their skills. Through training, participants learned to transform seaweed into high-fiber chips, visually appealing sushi, and soap that supports skin health. These sessions not only provided technical skills in processing seaweed but also soft skills in business and marketing, helping participants better understand the market benefits of product diversification and gain the confidence to manage their businesses independently.



Figure 12.3 Documentation of community empowerment activities in Takalar

Aligned with **SDG 1: No Poverty**, this program offers a sustainable income pathway for seaweed farmers, enabling them to maximize the economic potential of locally available resources. Additionally, the initiative supports **SDG 8: Decent Work and Economic Growth** by fostering entrepreneurship, creating local employment opportunities, and building a skilled workforce. By encouraging the efficient use of resources, the program also resonates with **SDG 12: Responsible Consumption and Production**. The results highlight the value of collaboration among academics, community members, and local organizations in unlocking economic potential based on local resources. Through continued support and mentorship, the seaweed farmers

of Takalar are expected to thrive in their businesses, strengthening both their economic resilience and competitiveness in an increasingly dynamic market.

A Review of the Potential Health Benefits of *Nigella sativa* on Obesity and Its Associated Complications



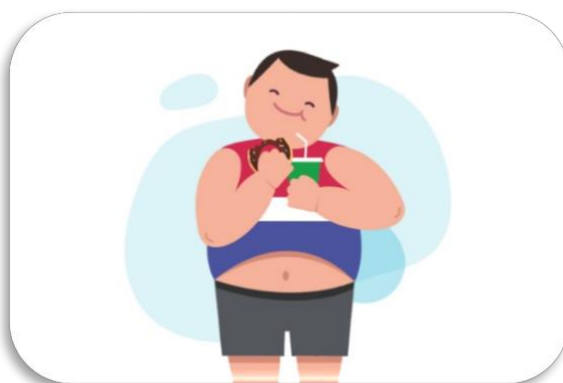
Research by Adam S.H, et al. in 2023 discusses obesity which is currently a global health problem and continues to increase with a very alarming prevalence rate. Obesity is not only an aesthetic disorder, but a serious condition that contributes

greatly to the emergence of various comorbidities, such as type 2 diabetes, stroke, cardiovascular disease, and even cancer. This condition leads to higher morbidity and mortality rates, making it a top priority in the world of health.

Obesity and Its Complications

Obesity is considered one of the main risk factors for the development of various metabolic diseases. In this study, Adam S.H, et al. highlighted that the prevalence of obesity continues to increase globally, which ultimately increases the risk of other comorbidities. Although efforts to manage obesity through conventional methods such as dietary changes, increased physical activity, and the use of certain medications have been pursued for a long time, the results obtained are often

unsatisfactory. The study noted that conventional methods for treating obesity are often limited in their effectiveness and often cause unwanted side effects. For example, strict dietary interventions are often difficult to adhere to in the long term, while weight loss medications sometimes have side effects such as indigestion, increased heart rate, and insomnia.



Nigella sativa as an Alternative Therapy

Nigella sativa (NS), also known by the name black cumin, is a medicinal plant that has been used in traditional medicine for centuries. In recent decades, NS has begun to gain scientific attention due to its various pharmacological properties, including antidiabetic, anti-inflammatory, antimicrobial, and antioxidant activities. This study highlights the potential of NS as a supportive or complementary therapy in the treatment of obesity and its associated complications.

Mechanism of Action of *Nigella sativa* in the Treatment of Obesity

Some of the active components in NS, such as **thymoquinone**, have excellent potential in helping regulate fat and glucose metabolism, which is especially important in the context of obesity. Thymoquinone is known to have powerful antioxidant effects, which can reduce oxidative stress and chronic inflammation, two of the main mechanisms underlying the development of obesity and its complications. The study further discusses the mechanism behind the potential of *Nigella sativa* in the treatment of obesity.



Figure 12.4 *Nigella* Images

Thymoquinone, as one of the main components in NS, has been shown

to act on several metabolic pathways related to fat regulation and energy metabolism. Some of these mechanisms include regulating the expression of genes involved in fat formation and energy use, as well as a reduction in the production of free radicals that can damage tissues and worsen obesity. Thymoquinone also plays a role in lowering the production of pro-inflammatory cytokines, such as TNF- α and IL-6, which are often increased in obese people. By lowering levels of these cytokines, NS may help reduce chronic inflammation associated with obesity and other metabolic diseases.

SDG 2, which focuses on ending hunger and improving nutrition, is relevant because *Nigella sativa* (black cumin) can play a role in the treatment of obesity and support healthier diets, helping to prevent health complications arising from malnutrition and overweight. **SDG 3**, health and well-being, is directly related because research on *Nigella sativa* offers a more natural and potentially low-side treatment alternative for people with obesity, helping to improve public health and reduce the risk of chronic diseases such as diabetes and hypertension. In addition, **SDG 12**, responsible consumption and production, is also relevant in this context because the use of *Nigella sativa* as a natural ingredient can support a more sustainable and environmentally friendly treatment approach than synthetic drugs, by reducing dependence on chemically intensive resources. The potential of *Nigella sativa* as a natural solution to obesity not only supports individual health but also contributes to food security, resource management, and health system sustainability.

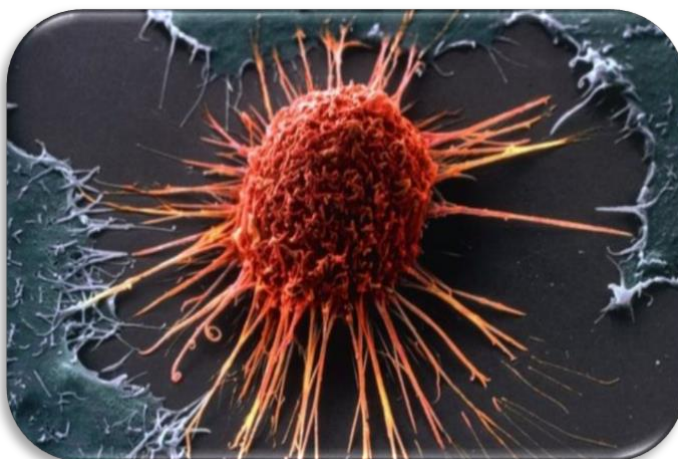
Lipid-Based Nanomaterials for Drug Delivery Systems in Breast Cancer Therapy

Research by Rethi L, et al. in 2022 discussed the potential of lipid-based nanomaterials as drug delivery systems in breast cancer therapy. Breast cancer is one of the most common diseases worldwide, and poses a serious threat to human health, especially for women. Although many therapies have been developed for breast cancer, these treatments are often faced with challenges such as adverse side effects, lack of specificity against cancer cells, and inability to achieve effective optimal doses.

Therefore, research on lipid nanomaterial-based drug delivery systems is the main focus in efforts to overcome this problem and improve the effectiveness of breast cancer treatment.

Breast Cancer and Its Challenges in Therapy

Breast cancer is the most common type of cancer among women and is the leading cause of cancer death in women worldwide. This cancer occurs when breast cells begin to grow out of control and can spread to surrounding tissues or even to other parts of the body (metastasis). Different types of therapies have been developed to treat breast cancer, including surgery, chemotherapy, radiation therapy, and hormone therapy.



Lipid-Based Nanomaterials as Drug Delivery Systems

Lipid-based nanomaterials have a variety of advantages that make them ideal candidates as drug delivery systems in cancer therapy. Lipids are biological molecules that can be found naturally in the body, so they are biocompatible and have **low toxicity**. This allows lipids to be used as drug delivery without triggering an adverse immune response or causing serious side effects.

Lipid-Based Drug Delivery Mechanism

Lipid-based nanomaterials work by combining drug molecules into lipids, which then form tiny particles called liposomes or solid lipid nanoparticles (SLNs). Liposomes have the ability to fuse with the target cell membrane and release the drug directly into the cell, increasing the concentration of the drug on the desired area. In addition, liposomes can be modified with ligands that allow them to recognize and target cancer cells specifically. The study also highlights the role **of conjugation** in lipid-based drug delivery systems. Conjugation is the process of binding an active molecule (such as an antibody or peptide) to the surface of a liposome, so that liposomes can actively target specific receptors that are only present in cancer cells. Thus, these modified liposomes can be directed directly at the tumour and release the drug in a controlled manner. **SDG 3**, which emphasizes health and well-being, is relevant because lipid-based nanomaterial technology enables more effective and targeted drug delivery in

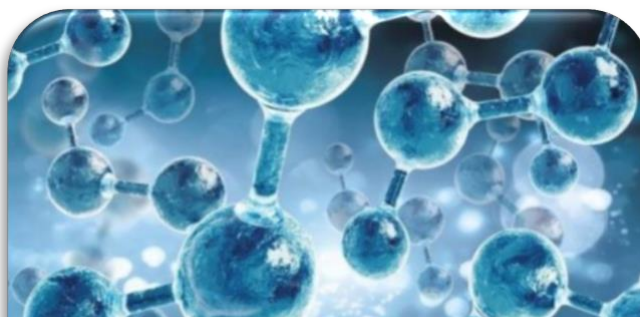


Figure 12.5 Lipids

breast cancer therapy, reducing side effects as well as improving patients' quality of life. This innovation promises to improve the results of more personalized and efficient therapy, supporting women's health in particular. **SDG 12**, responsible consumption and production, is reflected in the use of lipid-based materials that are more environmentally friendly compared to synthetic chemicals, and this approach can reduce pharmaceutical waste and carbon emissions in the drug production process. Lastly, **SDG 17**, a partnership to achieve the goals, is an important cornerstone in the development and application of this drug delivery technology, which requires collaboration between scientists, the pharmaceutical industry, and health institutions. This collaboration allows scientific advances to be translated into health solutions that are widely accessible to the public. Thus, lipid-based nanomaterials for breast cancer therapy not only support patient health but also advance sustainability and collaboration in medical research.

Natural sciences and social sciences learning in school garden, Indonesian School of the Hague, Netherlands



The school garden initiative at the Indonesian School of the Hague (SIDH) strongly aligns with the objectives of **SDG 4 (Quality Education)** as highlighted in the Times Higher Education Impact Rankings. This program, by incorporating natural and social sciences education within a practical garden setting, provides students with a holistic and active learning experience, moving beyond traditional classroom boundaries. Through hands-on gardening activities—such as planting, cultivating, and harvesting crops—students engage directly with concepts in biology, environmental science, and sustainable agriculture, thus deepening their understanding of natural sciences. Social science learning is enhanced as students interact, cooperate, and communicate, fostering essential life skills like teamwork, social responsibility, and respect for nature. This approach to education not only supports academic growth but also nurtures personal and social development, encouraging students to appreciate and contribute to sustainable practices. Furthermore, by emphasizing the role of sustainable food production and the economic value of agricultural practices, the garden project installs an early understanding of responsible consumption and environmental stewardship. SIDH's initiative exemplifies how integrating sustainable practices within educational programs can lead to a more inclusive, engaging, and impactful learning environment. By fostering critical thinking, environmental consciousness, and practical life skills, this school garden project directly supports the core principles of SDG 4, particularly in ensuring inclusive, equitable, and quality education that promotes lifelong learning. Through such initiatives, SIDH not only enhances its students' academic capabilities but also prepares them as environmentally aware citizens, aligned with the global educational impact goals set forth in the Times Higher Education Impact Rankings.

The school garden program at the Indonesian School of the Hague (SIDH) aligns with several key SDGs. By providing quality education through hands-on learning in the garden, this program supports SDG 4 as it actively engages students in exploring natural and social sciences in an engaging and immersive way. The program also promotes **SDG 2 (Zero Hunger)** by introducing sustainable agriculture practices and raising awareness of food security and nutrition, teaching students the value of responsible food production. Gardening activities contribute to **SDG 3 (Good Health and Well-being)** by enhancing students' physical and mental well-being through outdoor activities and a deeper understanding of the importance of nutritious food. Additionally, the program supports **SDG 12 (Responsible Consumption and Production)** by instilling sustainable consumption practices and reducing food waste, which students can apply in their daily lives. Finally, the program aligns with **SDG 15 (Life on Land)** as students learn about biodiversity and the importance of environmental conservation through plant care and ecosystem observation. This school garden program not only enriches academic knowledge but also fosters environmental awareness and a commitment to sustainability among students.



Figure 12.6 The school garden initiative at the Indonesian School of the Hague

Integration of Kouprey-Inspired Optimization Algorithms with Smart Energy Nodes for Sustainable Energy Management of Agricultural Orchards



Kittisak Jermsittiparsert and his team conducted a study titled “Integration of Kouprey-Inspired Optimization Algorithms with Smart Energy Nodes for Sustainable Energy Management of Agricultural Orchards.” This research addresses energy management challenges within agricultural orchards, specifically targeting volcanic durian cultivation in Sisaket Province, Thailand. The study employs Kouprey-Inspired Optimization (KIO) algorithms alongside smart energy nodes to enhance energy efficiency by integrating renewable solar energy with traditional power sources. This

system significantly reduces labor and energy costs by approximately 30% and 50%, respectively, contributing to both sustainable agriculture and community-based tourism.

The study directly supports **SDG 7: Affordable and Clean Energy** by optimizing energy use in rural and agricultural settings. Smart energy nodes within the system facilitate the use of clean solar power, reducing reliance on conventional energy sources and lowering energy expenses for farmers and tourism operators. Figure 5 presents the theoretical framework of the smart energy system, illustrating its application in both durian plantations and tourist accommodations. In addition to energy goals, this study contributes to **SDG 2: Zero Hunger** by improving agricultural productivity. Reduced energy and labor costs allow farmers to reinvest savings into enhancing crop yields, thereby supporting food security and income stability. This system benefits the local agricultural economy, ensuring stable food sources and sustainable livelihoods. Moreover, consistent with **SDG 8: Decent Work and Economic Growth**, the integration of smart technology within agriculture and tourism not only lowers operational costs but also enhances profitability. This sustainable model fosters economic growth and creates employment opportunities within rural communities.

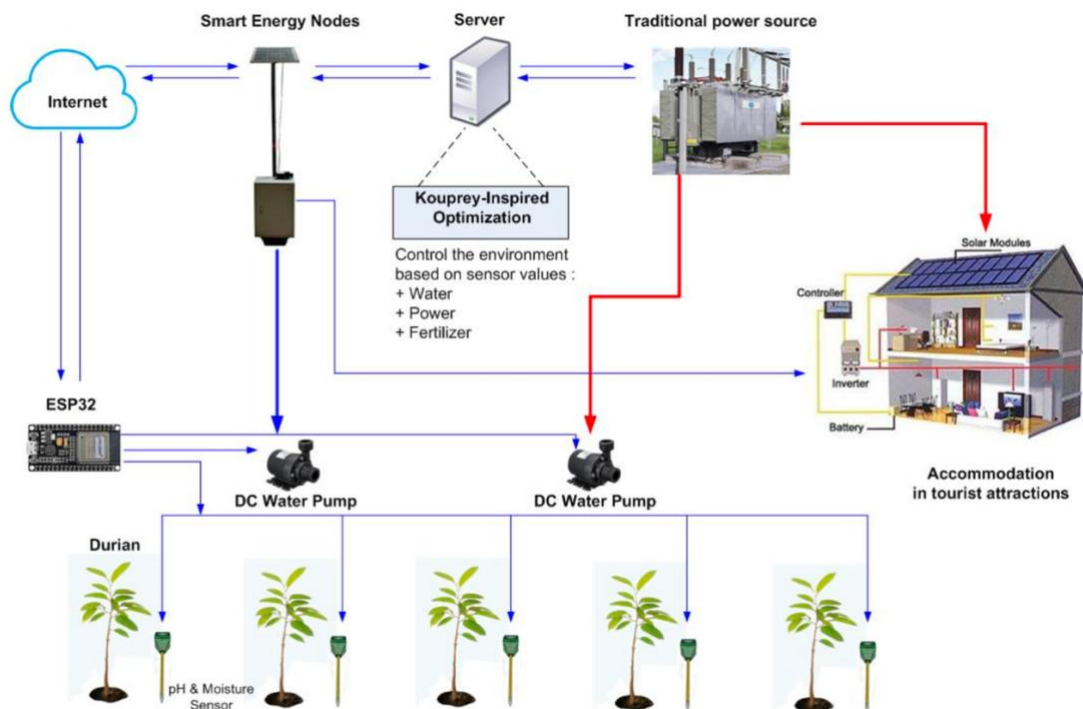


Figure 12.7 Theoretical framework of smart energy

The study also advances **SDG 12: Responsible Consumption and Production** by promoting efficient energy management practices. The smart energy nodes regulate energy usage sustainably, minimizing waste and ensuring resources are used responsibly. This approach reduces environmental impacts and enhances the sustainability of production systems. Lastly, the research supports **SDG 17: Partnerships for the Goals** by demonstrating the importance of collaboration between local governments, academic institutions, and private sectors. The success of the

energy management system highlights the effectiveness of partnerships in driving sustainable development within the agricultural and tourism industries. These collaborations ensure that innovative energy solutions are developed and effectively implemented, fostering economic and environmental resilience in the long term.

Waste Bank Policy Implementation through Collaborative Approach: Comparative Study in Makassar and Bantaeng, Indonesia



The study "Waste Bank Policy Implementation through Collaborative Approach: Comparative Study in Makassar and Bantaeng, Indonesia" examines the dynamics and challenges of waste management through waste banks, a community-based waste management initiative. Authors Fatmawati, Mustari, Haerana, Niswaty, and Abdillah from Universitas Muhammadiyah Makassar conducted a qualitative analysis comparing Makassar City and Bantaeng Regency. This research focuses on collaborative governance and policy implementation involving local governments, private sectors, and community members. Data was collected via interviews, field observations, and analyzed with NVivo software, identifying key factors that affect waste bank effectiveness, such as stakeholder communication and community engagement.

Findings indicate that while the waste bank programs provide economic and environmental benefits by converting waste into reusable resources, they face challenges like insufficient community participation and communication gaps among stakeholders. In Makassar, the waste bank program has been more established, yet Bantaeng's initiatives are gaining traction through support from government and private partnerships. The study recommends strengthening collaborative efforts and enhancing public awareness to optimize waste management systems, encouraging a culture of sustainability in urban and rural areas alike.

This study contributes to **SDG 11** by showing how waste banks create cleaner, more sustainable urban environments. Through efficient waste management, these programs help reduce landfill dependency, fostering healthier and more livable communities. Waste banks also support **SDG 12** by encouraging recycling and resource efficiency, turning waste into valuable resources and promoting sustainable consumption habits within the community. The collaborative approach of the waste bank program aligns with **SDG 16**, advancing transparency and inclusivity in waste management policies. By involving local governments, private sectors, and community members, the program builds trust and accountability within public institutions. Emphasizing the role of partnerships, the study supports **SDG 17** by demonstrating how multi-stakeholder collaboration can drive environmental sustainability. By uniting efforts across government, business, and NGOs, the waste bank model showcases how effective partnerships can address complex environmental challenges.

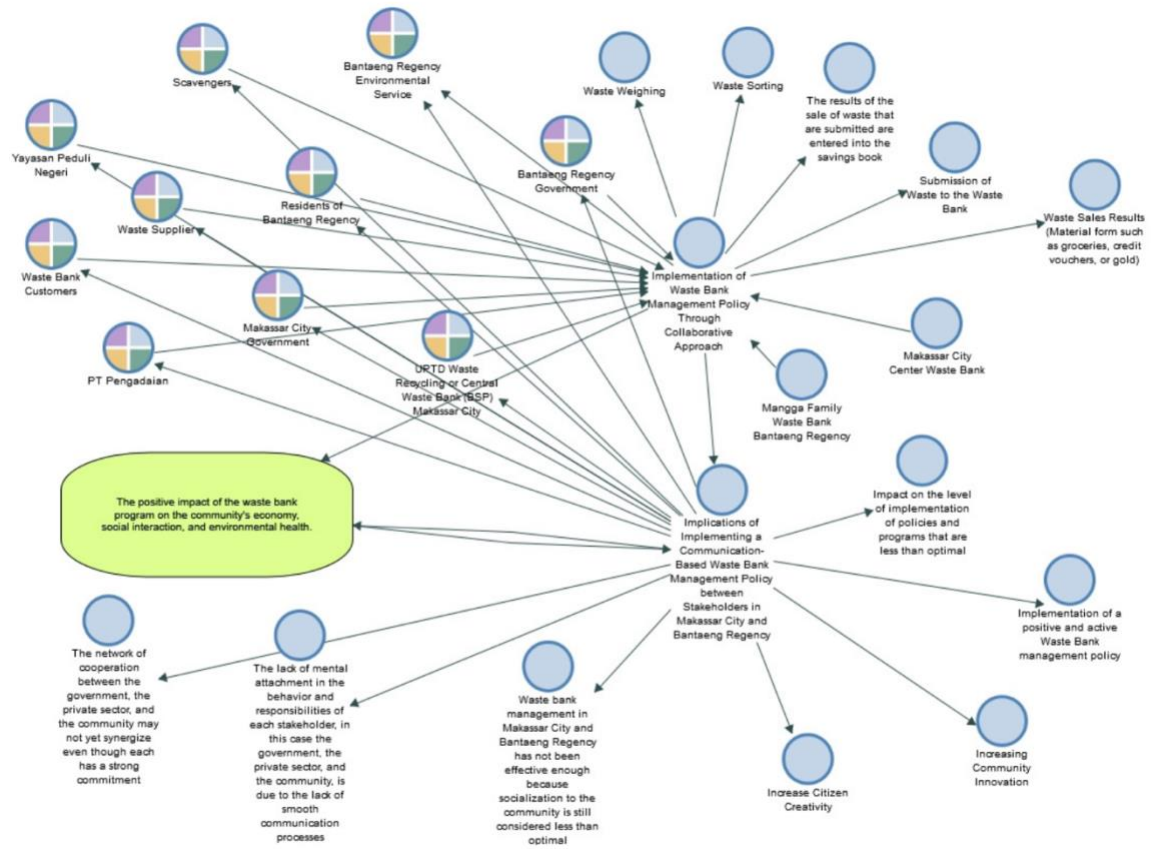


Figure 12.8 Implications of implementing waste bank policy in Makassar City and Bantaeng Regency

Universitas Muhammadiyah Makassar's commitment to SDG 13: Climate Action is demonstrated through impactful research on sustainable practices, renewable energy, and climate-resilient infrastructure. Studies on sustainable investment in the palm oil industry and electric vehicle (EV) promotion highlight strategies to reduce carbon footprints and advocate for responsible resource management. Research on photovoltaic (PV) power forecasting improves renewable energy integration, advancing climate resilience. Additionally, community-based initiatives in the Saddang watershed address maladaptation in climate strategies, underscoring the importance of inclusive, community-driven adaptation efforts. Through these projects, the university actively contributes to climate action, promoting innovative solutions that support a sustainable, climate-resilient future.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



The study "Sustainable Investment Strategies in the Palm Oil Industry in Indonesia" by Yulsaini and colleagues examines investment strategies that balance economic growth with environmental and social sustainability in Riau Province's palm oil sector. Acknowledging the industry's economic importance, the research also addresses its environmental and social challenges, such as deforestation, carbon emissions, and land conflicts. Utilizing Online Research Methods (ORM) and Nvivo 12 Plus for data analysis, the study identifies critical strategies for sustainable investment, including regulatory support, improved plantation licensing, enhanced market access, RSPO certification, and the development of a downstream industry. The government's role emerges as essential, particularly in fostering foreign investment, implementing replanting programs, and establishing sustainable plantation partnerships. Despite these strategies, the study notes ongoing challenges, such as limited technological advancements and the industry's reliance on exports, which could impede sustainable progress.



The study's contributions align with **SDG 9: Industry, Innovation, and Infrastructure** by promoting sustainable industrial practices within the palm oil sector. It underscores the importance of modern infrastructure—such as streamlined licensing systems and biogas facilities that repurpose palm oil waste—to enhance eco-friendly production and reduce waste. These innovations are critical for developing a more sustainable and resilient palm oil industry that supports long-term economic growth.



Figure 13.1 The government continues to encourage the development of renewable energy to be utilized massively by developing the potential for palm oil effluent or POME as a raw material for biogas which can be used as fuel for power plants.

Additionally, the study supports **SDG 13: Climate Action** by emphasizing practices that reduce the environmental footprint of palm oil production. The focus on RSPO certification and sustainable partnerships underscores the sector's potential role in addressing climate issues, encouraging practices that mitigate carbon emissions and foster environmental stewardship. This comprehensive approach illustrates how sustainable investment strategies, coupled with government support, can transform the palm oil industry into a driver of climate resilience and sustainability.

Short-Term PV Power Forecasting Using A Regression-Based Ensemble Method



Andi A. H. Lateko, Hong-Tzer Yang, and Chao-Ming Huang conducted a study titled “Short-Term PV Power Forecasting Using a Regression-Based Ensemble Method.” The research aims to improve the accuracy of photovoltaic (PV) power forecasting, which is essential for integrating renewable energy into smart grids and supports SDG 7: Affordable and Clean Energy. The study introduces a regression-based ensemble method that combines multiple forecasting models, including Random Forest (RF) and Support Vector Machine (SVM), to enhance the precision of day-ahead PV power predictions. By adjusting model weighting based on weather conditions, the method achieved a 20% improvement in mean relative error (MRE) compared to the best-performing individual RF model and a 2% improvement over a benchmark stacking

RNN model. Figure 2 presents one-day-ahead PV power forecasting results under sunny conditions, showcasing the performance of various models.

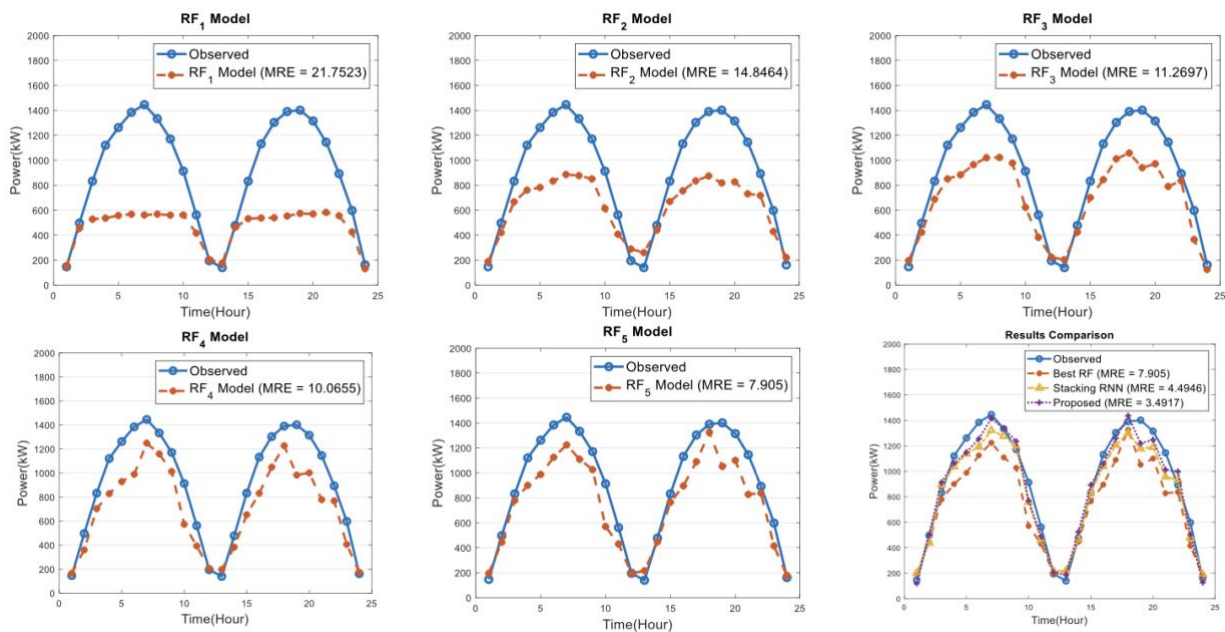


Figure 13.2 Results for one-day-ahead PV power forecasting for sunny weather conditions

The study contributes directly to **SDG 7: Affordable and Clean Energy** by improving the efficiency of integrating solar energy into the grid. Accurate PV power forecasting enables better management and planning of energy distribution, reducing operational costs and complexities associated with balancing supply and demand. This improvement enhances the reliability of renewable energy sources, ensuring a stable and cost-effective energy supply. By minimizing forecasting errors, this research supports the viability of solar energy as an affordable and reliable energy solution, which is crucial for expanding access to clean energy in diverse regions.

The enhanced accuracy of PV power predictions not only optimizes energy management but also contributes to **SDG 13: Climate Action** by facilitating increased reliance on renewable energy, thereby reducing the need for fossil fuel-based power generation. The ability to accurately predict solar power output plays a pivotal role in maximizing the utilization of clean energy resources, ultimately reducing greenhouse gas emissions and supporting climate action efforts globally. Therefore, this study highlights the effectiveness of a regression-based ensemble method in improving PV power forecasting. The enhanced prediction accuracy is essential for integrating renewable energy sources into smart grids, promoting a more sustainable and resilient energy infrastructure that aligns with global sustainable development goals.

An Intelligent Recommendation for Intelligently Accessible Charging Stations: Electronic Vehicle Charging to Support a Sustainable Smart Tourism City



A research team led by Jermstittiparsert at Universitas Muhammadiyah Makassar conducted a study titled “An Intelligent Recommendation for Intelligently Accessible Charging Stations: Electronic Vehicle Charging to Support a Sustainable Smart Tourism City.” This research addresses significant challenges, including inadequate electric vehicle (EV) charging infrastructure and the imbalanced spatial and temporal demand for charging. Utilizing the Spatio-Temporal Multi-Agent Reinforcement Learning (STMARL) framework, the study enhances the efficiency of public-accessible EV charging stations by significantly reducing wait times, costs, and failure rates compared to traditional random selection approaches. Figure 3 illustrates the implementation of an EV charging recommendation system based on the study's findings.

This research makes substantial contributions to multiple SDGs. First, it supports **SDG 7: Affordable and Clean Energy** by enhancing EV charging system efficiency, making clean energy solutions more accessible and cost-effective for urban and tourist transportation. The optimization of EV charging station locations and operations minimizes energy wastage and encourages renewable energy utilization in the transportation sector. In alignment with **SDG 11: Sustainable Cities and Communities**, this study contributes to the development of smart and sustainable urban areas. By integrating intelligent EV charging infrastructure, particularly in tourist cities like Chiang Mai, the research reduces pollution and traffic congestion, enhancing the sustainability and attractiveness of these cities for residents and visitors alike.

Moreover, this research supports **SDG 12: Responsible Consumption and Production** by advocating for responsible and efficient energy consumption. The intelligent charging system ensures optimal use of energy resources, reducing overconsumption and advancing sustainability in urban energy production and consumption cycles. Aligning with **SDG 13: Climate Action**, the study contributes to efforts in mitigating climate change by promoting EV adoption, which decreases greenhouse gas emissions and air pollution. The STMARL framework optimizes charging station operations, minimizing energy loss and reducing carbon emissions. Additionally, this work aligns with **SDG 17: Partnerships for the Goals** by emphasizing collaboration among local governments, tourism authorities, and energy providers. These partnerships are essential for advancing clean energy initiatives and establishing resilient urban systems that support long-term sustainability.

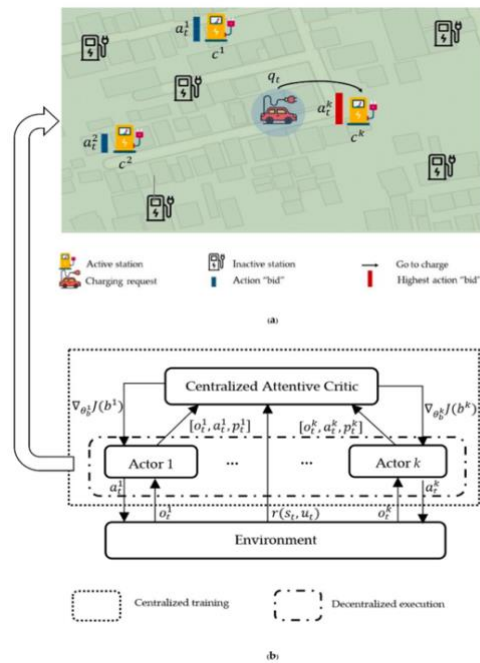


Figure 13.3 The implementation of electric vehicle (EV) charging recommendation systems. (a) EV Charging Station (b) EV Charging Framework.

In conclusion, Jermisittiparsert and his team's research underscores the vital role of innovation in developing EV infrastructure to support sustainable mobility and smart city growth. By implementing the STMARL framework, the study not only enhances EV charging system efficiency but also contributes to achieving SDGs 7, 11, 12, 13, and 17. This research promotes clean energy usage and highlights the importance of collaborative efforts in establishing sustainable, climate-resilient urban environments.

Mapping the Environmental Education Policies for the Youth to Encourage Rural Development and to Reduce Urbanisation: Econometric Approach



Hasan and his team conducted a study titled "Mapping the Environmental Education Policies for the Youth to Encourage Rural Development and to Reduce Urbanisation: An Econometric Approach". The study addresses the significant environmental impacts of urbanisation, rural development, climate change, and population growth on sustainability, especially in rural areas of Indonesia. It emphasizes the role of environmental education in encouraging youth to focus on rural development and sustainable practices as a strategy to slow down urban migration. Using a knowledge-based framework, the research applied regression and bootstrap analysis to data from 227 provinces in Indonesia and Malaysia. Results indicate that ecologically friendly education among young executives fosters environmental awareness and sustainable managerial practices, mediating the relationship between education and urbanisation while positively moderating the impact of ecological challenges. This research underscores the importance of youth-centered environmental education as a critical

driver for promoting rural sustainability, reducing urbanisation, and achieving broader sustainable development.

The contributions of this study are closely aligned with **SDG 11: Sustainable Cities and Communities**, as it promotes environmental education to encourage youth to support rural development. This focus reduces migration pressures on urban centers, promoting balanced, sustainable communities across urban and rural settings. Additionally, the study aligns with **SDG 12: Responsible Consumption and Production** by encouraging environmentally responsible practices among young people, fostering rural resilience through sustainable approaches to resource use.

The study also supports **SDG 13: Climate Action** by advocating for climate-conscious education policies that equip youth with the knowledge and motivation to address environmental challenges. By empowering young people to adopt sustainable practices, the study highlights a proactive approach to reducing the ecological footprint associated with urban migration. Furthermore, by collecting data from Indonesia and Malaysia, this research exemplifies **SDG 17: Partnerships for the Goals** through cross-border collaboration in tackling shared environmental issues. The study underscores how cooperative policy efforts between nations can drive sustainable development, demonstrating the power of regional partnerships in achieving environmental goals. Through these insights, the research offers a comprehensive approach to enhancing rural development and sustainability through youth-driven, knowledge-based policies.

Adaptation From Maladaptation: A Case study of Community-Based Initiatives of the Saddang Watershed



Naufal and his team conducted a study titled "Adaptation From Maladaptation: A Case Study of Community-Based Initiatives of the Saddang Watershed". They stated that over recent decades, countries have heavily invested in climate adaptation and mitigation efforts; however, some measures have resulted in maladaptation, particularly within watershed communities. This study focused on the Saddang watershed, a priority area in Indonesia, analyzing primary data from observations and in-depth interviews with villagers impacted by extreme weather (droughts and floods) between 2009 and 2020. Secondary data from satellite imagery revealed land cover changes, sedimentation, and river flow alterations. Findings showed that adaptation strategies in the upstream area, such as deforestation to combat prolonged drought, inadvertently triggered maladaptation, worsening the effects of climate change for both upstream and downstream communities. This maladaptation created new hazards and vulnerabilities downstream, despite efforts labeled as "climate resilience" and aimed at enhancing food security. The study underscores the need for consolidated adaptation measures that consider the watershed as an integrated landscape, reinforcing the importance of partnerships for effective climate action and sustainable food security

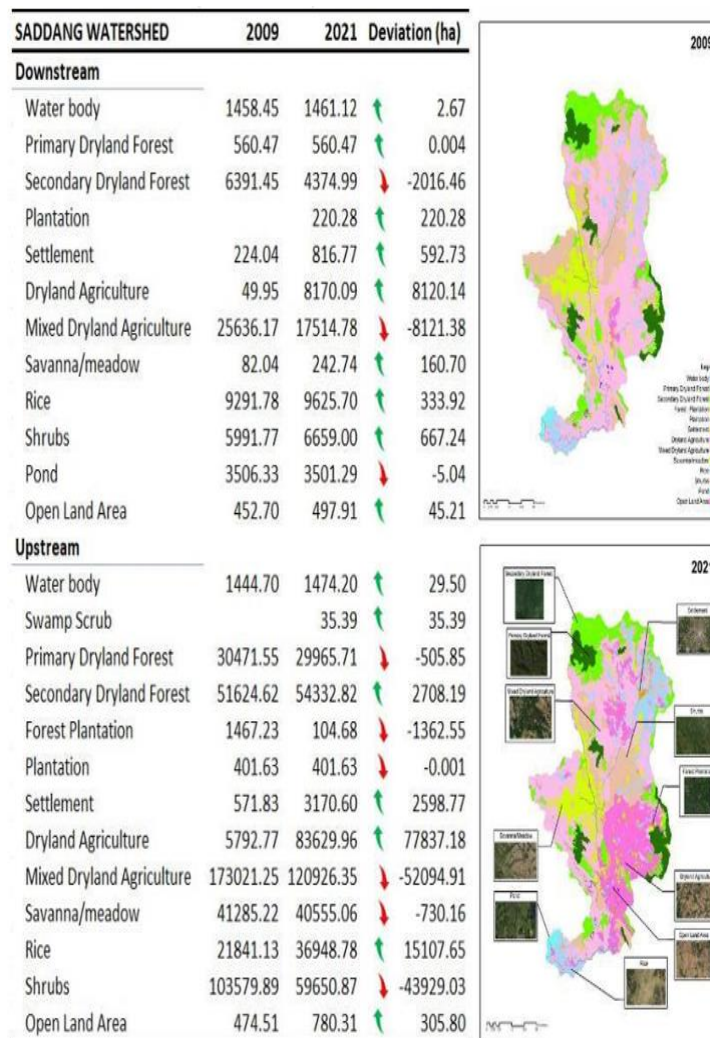


Figure 13.4 Analysis results of the study

This research contributes to **SDG 2: Zero Hunger** by emphasizing the interconnectedness of climate adaptation and food security. It highlights the importance of sustainable farming practices, as the adoption of drought-resistant crops in unsuitable terrains leads to soil degradation, which could undermine long-term food security goals. In relation to **SDG 13: Climate Action**, the study underscores the need for adaptation measures that do not worsen environmental conditions. By pointing out the unintended impacts of current practices, it calls for climate action strategies that enhance resilience without increasing emissions or environmental risks.

Furthermore, the study aligns with **SDG 16: Peace, Justice, and Strong Institutions** by fostering inclusive decision-making. Involving community perspectives in the assessment of adaptation strategies promotes fair governance, enabling policies that reflect local needs and bolster community resilience. Finally, supporting **SDG 17: Partnerships for the Goals**, the study exemplifies the value of collaborative approaches. By bridging research insights with local government and community actions, it highlights how partnerships and knowledge-sharing can guide communities toward more sustainable climate adaptation.

Indonesian Policy Campaign for Electric Vehicles to Tackle Climate Change: Maximizing Social Media



The study titled "Indonesian Policy Campaign for Electric Vehicles to Tackle Climate Change: Maximizing Social Media" by Said Lestaluhu, Tawakkal Baharuddin, and Marno Wance explores how the Indonesian government has utilized social media to advocate for electric vehicle (EV) adoption as part of its climate change strategy. The research focuses on the government's official campaign efforts, particularly on Twitter through President Joko Widodo's account (@jokowi), analyzing 1,897 tweets related to electric vehicles and climate initiatives. Employing quantitative and content analysis methods with tools like Nvivo 12 Plus, the study identifies key themes in the campaign, such as reducing CO₂ emissions, creating an EV-friendly ecosystem, encouraging investment, and involving the public in sustainable practices. Through social media, the government has effectively communicated the importance of transitioning to EVs, aiming to educate and mobilize the public to reduce reliance on fossil fuels and support Indonesia's broader climate goals.

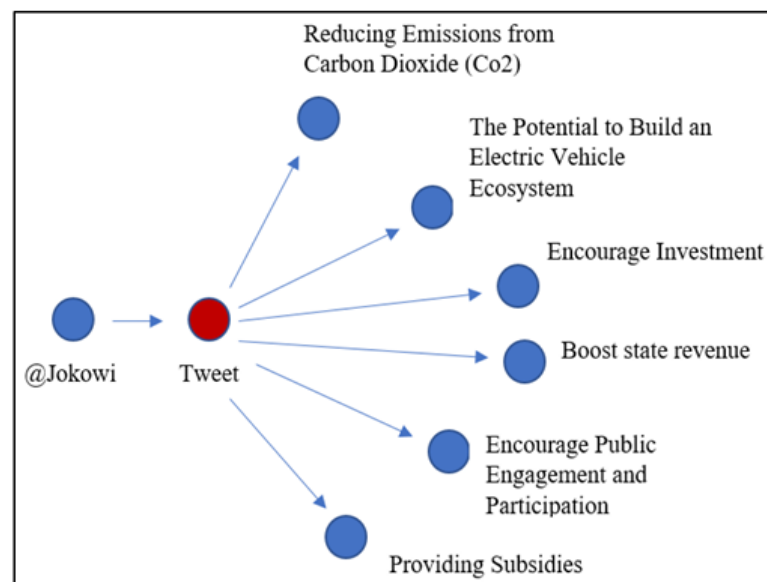


Figure 13.6 Mapping on government campaign topics on Twitter

The study makes valuable contributions to **SDG 13: Climate Action** by illustrating how EV adoption is framed as a crucial part of reducing Indonesia's carbon footprint. The campaign's emphasis on the environmental benefits of EVs helps build public understanding of climate issues and promotes cleaner, more sustainable transport options. In relation to **SDG 16: Peace, Justice, and Strong Institutions**, the study demonstrates the role of social media in enhancing transparency and accessibility in policy communication. By using platforms like Twitter to engage with the public

openly, the government fosters trust and encourages civic participation, making policy efforts on climate action more inclusive and transparent.

Moreover, the research aligns with **SDG 17: Partnerships for the Goals** by highlighting the importance of collaborative efforts across sectors. The campaign encourages partnerships between government entities, private industry, and the public to support sustainable development goals, demonstrating how digital tools can unite communities in shared environmental initiatives.



TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS

Universitas Muhammadiyah Makassar supports SDG 14: Life Below Water through research focused on sustainable coastal and marine ecosystem management. Studies on soil and water quality in mangrove areas, low-salinity shrimp aquaculture, and mangrove ecosystem health emphasize the importance of balanced environmental practices. Research in Tongke-Tongke Village highlights sustainable aquaculture that preserves marine biodiversity, while findings in Kabonga Besar call for conservation to protect mangrove habitats. Further studies emphasize community resilience and governance in response to coastal climate impacts. Through partnerships with local communities and government agencies, the university promotes sustainable marine resource management, enhancing ecosystem health and supporting coastal livelihoods in line with SDG 14.

Quality Parameters of Soil Chemical Physics and Water Ecosystem in Indonesia



The study "Quality Parameters of Soil Chemical Physics and Water Ecosystem in Indonesia" by Abdul Haris Sambu, Burhanuddin, and Amruddin, investigates the environmental quality of coastal ecosystems in Tongke-Tongke Village, South Sulawesi. The research assesses soil and water quality parameters essential for supporting biodiversity and sustainable aquaculture. The analysis included factors such as soil pH, organic content, nitrogen, and phosphorus levels, alongside water temperature, pH, salinity, and dissolved oxygen. Findings indicate that soil is predominantly sandy, with some acidity due to low water circulation and high organic decomposition in dense mangrove areas. Water quality parameters remain optimal for aquaculture, supporting both educational tourism and conservation activities in the mangrove ecosystem. However, the study emphasizes the need for ongoing environmental monitoring to prevent degradation due to aquaculture expansion and human activity, recommending sustainable practices to balance ecological health and economic development.



Figure 14.1 The research team is investigating the environmental quality of coastal ecosystems in Tongke-Tongke Village, South Sulawesi

This research makes significant contributions to **SDG 14: Life Below Water** by promoting sustainable aquaculture practices that prioritize marine biodiversity protection. By focusing on the quality of soil and water in the ecosystem, the study supports efforts to maintain healthy coastal environments, ensuring that local marine life is preserved for future generations and that coastal communities reliant on fishing have sustainable livelihoods.

Furthermore, the study aligns with **SDG 17: Partnerships for the Goals** by emphasizing the role of collaboration between local communities, government agencies, and educational institutions in preserving coastal ecosystems. The research advocates for community engagement and knowledge-sharing as vital components for implementing sustainable practices. This partnership-driven approach strengthens local capabilities to manage and protect the ecosystem, demonstrating how collective action can achieve long-term environmental sustainability. Through these insights, the study illustrates the crucial balance between environmental stewardship and economic activities in supporting resilient coastal ecosystems.

Vulnerable countries, resilient communities: climate change governance in the coastal communities in Indonesia



The study titled "Vulnerable Countries, Resilient Communities: Climate Change Governance in the Coastal Communities in Indonesia" by Andi Luhur Prianto and Abdillah explores the resilience of Indonesian coastal communities facing significant climate change impacts. Focusing on regions like Pangkep, East Lombok, and Rembang, the research delves into the socioeconomic challenges these communities encounter due to sea-level rise, extreme weather, and coastal erosion. These climate-induced threats have deeply affected local livelihoods, particularly those dependent

on fishing and agriculture. Using a qualitative-exploratory approach, the study analyzes how adaptive strategies, supported by robust governance frameworks, can enhance community resilience. Prianto and his team emphasize the importance of sustainable resource management and inclusive policies that empower local populations, creating a comprehensive framework aimed at reducing climate vulnerability. Their findings underscore that resilience-building in these communities requires improving public services and economic support to help mitigate the risks posed by climate change.

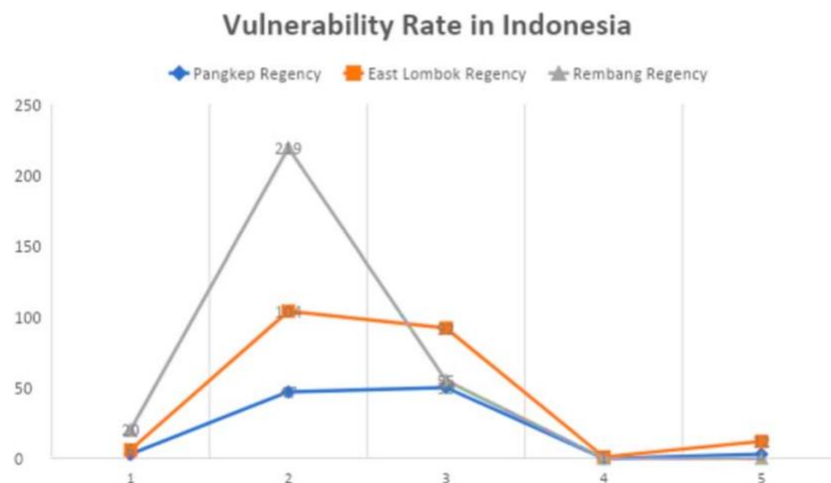


Figure 14.2 Percentage of vulnerability in three Regency of Indonesia

The study contributes to **SDG 13** by proposing climate-resilient strategies that address the specific vulnerabilities of coastal areas. The research highlights the necessity for climate-adaptive policies and practices, including sustainable resource use and ecosystem protection, to help these communities cope with and adapt to climate-related risks. This research aligns with **SDG 14** by emphasizing the need for responsible marine and coastal ecosystem management. Sustainable fishing practices and marine conservation efforts were identified as essential strategies for maintaining biodiversity and supporting the livelihoods of communities that rely on marine resources, helping to preserve ocean health while supporting economic stability.

By advocating for stronger governance and inclusive decision-making processes, the study supports **SDG 16**. It stresses the importance of building robust institutions that ensure equitable resource access and empower community participation in resilience-building. This approach fosters trust and stability, crucial for effective adaptation to climate challenges. Prianto's study underscores the value of partnerships among local governments, NGOs, and community organizations in addressing climate adaptation. Collaborative efforts enable the sharing of resources, knowledge, and support systems essential for sustainable development, aligning with **SDG 17's** emphasis on multi-stakeholder partnerships to achieve resilience in vulnerable regions.

Vulnerable countries, resilient communities: climate change governance in the coastal communities in Indonesia



The study "Low Salinity Application to Improve Biofloc System in Early Grow-Out Stage of White Shrimp (*Litopenaeus vannamei*)" by M. Syaichudin and colleagues investigates the impact of low salinity on shrimp farming, specifically to improve survival and growth rates in Pacific white shrimp cultivation. Conducted in controlled aquaculture ponds, the study compares a standard salinity environment (27 ppt) with a low salinity condition (15 ppt) to assess survival, growth, and resistance to bacterial infections, particularly from *Vibrio harveyi*. Results show that shrimp raised in the lower salinity environment exhibited higher survival rates (98% compared to 86% in the control) and better feed conversion, which suggests increased growth efficiency and resilience against bacterial diseases. The findings highlight that low-salinity environments can create conditions that reduce pathogenic risks, thus supporting healthier shrimp populations and potentially lowering the environmental impact of shrimp farming by minimizing disease outbreaks and the need for antibiotics.

The study supports **SDG 14** by promoting sustainable aquaculture practices that prioritize ecosystem health. By using low-salinity environments and biofloc technology, the research presents a model that minimizes chemical inputs and water pollution. This method reduces the ecological footprint of shrimp farming and conserves marine biodiversity by mitigating the release of harmful pathogens and chemicals into surrounding waters.



Figure 14.3 Biofloc system used to maintain and measure salinity levels

Kabonga Besar Mangrove Ecosystem Health Status, Donggala, Indonesia – An Analysis of Viability Versus Threats



The study "Kabonga Besar Mangrove Ecosystem Health Status, Donggala, Indonesia – An Analysis of Viability Versus Threats" assesses the health of the Kabonga Besar mangrove ecosystem in Donggala, Indonesia, by analyzing both its viability and the threats it faces. The research team conducted observations, interviews, and focus group discussions (FGDs) to gather data on key ecological attributes like canopy coverage, species composition, and habitat zoning. Using The Nature Conservancy's CAP v6b software, they evaluated the ecosystem's viability and threats. Results show that the mangrove ecosystem's health is generally good, with high viability in terms of canopy cover and species diversity. However, the ecosystem faces significant threats, primarily from human activities, such as land conversion for settlements, agricultural expansion, recreational use, and infrastructure development. These activities increase the threat level, indicating a need for improved management and conservation strategies to protect the ecosystem's health.



Figure 14.4 Kabonga Besar mangrove ecosystem in Donggala

This study supports **SDG 14** by emphasizing the need for sustainable management of marine and coastal ecosystems. By identifying key threats and proposing conservation measures, the research highlights the importance of protecting the mangrove ecosystem, which serves as a crucial habitat for marine biodiversity, helps prevent coastal erosion, and supports local fisheries. Effective conservation strategies could ensure the long-term sustainability of this critical ecosystem, benefiting both biodiversity and local communities.

The research underlines the value of partnerships between local communities, government agencies, and research institutions in safeguarding coastal ecosystems. Collaborative efforts in data collection, management, and conservation planning are essential to address the threats faced by the mangrove ecosystem. These

partnerships foster resource sharing, knowledge exchange, and joint action, aligning with **SDG 17's** emphasis on multi-stakeholder collaboration to achieve sustainable development goals

Analysis of mangrove ecosystem sustainability in the Biringkassi mangrove area, Pangkep District, Indonesia



A study by Zulkifli Mappasomba from Universitas Muhammadiyah Makassar, Sattar Yunus from Universitas Muslim Indonesia, and Muh Haidir from Universitas Teknologi Sulawesi investigates the sustainability of the Biringkassi mangrove ecosystem in Pangkep District, Indonesia. Using Rapid Assessment for Fisheries (RAPFISH) software and a Multidimensional Scaling (MDS) approach, the research assesses ecological, economic, social, and institutional dimensions. Findings indicate that, while ecological and institutional aspects show moderate sustainability, economic and social dimensions fall short, highlighting an overall less sustainable state. Key challenges include limited financial resources and inadequate alternative income sources, which undermine both local livelihoods and ecosystem resilience.

This study aligns with **SDG 8 on Decent Work and Economic Growth** by emphasizing sustainable economic activities within the mangrove ecosystem. Enabling local communities to earn sustainable income through mangrove resources can alleviate poverty and support coastal economies. Furthermore, **SDG 14 (Life Below Water)** is addressed, as mangrove ecosystems play a vital role in protecting marine biodiversity, serving as nurseries, stabilizing coastlines, and filtering pollutants, essential for sustainable fisheries and coastal protection.

Aligned with **SDG 15 (Life on Land)**, the research focuses on sustainable land use and biodiversity conservation through mangrove regeneration and erosion control. Additionally, the study underscores **SDG 17 (Partnerships for the Goals)**, emphasizing the importance of collaboration between local communities, government agencies, and NGOs. Strengthened partnerships are critical for shared resource management and successful conservation efforts.

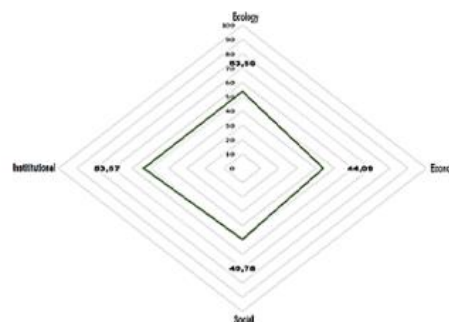


Figure 14.5 Mangrove Ecosystem sustainability

15 LIFE ON LAND



PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS

Universitas Muhammadiyah Makassar actively supports SDG 15: Life on Land through initiatives focused on biodiversity conservation and sustainable land management. Research on endangered Rainbow Celebes fish promotes eco-friendly feeding strategies to improve growth rates, supporting conservation efforts. Another study on geronggang oil extraction emphasizes sustainable use of forest resources, protecting native plant species while supporting community health. Further, mangrove ecosystem studies in Biringkassi highlight sustainable land use, crucial for maintaining coastal biodiversity and preventing erosion. Educational programs, like the school garden project, foster environmental stewardship by teaching students sustainable agriculture and biodiversity values. Through these projects, the university advances land conservation, supporting resilient ecosystems and biodiversity preservation.

The Effect of Natural *Daphnia* Sp. and Different Synbiotic Feed on Rainbow Celebes (*Marosatherina ladigesii*) Growth Performance and Survival Rate

15 LIFE ON LAND



The study "The Effect of Natural *Daphnia* Sp. and Different Synbiotic Feed on Rainbow Celebes (*Marosatherina ladigesii*) Growth Performance and Survival Rate" conducted by researchers including Rahmi from Universitas Muhammadiyah Makassar, investigates feeding strategies to improve the growth and survival of the endangered Rainbow Celebes fish, native to South Sulawesi, Indonesia. Researchers tested four feeding treatments: natural *Daphnia* sp., artificial feed, synbiotic feed with teak leaf extract, and synbiotic feed with *Sargassum* sp.. The fish were monitored for growth (length and width) and survival rates across these conditions. The study found that fish fed with synbiotic feed and *Sargassum* sp. exhibited the highest growth rate and survival rate, reaching 2.05% growth per day and 100% survival. This was attributed to the high nutritional content in *Sargassum* sp., which enhanced digestion and promoted efficient nutrient absorption, thereby boosting growth performance. These findings suggest that using natural and synbiotic feeds like *Daphnia* and *Sargassum* can support the health and growth of this species, which is crucial for conservation efforts.

This study supports **SDG 14** by promoting sustainable aquaculture practices for an endangered species. By identifying effective feeding strategies that enhance growth and survival rates, the research contributes to efforts aimed at preserving marine biodiversity. These findings could guide conservation programs, helping to sustain the Rainbow Celebes fish population while reducing the environmental impact of artificial

feeds. The study also aligns with **SDG 15** by emphasizing the importance of sustainable natural resource use, including the incorporation of *Daphnia* sp. and *Sargassum* sp. as eco-friendly feed options. This approach reduces dependency on industrial feeds, promoting a balanced ecosystem that respects biodiversity and reduces environmental degradation.



Figure 15.1 Researcher tested four feeding treatments

Local Wisdom on Processing and Utilization of Geronggang's Oil for Daily Remedy and Healthcare



The study "Local Wisdom on Processing and Utilization of Geronggang's Oil for Daily Remedy and Healthcare" by Latifah from Universitas Muhammadiyah Makassar and colleagues explores traditional methods of extracting and using geronggang oil (from *Cratoxylum arborescens*) as a remedy in Indonesian communities, especially in Sumatra and Borneo. The research evaluates the effectiveness of different carrier oils—virgin coconut oil, olive oil, moringa oil, and castor oil—to extract valuable compounds from geronggang bark. By boiling the bark with these carrier oils, the researchers found that moringa and castor oils produced the most concentrated and nutrient-rich solutions. Geronggang oil has a history of use in treating ailments such as fever, cough, and skin disorders, with local communities valuing its anti-inflammatory, antibacterial, and antioxidant properties. However, due to limited knowledge of efficient processing techniques, the sustainable management of geronggang remains a challenge, particularly given threats from illegal logging and deforestation.

This study supports **SDG 15** by promoting sustainable use of geronggang, a non-timber forest product. By documenting traditional extraction methods and exploring improved processing techniques, the research highlights ways to enhance the utilization of geronggang oil while advocating for conservation. Sustainable

harvesting and processing practices can reduce pressure on natural populations, supporting biodiversity and preventing the overexploitation of this valuable plant resource.

Analysis of mangrove ecosystem sustainability in the Biringkassi mangrove area, Pangkep District, Indonesia



A study by Zulkifli Mappasomba from Universitas Muhammadiyah Makassar, Sattar Yunus from Universitas Muslim Indonesia, and Muh Haidir from Universitas Teknologi Sulawesi investigates the sustainability of the Biringkassi mangrove ecosystem in Pangkep District, Indonesia. Using Rapid Assessment for Fisheries (RAPFISH) software and a Multidimensional Scaling (MDS) approach, the research assesses ecological, economic, social, and institutional dimensions. Findings indicate that, while ecological and institutional aspects show moderate sustainability, economic and social dimensions fall short, highlighting an overall less sustainable state. Key challenges include limited financial resources and inadequate alternative income sources, which undermine both local livelihoods and ecosystem resilience.

This study aligns with **SDG 8 on Decent Work and Economic Growth** by emphasizing sustainable economic activities within the mangrove ecosystem. Enabling local communities to earn sustainable income through mangrove resources can alleviate poverty and support coastal economies. Furthermore, **SDG 14 (Life Below Water)** is addressed, as mangrove ecosystems play a vital role in protecting marine biodiversity, serving as nurseries, stabilizing coastlines, and filtering pollutants, essential for sustainable fisheries and coastal protection.

Aligned with **SDG 15 (Life on Land)**, the research focuses on sustainable land use and biodiversity conservation through mangrove regeneration and erosion control. Additionally, the study underscores **SDG 17 (Partnerships for the Goals)**, emphasizing the importance of collaboration between local communities, government agencies, and NGOs. Strengthened partnerships are critical for shared resource management and successful conservation efforts.

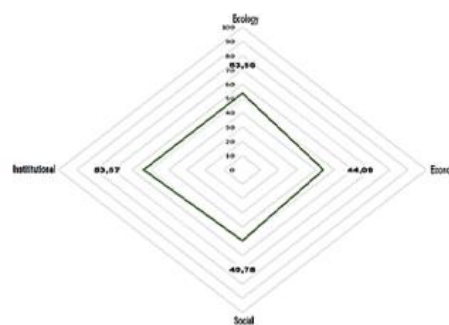


Figure 15.2 Mangrove Ecosystem sustainability

Natural sciences and social sciences learning in school garden, Indonesian School of the Haque, Netherlands



The school garden initiative at the Indonesian School of the Hague (SIDH) strongly aligns with the objectives of **SDG 4 (Quality Education)** as highlighted in the Times Higher Education Impact Rankings. This program, by incorporating natural and social sciences education within a practical garden setting, provides students with a holistic and active learning experience, moving beyond traditional classroom boundaries. Through hands-on gardening activities—such as planting, cultivating, and harvesting crops—students engage directly with concepts in biology, environmental science, and sustainable agriculture, thus deepening their understanding of natural sciences. Social science learning is enhanced as students interact, cooperate, and communicate, fostering essential life skills like teamwork, social responsibility, and respect for nature. This approach to education not only supports academic growth but also nurtures personal and social development, encouraging students to appreciate and contribute to sustainable practices. Furthermore, by emphasizing the role of sustainable food production and the economic value of agricultural practices, the garden project installs an early understanding of responsible consumption and environmental stewardship. SIDH’s initiative exemplifies how integrating sustainable practices within educational programs can lead to a more inclusive, engaging, and impactful learning environment. By fostering critical thinking, environmental consciousness, and practical life skills, this school garden project directly supports the core principles of SDG 4, particularly in ensuring inclusive, equitable, and quality education that promotes lifelong learning. Through such initiatives, SIDH not only enhances its students’ academic capabilities but also prepares them as environmentally aware citizens, aligned with the global educational impact goals set forth in the Times Higher Education Impact Rankings.

The school garden program at the Indonesian School of the Hague (SIDH) aligns with several key SDGs. By providing quality education through hands-on learning in the garden, this program supports SDG 4 as it actively engages students in exploring natural and social sciences in an engaging and immersive way. The program also promotes **SDG 2 (Zero Hunger)** by introducing sustainable agriculture practices and raising awareness of food security and nutrition, teaching students the value of responsible food production. Gardening activities contribute to **SDG 3 (Good Health and Well-being)** by enhancing students’ physical and mental well-being through outdoor activities and a deeper understanding of the importance of nutritious food. Additionally, the program supports **SDG 12 (Responsible Consumption and Production)** by instilling sustainable consumption practices and reducing food waste, which students can apply in their daily lives. Finally, the program aligns with **SDG 15 (Life on Land)** as students learn about biodiversity and the importance of environmental conservation through plant care and ecosystem observation. This school garden program not only enriches academic knowledge but also fosters environmental awareness and a commitment to sustainability among students.



Figure 15.3 The school garden initiative at the Indonesian School of the Hague



16 PEACE, JUSTICE
AND STRONG
INSTITUTIONS

PROMOTE PEACEFUL AND INCLUSIVE SOCIETIES FOR SUSTAINABLE DEVELOPMENT, PROVIDE ACCESS TO JUSTICE FOR ALL AND BUILD EFFECTIVE, ACCOUNTABLE AND INCLUSIVE INSTITUTIONS AT ALL LEVELS

Universitas Muhammadiyah Makassar supports SDG 16: Peace, Justice, and Strong Institutions through diverse initiatives focusing on governance, community empowerment, and social justice. Research on social capital highlights its role in empowering farmers for sustainable agriculture, fostering trust and equitable resource access. A study on migrant worker governance underscores international collaboration and institutional accountability, ensuring fair treatment of Indonesian workers in Malaysia. Further studies, like those on climate adaptation strategies and social media-driven policy advocacy for EVs, emphasize inclusive governance and transparency in policy communication, engaging communities in sustainable development. Additionally, projects on waste bank management showcase collaborative governance, promoting trust and accountability. Through these efforts, the university champions resilient communities and strong institutions, advancing SDG 16.

Social Capital and Community Empowerment: Towards Sustainable Agriculture



Syafiuddin Saleh and his team conducted research on the role of social capital in community empowerment toward sustainable agriculture. Using qualitative research methods with tools like Nvivo 12 Plus, the study identifies how different forms of social capital—bonding, bridging, and linking—are mobilized by bureaucratic and entrepreneurial actors to support the transformation toward organic farming. Their study highlights that both essential and supporting forms of social capital are crucial in empowering organic farmers, with bureaucratic and entrepreneurial actors playing key roles. Essential social capital drives bonding among farmers, strengthened by knowledge exchange and work motivation, while supporting social capital aids through linking, facilitated by price certainty and product certification. Bridging social capital is further enhanced through consistent problem-solving. Collectively, these forms of social capital foster community empowerment, improve agricultural productivity, ensure fair market access, and strengthen institutional partnerships, making social capital both foundational and catalytic for sustainable agricultural development. The study underscores that building strong networks and collaborative efforts is essential for achieving sustainable practices and long-term development across agricultural sectors.

This study's contributions align with several SDGs. It directly supports **SDG 2: Zero Hunger** by promoting sustainable food production practices that improve soil fertility and crop resilience without relying on synthetic chemicals. This approach enhances food security and contributes to healthier food systems, which are essential for reducing hunger and supporting community resilience. In addition, by improving the market viability of organic farming, the study contributes to **SDG 8: Decent Work and Economic Growth**. The emphasis on high-value organic products provides farmers with sustainable income sources, fostering economic empowerment and decent work in rural areas.

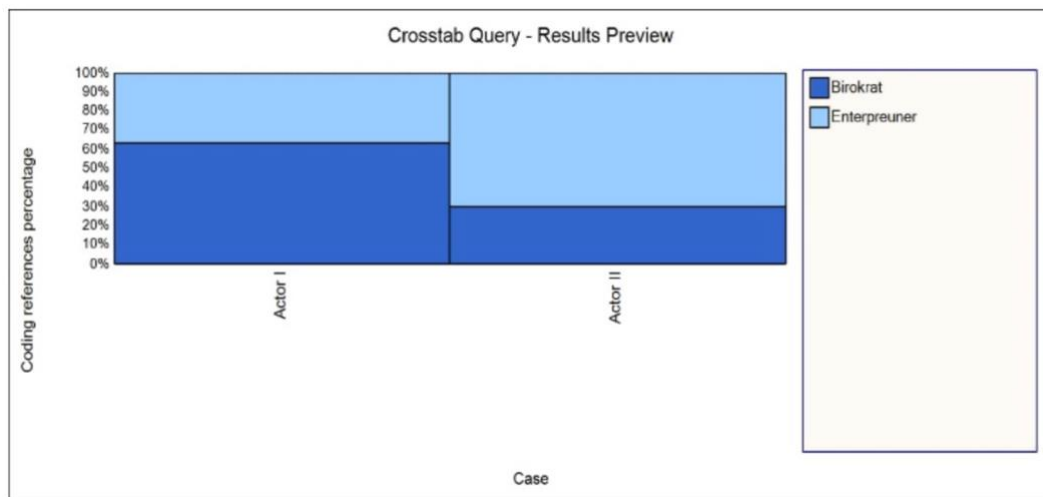


Figure 16.1. Percentage of Bureaucrat Actors and Entrepreneurial Actors

The study's focus on organic farming also supports **SDG 12**, encouraging agricultural practices that minimize environmental impact through reduced chemical dependency. This sustainable approach promotes resource efficiency and aligns with responsible production goals. Furthermore, through its collaboration with government agencies and agricultural extension services, the research advances **SDG 16** by building robust community networks and reinforcing governance structures that ensure fair access to resources and information for farmers. Finally, the study highlights the significance of partnerships in achieving sustainable agriculture, aligning with **SDG 17**: Partnerships for the Goals. The cooperation between government entities, local communities, and entrepreneurs exemplifies the collective effort needed to support sustainable agricultural transformation. By demonstrating the power of social capital in empowering organic farmers, the study provides valuable insights into the role of community-driven initiatives in achieving sustainable development goals.

Governance and Protection of Indonesian Migrant Workers in Malaysia: A Study on Policy and Innovation Network



The study titled "Governance and Protection of Indonesian Migrant Workers in Malaysia: A Study on Policy and Innovation Network" by Andi Luhur Prianto, Aqmal Reza Amri, and Mohd Na'eim Ajis explores the collaborative efforts between Indonesia and Malaysia to improve the governance and protection of Indonesian migrant workers (IMWs) in Malaysia. The research investigates the role of policy networks and digital innovations, such as the "one channel system," an official recruitment mechanism established through a Memorandum of Understanding (MoU) between the two countries. This system aims to streamline recruitment processes, reduce exploitation, and enhance protection measures for migrant workers. However, the study identifies ongoing challenges in the implementation of these innovations,

particularly within Malaysia, underscoring the complexities of cross-border labor governance and the critical need for sustained collaboration to safeguard the rights and welfare of IMWs.

The study contributes to **SDG 9: Industry, Innovation, and Infrastructure** by highlighting the use of digital innovation in the recruitment and management of migrant labor through the "one channel system." This system advances the industrial and digital infrastructure necessary to modernize labor management, creating a more secure, efficient recruitment process that prioritizes worker protection and aligns with sustainable development goals. In support of **SDG 10: Reduced Inequalities**, the study addresses the vulnerabilities faced by Indonesian migrant workers and advocates for equitable policies that protect them from exploitation and discrimination. This focus on fair treatment and protective measures is essential in reducing socioeconomic inequalities, particularly for marginalized migrant populations.



Figure 16.3 The collaborative efforts between Indonesia and Malaysia to improve the governance and protection of Indonesian migrant workers (IMWs)

The research also aligns with **SDG 16: Peace, Justice, and Strong Institutions** by emphasizing the importance of robust governance and institutional accountability. The bilateral agreements and regulatory frameworks discussed in the study foster justice, transparency, and inclusivity in the treatment of migrant workers, ensuring that their rights are upheld through strong institutional support.

Finally, the study underscores the significance of **SDG 17: Partnerships for the Goals** by showcasing the importance of international collaboration between Indonesia and Malaysia. This partnership facilitates the development of a supportive network dedicated to addressing the protection and governance needs of migrant workers, demonstrating how cross-border cooperation can effectively promote labor rights and human dignity. Through these contributions, the study highlights the transformative potential of policy innovation and collaborative governance in addressing complex issues surrounding migrant labor.

Adaptation From Maladaptation: A Case study of Community-Based Initiatives of the Saddang Watershed



Naufal and his team conducted a study titled "Adaptation From Maladaptation: A Case Study of Community-Based Initiatives of the Saddang Watershed". They stated that over recent decades, countries have heavily invested in climate adaptation and mitigation efforts; however, some measures have resulted in maladaptation, particularly within watershed communities. This study focused on the Saddang watershed, a priority area in Indonesia, analyzing primary data from observations and in-depth interviews with villagers impacted by extreme weather (droughts and floods) between 2009 and 2020. Secondary data from satellite imagery revealed land cover changes, sedimentation, and river flow alterations. Findings showed that adaptation strategies in the upstream area, such as deforestation to combat prolonged drought, inadvertently triggered maladaptation, worsening the effects of climate change for both upstream and downstream communities. This maladaptation created new hazards and vulnerabilities downstream, despite efforts labeled as "climate resilience" and aimed at enhancing food security. The study underscores the need for consolidated adaptation measures that consider the watershed as an integrated landscape, reinforcing the importance of partnerships for effective climate action and sustainable food security.

This research contributes to **SDG 2: Zero Hunger** by emphasizing the interconnectedness of climate adaptation and food security. It highlights the importance of sustainable farming practices, as the adoption of drought-resistant crops in unsuitable terrains leads to soil degradation, which could undermine long-term food security goals. In relation to **SDG 13: Climate Action**, the study underscores the need for adaptation measures that do not worsen environmental conditions. By pointing out the unintended impacts of current practices, it calls for climate action strategies that enhance resilience without increasing emissions or environmental risks.

Furthermore, the study aligns with **SDG 16: Peace, Justice, and Strong Institutions** by fostering inclusive decision-making. Involving community perspectives in the assessment of adaptation strategies promotes fair governance, enabling policies that reflect local needs and bolster community resilience. Finally, supporting **SDG 17: Partnerships for the Goals**, the study exemplifies the value of collaborative approaches. By bridging research insights with local government and community actions, it highlights how partnerships and knowledge-sharing can guide communities toward more sustainable climate adaptation.

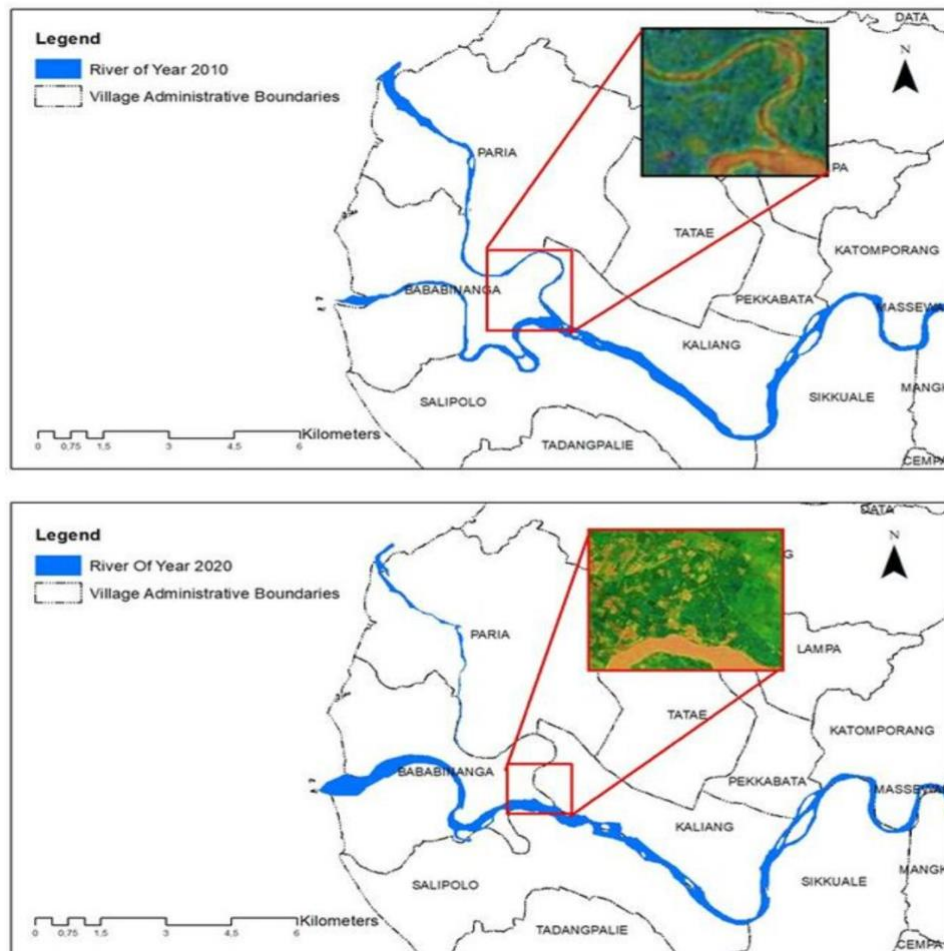
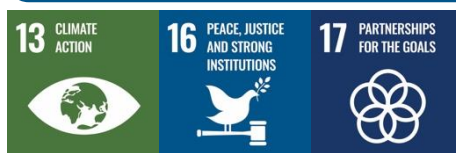


Figure 16.2 Comparison of rivers in Paria and Bababinaga villages in 2009 and 2020 at the Downstream Saddang River Basin

Indonesian Policy Campaign for Electric Vehicles to Tackle Climate Change: Maximizing Social Media



The study titled "Indonesian Policy Campaign for Electric Vehicles to Tackle Climate Change: Maximizing Social Media" by Said Lestaluhu, Tawakkal Baharuddin, and Marno Wance explores how the Indonesian government has utilized social media to advocate for electric vehicle (EV) adoption as part of its climate change strategy. The research focuses on the government's official campaign efforts, particularly on Twitter through President Joko Widodo's account (@jokowi), analyzing 1,897 tweets related to electric vehicles and climate initiatives. Employing quantitative and content analysis methods with tools like Nvivo 12 Plus, the study identifies key themes in the campaign, such as reducing CO₂ emissions, creating an EV-friendly ecosystem, encouraging investment, and involving the public in sustainable practices. Through

social media, the government has effectively communicated the importance of transitioning to EVs, aiming to educate and mobilize the public to reduce reliance on fossil fuels and support Indonesia's broader climate goals.

The study makes valuable contributions to **SDG 13: Climate Action** by illustrating how EV adoption is framed as a crucial part of reducing Indonesia's carbon footprint. The campaign's emphasis on the environmental benefits of EVs helps build public understanding of climate issues and promotes cleaner, more sustainable transport options. In relation to **SDG 16: Peace, Justice, and Strong Institutions**, the study demonstrates the role of social media in enhancing transparency and accessibility in policy communication. By using platforms like Twitter to engage with the public openly, the government fosters trust and encourages civic participation, making policy efforts on climate action more inclusive and transparent.

Moreover, the research aligns with **SDG 17: Partnerships for the Goals** by highlighting the importance of collaborative efforts across sectors. The campaign encourages partnerships between government entities, private industry, and the public to support sustainable development goals, demonstrating how digital tools can unite communities in shared environmental initiatives.

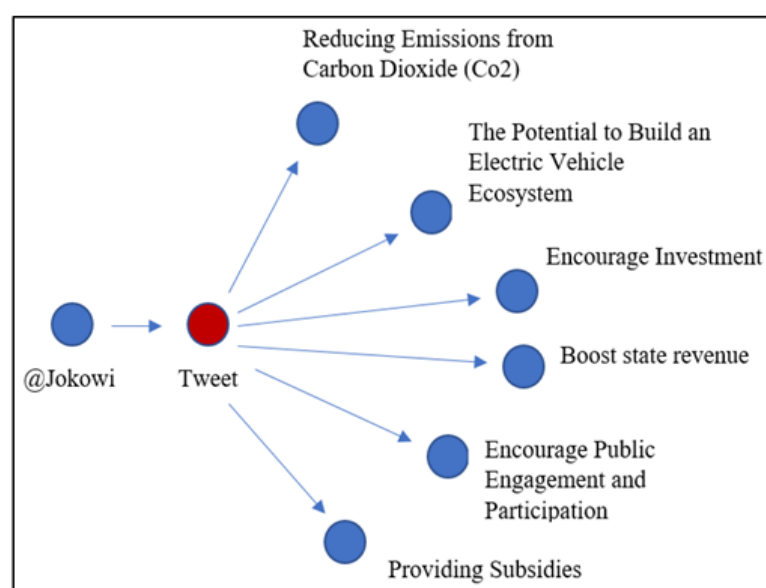


Figure 16.4 Mapping on government campaign topics on Twitter

Does Political Governance Influence the Sports Performance of Asia?



The study, conducted by Mochamad Vrans Romi, Ahmad Harakan, Muhammad Yusuf from Universitas Muhammadiyah Makassar, and colleagues, examines the influence

of political governance on sports performance across Asian countries. Using a quantitative research approach, the researchers analyzed governance indicators such as government effectiveness, regulatory quality, and rule of law to determine their impact on national sports outcomes. Data was collected on governance metrics and sports performance statistics across Asia, revealing a significant relationship between political governance and athletic success. Countries with high government effectiveness and strong regulatory frameworks were found to have better sports infrastructure and policies, contributing to improved performance in international sports competitions. The study highlights that stable political environments create a foundation for effective sports development, and variations in governance models across Asia account for differences in sports achievements. Recommendations include emphasizing transparent governance and effective reforms to build robust sports systems in countries where governance quality may be lacking.

This study aligns with **SDG 16** by underscoring the importance of strong, effective institutions for advancing national interests, including sports development. High governance quality, particularly in areas like regulatory effectiveness and transparency, creates a stable environment where resources for sports can be allocated effectively, ensuring equitable access and opportunities for athletes. Improved governance fosters justice and accountability in resource management, which supports fair competition and institutional integrity in sports.

Waste Bank Policy Implementation through Collaborative Approach: Comparative Study in Makassar and Bantaeng, Indonesia



The study "Waste Bank Policy Implementation through Collaborative Approach: Comparative Study in Makassar and Bantaeng, Indonesia" examines the dynamics and challenges of waste management through waste banks, a community-based waste management initiative. Authors Fatmawati, Mustari, Haerana, Niswaty, and Abdillah from Universitas Muhammadiyah Makassar conducted a qualitative analysis comparing Makassar City and Bantaeng Regency. This research focuses on collaborative governance and policy implementation involving local governments, private sectors, and community members. Data was collected via interviews, field observations, and analyzed with NVivo software, identifying key factors that affect waste bank effectiveness, such as stakeholder communication and community engagement.

Findings indicate that while the waste bank programs provide economic and environmental benefits by converting waste into reusable resources, they face challenges like insufficient community participation and communication gaps among stakeholders. In Makassar, the waste bank program has been more established, yet Bantaeng's initiatives are gaining traction through support from government and private partnerships. The study recommends strengthening collaborative efforts and

enhancing public awareness to optimize waste management systems, encouraging a culture of sustainability in urban and rural areas alike.

This study contributes to **SDG 11** by showing how waste banks create cleaner, more sustainable urban environments. Through efficient waste management, these programs help reduce landfill dependency, fostering healthier and more livable communities. Waste banks also support **SDG 12** by encouraging recycling and resource efficiency, turning waste into valuable resources and promoting sustainable consumption habits within the community. The collaborative approach of the waste bank program aligns with **SDG 16**, advancing transparency and inclusivity in waste management policies. By involving local governments, private sectors, and community members, the program builds trust and accountability within public institutions. Emphasizing the role of partnerships, the study supports **SDG 17** by demonstrating how multi-stakeholder collaboration can drive environmental sustainability. By uniting efforts across government, business, and NGOs, the waste bank model showcases how effective partnerships can address complex environmental challenges.

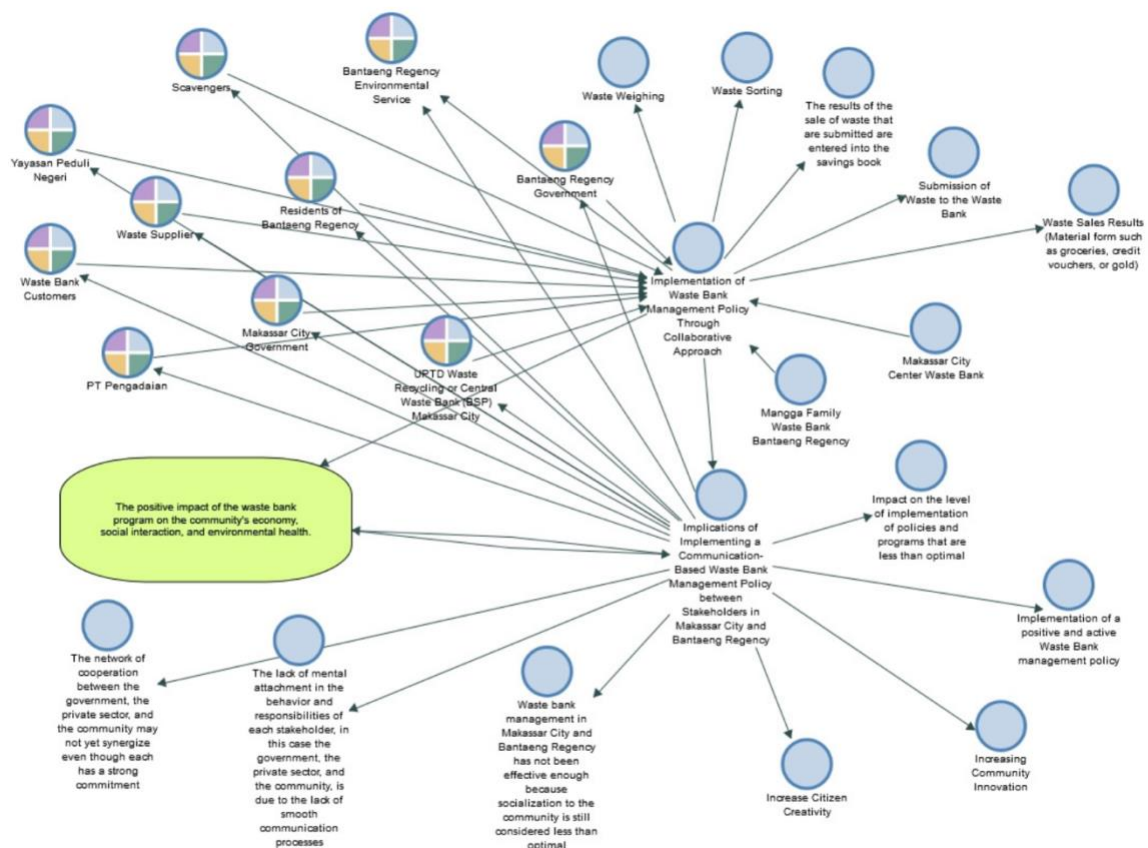


Figure 16.5 Implications of implementing waste bank policy in Makassar City and Bantaeng Regency

17 PARTNERSHIPS
FOR THE GOALS



Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Universitas Muhammadiyah Makassar is fully committed to supporting **SDG 17: Partnerships for the Goals**, which emphasizes the importance of cross-sector collaboration in achieving sustainable development. Through various research and programs, our university actively builds partnerships with government, local communities, private sectors, and international institutions. This commitment is reflected in initiatives such as social empowerment for food security, environmental conservation through mangrove ecosystem management, and enhancing community resilience against climate change. We hope that these collaborations will continue to grow, creating a broader positive impact on society and the environment.

Social Capital and Community Empowerment: Towards Sustainable Agriculture

2

**ZERO
HUNGER**



8

**DECENT WORK AND
ECONOMIC GROWTH**



12

**RESPONSIBLE
CONSUMPTION
AND PRODUCTION**



16

**PEACE, JUSTICE
AND STRONG
INSTITUTIONS**



17

**PARTNERSHIPS
FOR THE GOALS**



Syafiuddin Saleh and his team conducted research on the role of social capital in community empowerment toward sustainable agriculture. Using qualitative research methods with tools like Nvivo 12 Plus, the study identifies how different forms of social capital—bonding, bridging, and linking—are mobilized by bureaucratic and entrepreneurial actors to support the transformation toward organic farming. Their study highlights that both essential and supporting forms of social capital are crucial in empowering organic farmers, with bureaucratic and entrepreneurial actors playing key roles. Essential social capital drives bonding among farmers, strengthened by knowledge exchange and work motivation, while supporting social capital aids through linking, facilitated by price certainty and product certification. Bridging social capital is further enhanced through consistent problem-solving. Collectively, these forms of social capital foster community empowerment, improve agricultural productivity, ensure fair market access, and strengthen institutional partnerships, making social capital both foundational and catalytic for sustainable agricultural development. The study underscores that building strong networks and collaborative efforts is essential for achieving sustainable practices and long-term development across agricultural sectors.

This study's contributions align with several SDGs. It directly supports **SDG 2: Zero Hunger** by promoting sustainable food production practices that improve soil fertility and crop resilience without relying on synthetic chemicals. This approach enhances food security and contributes to healthier food systems, which are essential for reducing hunger and supporting community resilience. In addition, by improving the market viability of organic farming, the study contributes to **SDG 8: Decent Work and**

Economic Growth. The emphasis on high-value organic products provides farmers with sustainable income sources, fostering economic empowerment and decent work in rural areas.

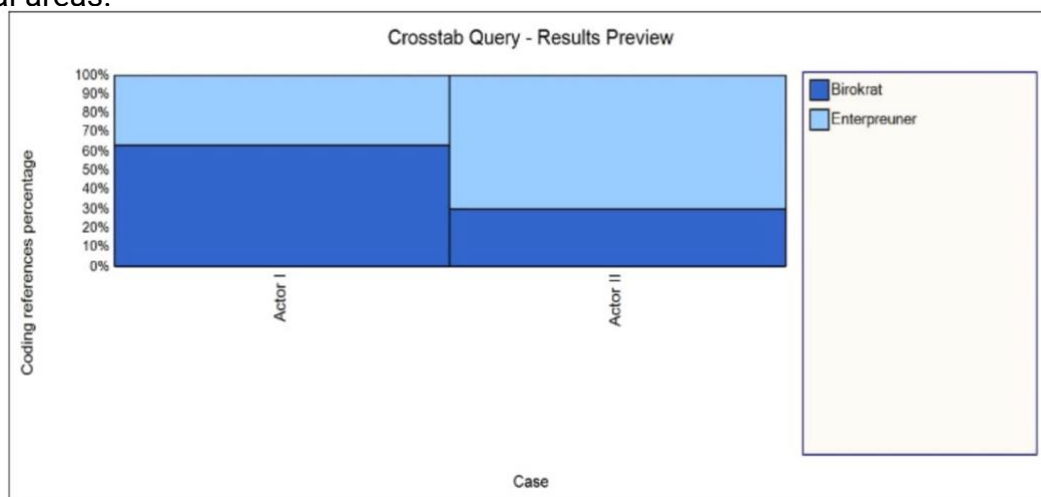


Figure 17.1. Percentage of Bureaucrat Actors and Entrepreneurial Actors

The study's focus on organic farming also supports **SDG 12**, encouraging agricultural practices that minimize environmental impact through reduced chemical dependency. This sustainable approach promotes resource efficiency and aligns with responsible production goals. Furthermore, through its collaboration with government agencies and agricultural extension services, the research advances **SDG 16** by building robust community networks and reinforcing governance structures that ensure fair access to resources and information for farmers. Finally, the study highlights the significance of partnerships in achieving sustainable agriculture, aligning with **SDG 17**: Partnerships for the Goals. The cooperation between government entities, local communities, and entrepreneurs exemplifies the collective effort needed to support sustainable agricultural transformation. By demonstrating the power of social capital in empowering organic farmers, the study provides valuable insights into the role of community-driven initiatives in achieving sustainable development goals.

Adaptation From Maladaptation: A Case study of Community-Based Initiatives of the Saddang Watershed



Naufal and his team conducted a study titled "Adaptation From Maladaptation: A Case Study of Community-Based Initiatives of the Saddang Watershed". They stated that over recent decades, countries have heavily invested in climate adaptation and mitigation efforts; however, some measures have resulted in maladaptation, particularly within watershed communities. This study focused on the Saddang watershed, a priority area in Indonesia, analyzing primary data from observations and in-depth interviews with villagers impacted by extreme weather (droughts and floods)

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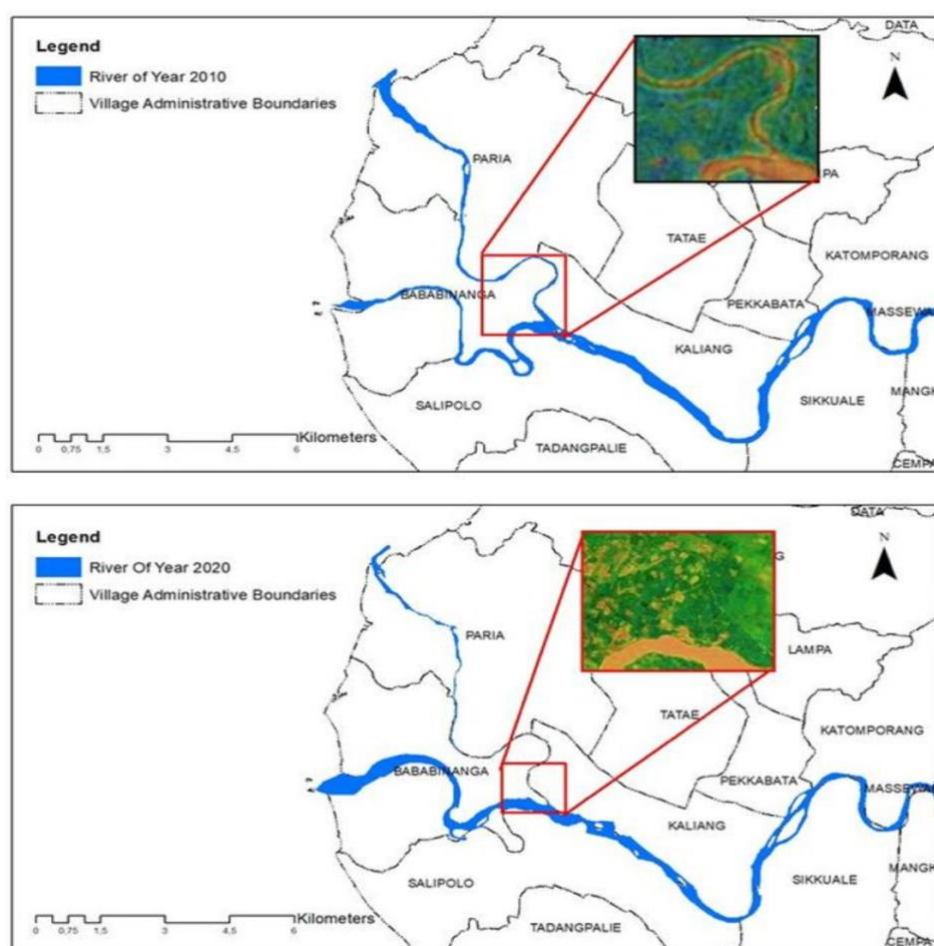


Figure 17.2 Comparison of rivers in Paria and Bababinaga villages in 2009 and 2020 at the Downstream Saddang River Basin

This research contributes to **SDG 2: Zero Hunger** by emphasizing the interconnectedness of climate adaptation and food security. It highlights the importance of sustainable farming practices, as the adoption of drought-resistant crops in unsuitable terrains leads to soil degradation, which could undermine long-term food security goals. In relation to **SDG 13: Climate Action**, the study underscores the need for adaptation measures that do not worsen environmental conditions. By pointing out the unintended impacts of current practices, it calls for climate action strategies that enhance resilience without increasing emissions or environmental risks.

Furthermore, the study aligns with **SDG 16: Peace, Justice, and Strong Institutions** by fostering inclusive decision-making. Involving community perspectives in the assessment of adaptation strategies promotes fair governance, enabling policies that reflect local needs and bolster community resilience. Finally, supporting **SDG 17: Partnerships for the Goals**, the study exemplifies the value of collaborative approaches. By bridging research insights with local government and community actions, it highlights how partnerships and knowledge-sharing can guide communities toward more sustainable climate adaptation.

Determinants of Household Food Security in Tamalate District Makassar City



Hastuti Nustari and her team conducted a study on the determinants of household food security in Barombong Village, Tamalate District, Makassar City, aligning with SDG 2 (Zero Hunger) and 17 (Partnerships for the Goals). The research examined food security dynamics among farmer and non-farmer households, using purposive sampling to select 40 respondents and analyzing the data with multiple linear regression and quantitative descriptive statistics. Findings revealed significant differences in food and non-food expenditures between the two groups, with farmer households allocating 72% of their budget to food, compared to 65.26% among non-farmer households. While high expenses were observed in side dishes, rice, and cigarettes for both groups, farmers also faced added costs for education, donations, and fuel oil. Notably, only 10% of farmer households were food-secure, compared to 40% of non-farmer households. Key factors influencing household food security included income, family size, formal education, and sugar prices, with higher income and education correlating positively with food security, whereas larger family sizes and rising sugar prices had adverse effects. This study underscores the paradoxical vulnerability of farmer households regarding food security and emphasizes the need for collaborative agricultural and social interventions to enhance resilience and sustainability.

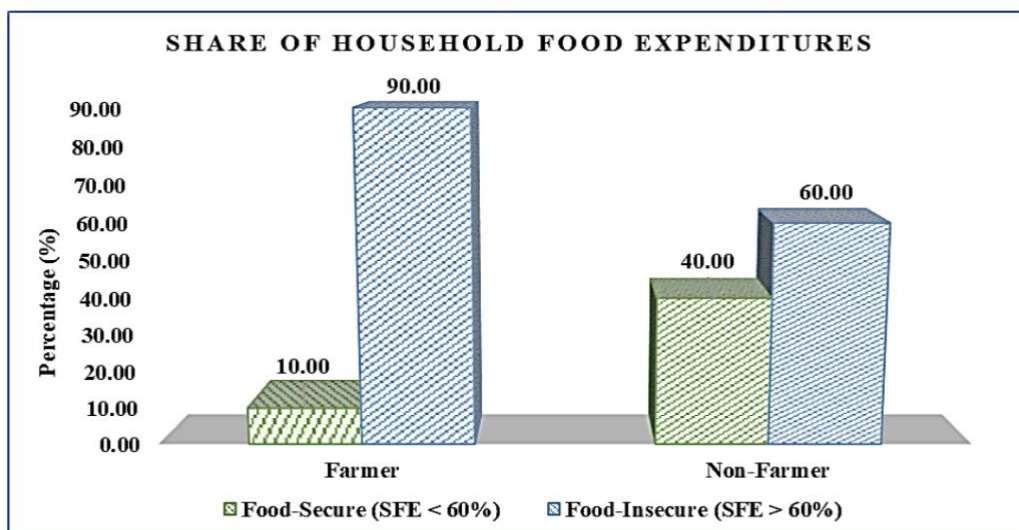


Figure 17.3 Farmer and Non-Farmer Household Food Expenditures

Peer Empowerment in the Community to Prevent Stress, Anxiety and Depression



Community Service Activities carried out by A. Nur Anna, et al in 2023. It focuses on peer empowerment as an effort to prevent stress, anxiety, and

depression among adolescents. As a first step, the team conducted a survey to measure the level of stress, anxiety, and depression among participants using a DASS (Depression Anxiety Stress Scale) questionnaire. The survey revealed a high prevalence of anxiety and depression in the adolescent group, with the majority of participants experiencing moderate to severe levels of anxiety. The service program is carried out through three main stages: preparation, implementation, and evaluation. In the preparation stage, the team compiled educational materials and formed peer groups as supporting media. During the implementation, material on the impact and prevention of stress, anxiety, and depression was delivered through a seminar which was attended by 87 respondents in a hybrid manner. The delivery of the material involved professional speakers and health practitioners. After the education, evaluations were carried out in the form of pretest and post-test to assess the improvement of participants' knowledge and understanding.

Results showed a decrease in anxiety and mild depression in participants who received peer intervention. The outcomes of this program include the formation of peer cadres who are ready to become role models. The program focuses on improving adolescent coping skills through education and peer counselling, in order to reduce the incidence of mental health problems in the future. **SDG 3**, which focuses on health and well-being, is directly related to these initiatives because peer support can help reduce stress, anxiety, and depression, thereby improving the mental health of individuals in the community. Peer empowerment is also in line with **SDG 4**, quality education, because it involves education about mental health and social skills that are

beneficial for individuals in supporting each other, raising awareness, and providing knowledge that can be applied in daily life. **SDG 11**, which highlights sustainable cities and communities, is reflected in this initiative as it strengthens social bonds and creates a safe and supportive environment, thus making communities more resilient and inclusive for all its members. Finally, SDG 17, a partnership to achieve the goals, underpins this approach, as successful peer empowerment requires collaboration between individuals, community organizations, educational institutions, and governments to create sustainable and accessible programs. Through this empowerment, communities can jointly overcome mental health problems and build better collective well-being.



Figure 17.4 Health socialization

Designing Worksheets to Improve Reflective Thinking for Elementary School Students on the Solid Figure Subject



The study in the provided document aligns with the **SDG 4**, which advocates for inclusive and equitable quality education and lifelong learning opportunities for all. The research focuses on developing student worksheets to enhance reflective thinking among fifth-grade elementary students on the topic of solid figures in mathematics. By integrating reflective thinking into problem-solving exercises, the worksheets aim to improve students' cognitive and analytical skills. This approach not only supports the acquisition of essential mathematical concepts but also cultivates critical thinking, a key skill for lifelong learning. The study's development methodology follows a systematic design, involving curriculum analysis and iterative testing to ensure the worksheets are effective and practical for classroom use. Validated by experts, the worksheets show promising results in increasing student engagement and reflective thinking abilities, as evidenced by improved scores in student assessments. Such educational innovations contribute to SDG 4 by providing tools that foster higher-order thinking and adaptability, preparing young learners for complex problem-solving and decision-making tasks in real-life scenarios. By

targeting early education, this study supports a foundation for continuous intellectual growth and development, essential for sustainable societal progress.

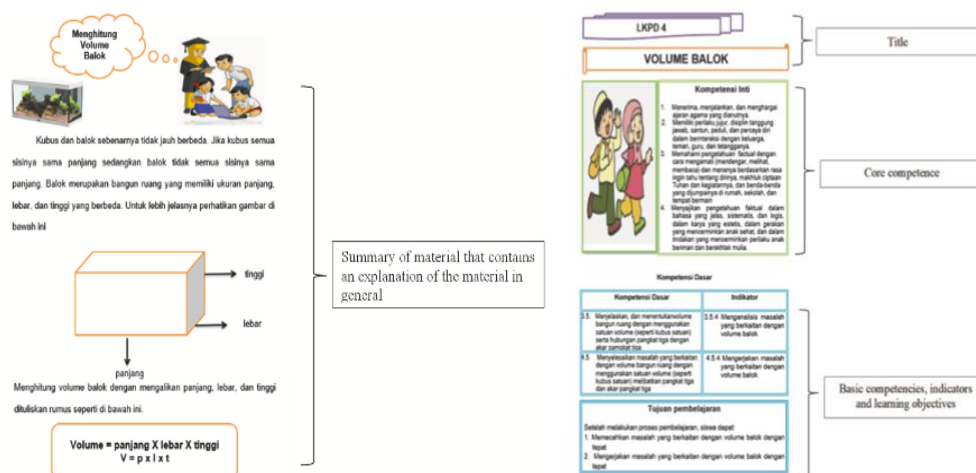


Figure 17.5 Result of the study

Apart from SDG 4, this study aligns well with **SDG 9**, which focuses on building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. The development of problem-solving-based worksheets reflects a commitment to educational innovation by creating tools that facilitate skill development in reflective thinking and problem-solving for young students. Additionally, **SDG 17**, which emphasizes partnerships to achieve the goals, is relevant, as this research involves collaboration among education experts, school practitioners, and the community. The study's approach to developing worksheets through validation and feedback from educational experts showcases an effective partnership model that supports resource sharing and expertise in creating impactful educational materials. This collaboration contributes to building a solid foundation for quality education through innovative materials, making SDGs 9 and 17 complementary to the study's objective of fostering a sustainable learning environment.

Analysis of Mangrove Ecosystem Sustainability in Biringkassi Mangrove Area, Pangkep Regency, Indonesia



A research conducted by Yunus, S, in 2023, highlights the importance of mangrove forest ecosystems in tropical and subtropical coastal areas. Mangrove forests, with their unique tree roots and some visible above water, have an important role as coastal habitats, nurseries for many species, as well as coastal protection from erosion. Mangroves play a significant ecological, social, and economic role for coastal areas. In addition to providing refuge for various marine species, mangroves also help improve the welfare of the surrounding community through abundant marine resources. This research focuses on the analysis of the sustainability of mangrove

ecosystems in the Biringkassi mangrove area, Pangkep Regency, Indonesia. With coastal conditions that are often threatened by human activities, determining the sustainability status of mangrove ecosystems is an important basis for formulating future management policies.

The results of the analysis of the four dimensions show that the ecological and institutional aspects of the mangrove ecosystem in Biringkassi are in a moderate or moderate status in terms of sustainability. This shows that the condition of mangroves still has the potential to be sustainable, but needs better management to achieve higher sustainability. On the other hand, economic and social aspects are considered to have a low level of sustainability. These results suggest that economic activities related to mangroves, such as fisheries or timber extraction, have not been managed sustainably and require more serious interventions to improve these conditions.



The results of this study can be a guide in the formulation of mangrove management policies in the future, so that the sustainability of coastal ecosystems can be maintained. **SDG 6**, which focuses on access to clean water and sanitation, is relevant because mangrove ecosystems act as natural filters that maintain water quality, helping to control waste and pollution that enter the waters. **SDG 14**, which emphasizes the protection of marine ecosystems, is reflected in efforts to conserve mangroves, which are important habitats for diverse marine species and play a role in preventing coastal erosion and protecting local fisheries that sustain the economies of local communities. **SDG 15**, which focuses on protecting terrestrial ecosystems, is also directly related to mangroves as they are an integral part of biodiversity that helps prevent land degradation and maintain the balance of coastal ecosystems. Lastly, **SDG 17**, a partnership to achieve the goals, is particularly relevant because the sustainability of mangrove ecosystems requires collaboration between governments, communities, researchers, and non-profit organizations in planning, monitoring, and preserving the area. This analysis of the sustainability of mangrove ecosystems not only supports environmental quality and biodiversity, but also creates a collaborative framework that strengthens conservation efforts at the local and national levels.

Synchronization of SDGs in the Concept of Waterfront Settlements in Makassar City



This research conducted by Amalia A.A in 2023, highlights major challenges in achieving sustainable development goals in Makassar City, especially related to waterfront settlements. Along with the global agenda of the SDGs 2030 which prioritizes universal, integrated, and inclusive principles to ensure that no one is left

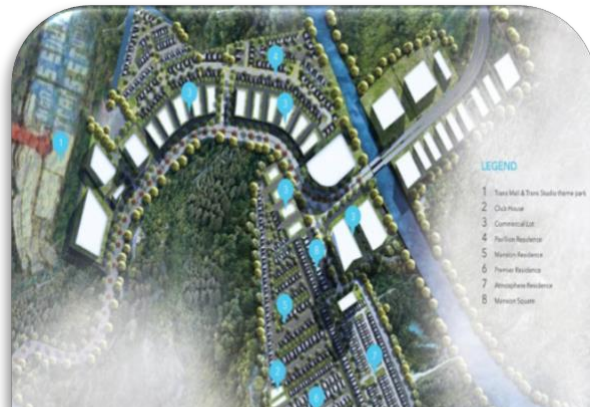


Figure 17.6 Waterfront Concept

behind, Makassar City is faced with the problem of slum areas that are still quite significant. Based on 2018 data, there are around 650.74 hectares of slum areas that have not been addressed, with the majority of the concentration being along the coastline or waterfront. The main problems found in settlements on the waterfront of Makassar City include seawater intrusion and sedimentation that occurs in household rainwater drains, as well as the lack of access to drinking water and sanitation for low-income people (MBR). In addition, uninhabitable

housing conditions are also a concern. This phenomenon is a big challenge for Makassar City to be able to meet the SDGs targets, especially in terms of access to clean water, sanitation, and decent housing for the entire community. The results of the study show that the distribution of slums in Makassar City which are located in waterfront settlements has a certain pattern that is closely related to the economic condition of the surrounding community, accessibility to basic infrastructure, and environmental quality. These slums tend to suffer from problems of low building resilience, inadequate building area, and insufficient access to drinking water and sanitation. In addition, seawater intrusion that occurs due to the geographical location of settlements located on the coastline adds to the challenge in creating decent and safe housing for the community.

The concept of waterfront villages based on the achievement of the SDGs must meet the criteria for decent housing, ranging from building resilience, adequacy of residential area, to access to sanitation and drinking water. **SDG 6**, which focuses on access to clean water and sanitation, is relevant in the development of waterfront settlements because the region must ensure sustainable water management, including the provision of clean water and environmentally friendly sanitation systems. The concept of this waterfront settlement is also in line with **SDG 11**, namely inclusive, safe, resilient, and sustainable cities and settlements. Settlement designs that are integrated with coastal ecosystems support sustainability, by minimizing flood risk, maintaining environmental quality, and providing inclusive access for all community groups. **SDG 17**, a partnership to achieve the goals, is an important foundation in realizing this concept, as sustainable waterfront development requires collaboration between governments, the private sector, local communities, and international institutions to share knowledge, technology, and resources. With this synchronization, the concept of waterfront settlements in Makassar City not only supports water and sanitation management and coastal area security, but also strengthens the partnership network for sustainable development.

Autonomous Energy Management by Applying Deep Q-Learning to Enhance Sustainability in Smart Tourism Cities



Jermstittiparsert and his team conducted a study titled “Autonomous Energy Management by Applying Deep Q-Learning to Enhance Sustainability in Smart Tourism Cities.” This research focuses on optimizing energy efficiency in microgrids, particularly those supporting tourism industries in remote areas where access to main power grids is limited. The study introduces a deep reinforcement learning approach (Deep Q-Learning) to optimize the production, storage, and distribution of energy within microgrids composed of renewable sources such as solar panels, energy storage systems, and generators. This system dynamically manages energy flows to ensure cost efficiency and sustainability, thereby supporting energy goals in off-grid tourism destinations. Figure 1 illustrates the application of a deep reinforcement learning-based energy management system.



Figure 17.7 Energy management system applied by deep reinforcement learning

This study contributes to several SDGs, particularly **SDG 7: Affordable and Clean Energy**, by improving energy efficiency and reducing costs by 13.19%. The autonomous management of renewable energy sources provides a sustainable and reliable energy supply, meeting the objective of providing affordable, clean energy for all. Additionally, aligning with **SDG 11: Sustainable Cities and Communities**, the integration of autonomous energy management promotes sustainable urban development by ensuring that tourism destinations operate more efficiently, reduce their environmental impact, and enhance the quality of life for both tourists and local communities. This approach supports the creation of sustainable tourism cities that utilize resources responsibly.

Furthermore, this research supports **SDG 12: Responsible Consumption and Production** by using deep reinforcement learning to optimize energy utilization. The system dynamically adjusts to energy demands, preventing overuse and encouraging efficient production and consumption practices, which minimizes environmental impact while maintaining operational efficiency. Consistent with **SDG 13: Climate Action**, the integration of renewable energy and smart energy management contributes to reducing greenhouse gas emissions and supports global climate action initiatives. The system enhances the efficiency of energy distribution, particularly in environmentally sensitive areas with high tourism activity, thereby reducing carbon footprints.

Finally, the study also aligns with **SDG 17: Partnerships for the Goals** by fostering collaborations among local governments, tourism operators, and energy providers. This partnership-driven approach is essential for developing effective energy solutions that support sustainable growth in tourism and energy efficiency. The collaborative efforts exemplify the impact of multi-stakeholder engagements on achieving SDGs, highlighting the role of intelligent energy management in establishing sustainable, resilient tourism cities.

An Intelligent Recommendation for Intelligently Accessible Charging Stations: Electronic Vehicle Charging to Support a Sustainable Smart Tourism City



A research team led by Jermstipparsert at Universitas Muhammadiyah Makassar conducted a study titled “An Intelligent Recommendation for Intelligently Accessible Charging Stations: Electronic Vehicle Charging to Support a Sustainable Smart Tourism City.” This research addresses significant challenges, including inadequate electric vehicle (EV) charging infrastructure and the imbalanced spatial and temporal demand for charging. Utilizing the Spatio-Temporal Multi-Agent Reinforcement Learning (STMARL) framework, the study enhances the efficiency of public-accessible EV charging stations by significantly reducing wait times, costs, and failure rates compared to traditional random selection approaches. Figure 3 illustrates the implementation of an EV charging recommendation system based on the study's findings.

This research makes substantial contributions to multiple SDGs. First, it supports **SDG 7: Affordable and Clean Energy** by enhancing EV charging system efficiency, making clean energy solutions more accessible and cost-effective for urban and tourist transportation. The optimization of EV charging station locations and operations minimizes energy wastage and encourages renewable energy utilization in the transportation sector. In alignment with **SDG 11: Sustainable Cities and Communities**, this study contributes to the development of smart and sustainable urban areas. By integrating intelligent EV charging infrastructure, particularly in tourist cities like

Chiang Mai, the research reduces pollution and traffic congestion, enhancing the sustainability and attractiveness of these cities for residents and visitors alike.

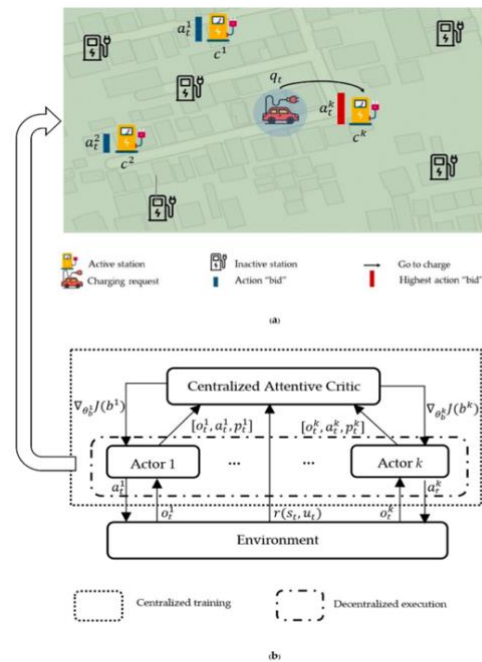


Figure 17.8 The implementation of electric vehicle (EV) charging recommendation systems. (a) EV Charging Station (b) EV Charging Framework.

Moreover, this research supports **SDG 12: Responsible Consumption and Production** by advocating for responsible and efficient energy consumption. The intelligent charging system ensures optimal use of energy resources, reducing overconsumption and advancing sustainability in urban energy production and consumption cycles. Aligning with **SDG 13: Climate Action**, the study contributes to efforts in mitigating climate change by promoting EV adoption, which decreases greenhouse gas emissions and air pollution. The STMARL framework optimizes charging station operations, minimizing energy loss and reducing carbon emissions. Additionally, this work aligns with **SDG 17: Partnerships for the Goals** by emphasizing collaboration among local governments, tourism authorities, and energy providers. These partnerships are essential for advancing clean energy initiatives and establishing resilient urban systems that support long-term sustainability.

In conclusion, Jermisittiparsert and his team's research underscores the vital role of innovation in developing EV infrastructure to support sustainable mobility and smart city growth. By implementing the STMARL framework, the study not only enhances EV charging system efficiency but also contributes to achieving SDGs 7, 11, 12, 13, and 17. This research promotes clean energy usage and highlights the importance of collaborative efforts in establishing sustainable, climate-resilient urban environments.

Integration of Kouprey-Inspired Optimization Algorithms with Smart Energy Nodes for Sustainable Energy Management of Agricultural Orchards



Kittisak Jermsittiparsert and his team conducted a study titled “Integration of Kouprey-Inspired Optimization Algorithms with Smart Energy Nodes for Sustainable Energy Management of Agricultural Orchards.” This research addresses energy management challenges within agricultural orchards, specifically targeting volcanic durian cultivation in Sisaket Province, Thailand. The study employs Kouprey-Inspired Optimization (KIO) algorithms alongside smart energy nodes to enhance energy efficiency by integrating renewable solar energy with traditional power sources. This system significantly reduces labor and energy costs by approximately 30% and 50%, respectively, contributing to both sustainable agriculture and community-based tourism.

The study directly supports **SDG 7: Affordable and Clean Energy** by optimizing energy use in rural and agricultural settings. Smart energy nodes within the system facilitate the use of clean solar power, reducing reliance on conventional energy sources and lowering energy expenses for farmers and tourism operators. Figure 5 presents the theoretical framework of the smart energy system, illustrating its application in both durian plantations and tourist accommodations. In addition to energy goals, this study contributes to **SDG 2: Zero Hunger** by improving agricultural productivity. Reduced energy and labor costs allow farmers to reinvest savings into enhancing crop yields, thereby supporting food security and income stability. This system benefits the local agricultural economy, ensuring stable food sources and sustainable livelihoods. Moreover, consistent with **SDG 8: Decent Work and Economic Growth**, the integration of smart technology within agriculture and tourism not only lowers operational costs but also enhances profitability. This sustainable model fosters economic growth and creates employment opportunities within rural communities.

The study also advances **SDG 12: Responsible Consumption and Production** by promoting efficient energy management practices. The smart energy nodes regulate energy usage sustainably, minimizing waste and ensuring resources are used responsibly. This approach reduces environmental impacts and enhances the sustainability of production systems. Lastly, the research supports **SDG 17: Partnerships for the Goals** by demonstrating the importance of collaboration between local governments, academic institutions, and private sectors. The success of the energy management system highlights the effectiveness of partnerships in driving sustainable development within the agricultural and tourism industries. These collaborations ensure that innovative energy solutions are developed and effectively implemented, fostering economic and environmental resilience in the long term.

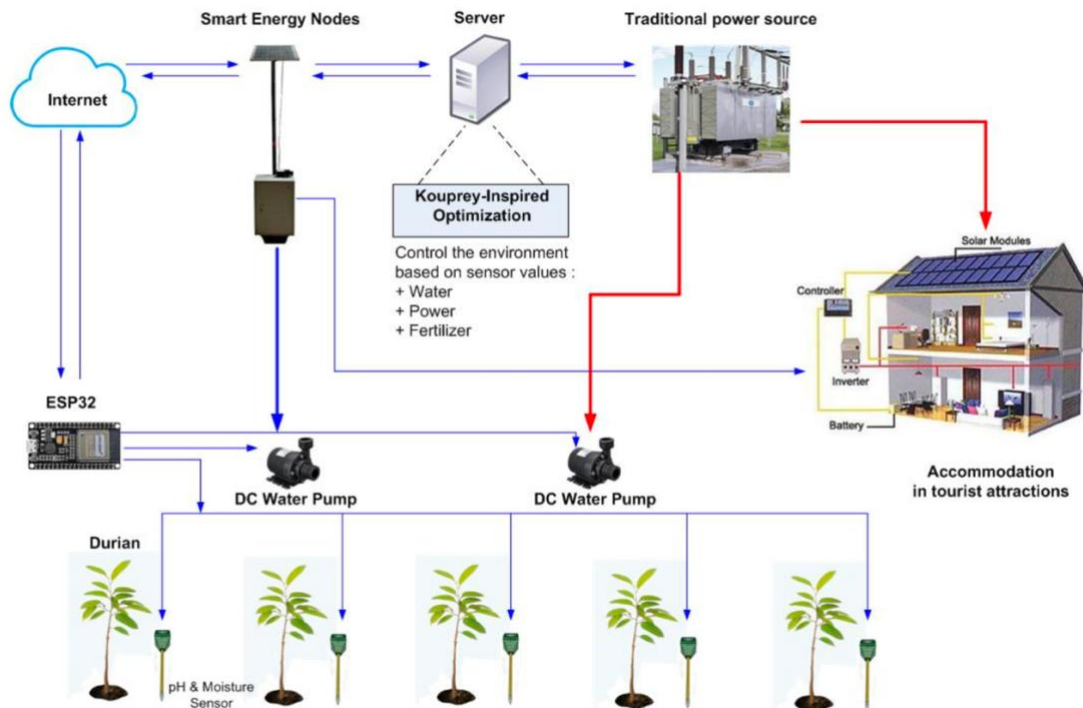


Figure 17.9 Theoretical framework of smart energy

Public Response on Twitter: The Urgency of Government Policy on Electric Vehicles



Luth, Kismartini, Dyah Lituhayu, Rani Maswati, and Tawakkal Baharuddin conducted a study titled “Public Response on Twitter: The Urgency of Government Policy on Electric Vehicles,” examining public perceptions of electric vehicle (EV) policies in Indonesia through Twitter sentiment analysis. This research aims to assess the urgency of EV policies in addressing pressing environmental issues, such as air pollution, dependency on imported fuels, and climate change, while promoting energy efficiency and reducing greenhouse gas emissions. Using Nvivo 12 Plus software, the researchers analyzed 5,789 tweets, capturing public reactions and sentiment toward EV policies. The findings reveal substantial negative public sentiment despite government incentives, such as fiscal benefits and tax exemptions for EVs. Key concerns include limited EV mileage, high costs, and inadequate charging infrastructure, all of which pose challenges to widespread adoption. Figure 6 shows the primary factors influencing negative sentiment and public acceptance regarding EV adoption in Indonesia.

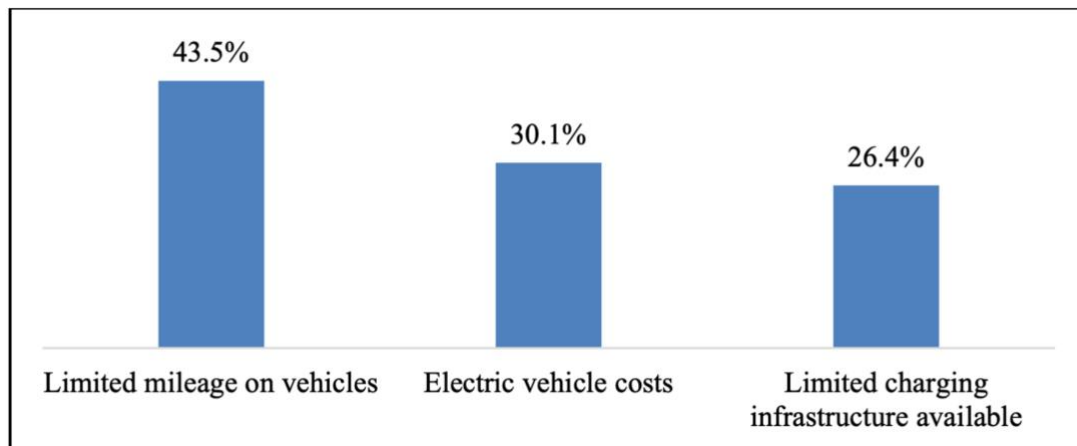


Figure 17.10 Dominant factors influencing negative sentiment and public acceptance

The study contributes to **SDG 7: Affordable and Clean Energy** by highlighting the need for comprehensive government policies to facilitate the shift toward cleaner transportation alternatives. The findings emphasize that effective policy frameworks and infrastructure development are crucial for making EVs accessible and affordable, thus promoting energy efficiency in Indonesia's transportation sector. By addressing infrastructure and cost barriers, government efforts can significantly improve public access to clean and sustainable energy options.

In alignment with **SDG 13: Climate Action**, the study underscores the importance of EV policies in reducing carbon emissions and enhancing air quality, especially in urban centers. The push for EV adoption is seen as a strategic initiative to reduce the transportation sector's dependence on fossil fuels, supporting broader climate goals. The research highlights that robust policy interventions are needed to fully realize the environmental advantages of EVs.

Furthermore, this study aligns with **SDG 17: Partnerships for the Goals** by underscoring the critical role of collaboration among government bodies, the automotive industry, and the public. It emphasizes that partnerships are essential for building the necessary infrastructure, providing subsidies, and conducting public awareness campaigns to boost EV adoption. The research suggests that establishing such alliances is vital to creating a supportive environment for EVs, thereby contributing to sustainable development on both national and global levels.

Governance and Protection of Indonesian Migrant Workers in Malaysia: A Study on Policy and Innovation Network



The study titled "Governance and Protection of Indonesian Migrant Workers in Malaysia: A Study on Policy and Innovation Network" by Andi Luhur Prianto, Aqmal

Reza Amri, and Mohd Na'eim Ajis explores the collaborative efforts between Indonesia and Malaysia to improve the governance and protection of Indonesian migrant workers (IMWs) in Malaysia. The research investigates the role of policy networks and digital innovations, such as the "one channel system," an official recruitment mechanism established through a Memorandum of Understanding (MoU) between the two countries. This system aims to streamline recruitment processes, reduce exploitation, and enhance protection measures for migrant workers. However, the study identifies ongoing challenges in the implementation of these innovations, particularly within Malaysia, underscoring the complexities of cross-border labor governance and the critical need for sustained collaboration to safeguard the rights and welfare of IMWs.

The study contributes to **SDG 9: Industry, Innovation, and Infrastructure** by highlighting the use of digital innovation in the recruitment and management of migrant labor through the "one channel system." This system advances the industrial and digital infrastructure necessary to modernize labor management, creating a more secure, efficient recruitment process that prioritizes worker protection and aligns with sustainable development goals. In support of **SDG 10: Reduced Inequalities**, the study addresses the vulnerabilities faced by Indonesian migrant workers and advocates for equitable policies that protect them from exploitation and discrimination. This focus on fair treatment and protective measures is essential in reducing socioeconomic inequalities, particularly for marginalized migrant populations.



Figure 17.11 The collaborative efforts between Indonesia and Malaysia to improve the governance and protection of Indonesian migrant workers (IMWs)

The research also aligns with **SDG 16: Peace, Justice, and Strong Institutions** by emphasizing the importance of robust governance and institutional accountability. The bilateral agreements and regulatory frameworks discussed in the study foster justice, transparency, and inclusivity in the treatment of migrant workers, ensuring that their rights are upheld through strong institutional support.

Finally, the study underscores the significance of **SDG 17: Partnerships for the Goals** by showcasing the importance of international collaboration between Indonesia and Malaysia. This partnership facilitates the development of a supportive network dedicated to addressing the protection and governance needs of migrant workers,

demonstrating how cross-border cooperation can effectively promote labor rights and human dignity. Through these contributions, the study highlights the transformative potential of policy innovation and collaborative governance in addressing complex issues surrounding migrant labor.

Opportunities and Challenges for Local Governments to Facilitate the Implementation of Investment Paradiplomacy



The study titled "Opportunities and Challenges for Local Governments to Facilitate the Implementation of Investment Paradiplomacy" by Ahmad Harakan from Muhammadiyah University of Makassar and Abel Alfred Kinyondo from the University of Dar es Salaam explores how local governments in South Sulawesi, Indonesia, and Dar es Salaam, Tanzania, are leveraging investment paradiplomacy to promote regional development. With decentralization policies in place, local governments now have greater autonomy to build international relations, fostering investment and showcasing local potential on a global scale. Using a qualitative approach that includes comparative analysis, interviews, and field observations, the study highlights both the opportunities and obstacles that local governments encounter in this endeavor.

The research reveals that local governments in both South Sulawesi and Dar es Salaam have implemented practices such as establishing supportive regulations, enhancing service and information infrastructure, and participating in international exhibitions to attract investors. However, disparities in resources and infrastructure pose challenges, with South Sulawesi showing a more advanced capacity for paradiplomacy due to stronger facilities, infrastructure, and human resources compared to Dar es Salaam. This difference reflects how varying local capabilities impact the effectiveness of investment-focused paradiplomacy.



Figure 17.12 Research implementation

The study's contributions align with **SDG 9: Industry, Innovation, and Infrastructure** by encouraging the development of essential infrastructure, regulatory frameworks, and communication systems that support investment.

Such modernization efforts equip local governments to create a competitive and attractive environment for industries, thus fostering regional innovation and sustainable economic growth. Additionally, the study embodies **SDG 17: Partnerships for the Goals** by showcasing the importance of international collaboration. Through paradiplomacy, local governments in Indonesia and Tanzania build strategic partnerships with global investors and institutions, facilitating sustainable development through shared knowledge and resources

Waste Bank Policy Implementation through Collaborative Approach: Comparative Study in Makassar and Bantaeng, Indonesia



The study "Waste Bank Policy Implementation through Collaborative Approach: Comparative Study in Makassar and Bantaeng, Indonesia" examines the dynamics and challenges of waste management through waste banks, a community-based waste management initiative. Authors Fatmawati, Mustari, Haerana, Niswaty, and Abdillah from Universitas Muhammadiyah Makassar conducted a qualitative analysis comparing Makassar City and Bantaeng Regency. This research focuses on collaborative governance and policy implementation involving local governments, private sectors, and community members. Data was collected via interviews, field observations, and analyzed with NVivo software, identifying key factors that affect waste bank effectiveness, such as stakeholder communication and community engagement.

Findings indicate that while the waste bank programs provide economic and environmental benefits by converting waste into reusable resources, they face challenges like insufficient community participation and communication gaps among stakeholders. In Makassar, the waste bank program has been more established, yet Bantaeng's initiatives are gaining traction through support from government and private partnerships. The study recommends strengthening collaborative efforts and enhancing public awareness to optimize waste management systems, encouraging a culture of sustainability in urban and rural areas alike.

This study contributes to **SDG 11** by showing how waste banks create cleaner, more sustainable urban environments. Through efficient waste management, these programs help reduce landfill dependency, fostering healthier and more livable communities. Waste banks also support **SDG 12** by encouraging recycling and resource efficiency, turning waste into valuable resources and promoting sustainable consumption habits within the community. The collaborative approach of the waste bank program aligns with **SDG 16**, advancing transparency and inclusivity in waste management policies. By involving local governments, private sectors, and community members, the program builds trust and accountability within public institutions. Emphasizing the role of partnerships, the study supports **SDG 17** by

demonstrating how multi-stakeholder collaboration can drive environmental sustainability. By uniting efforts across government, business, and NGOs, the waste bank model showcases how effective partnerships can address complex environmental challenges.

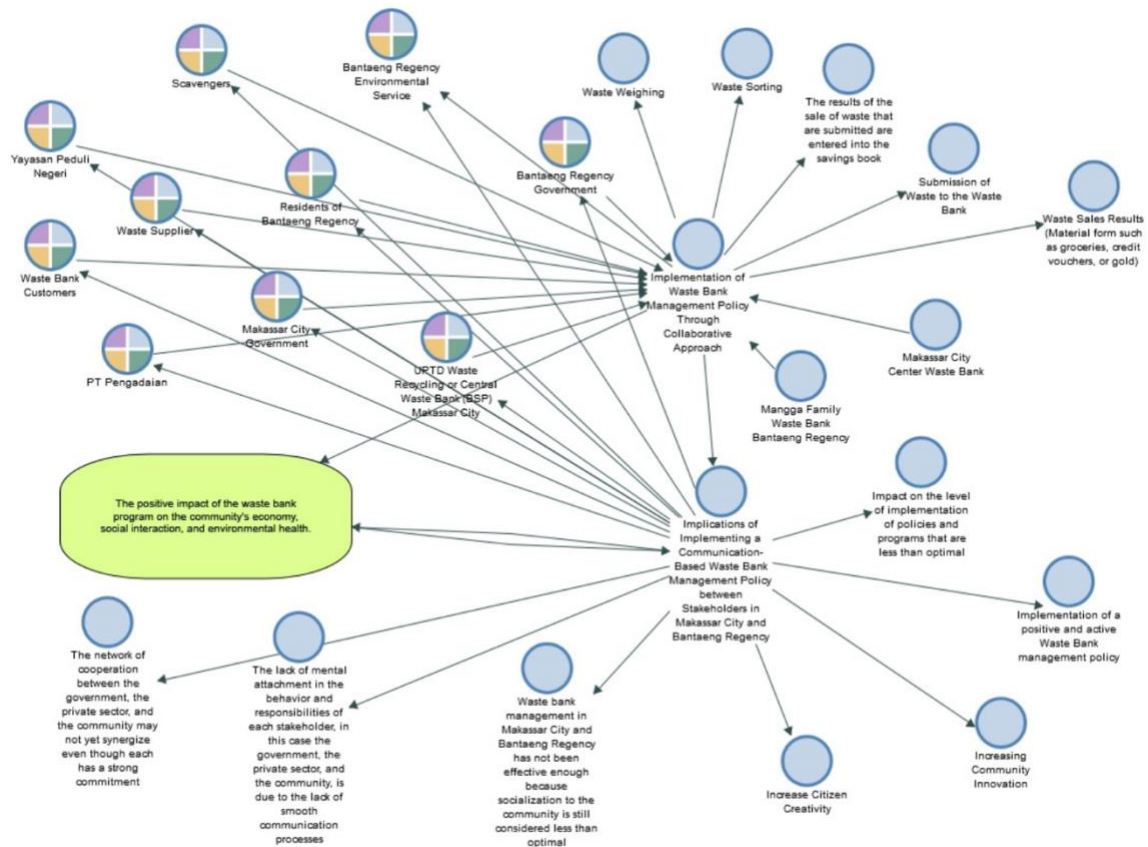


Figure 17.13 Implications of implementing waste bank policy in Makassar City and Bantaeng Regency

