

Artificial Intelligence-based System to Improve Seafood Product Quality

Abstract (200-300 words)

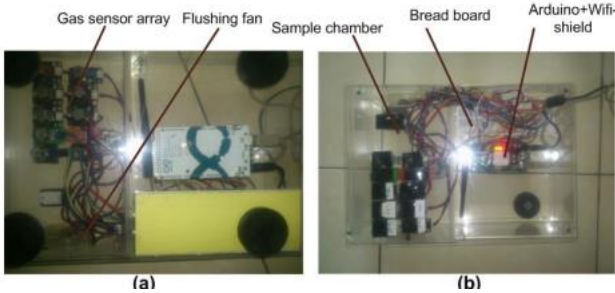
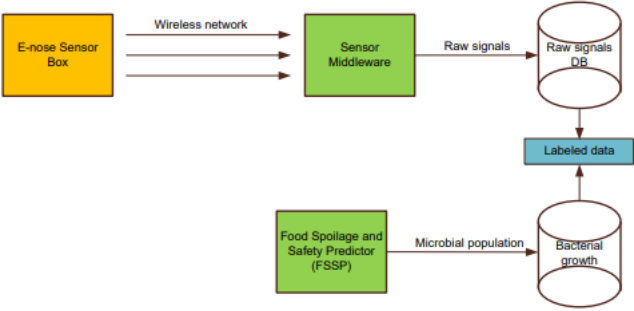
Indonesia as a maritime country has a very large potential for marine products that need to be accompanied by infrastructure facilities and infrastructure to optimize these resources. Currently, the Ministry of Maritime Affairs and Fisheries (KKP) continues to make various efforts to increase the export value of fishery products, whether live, fresh, cold, or processed. On the other hand, the stringent stringent export quality standards are a challenge in itself. As is known, marine and fishery products are perishable commodities, so they require special treatment in handling. The official standard of testing to determine the freshness and safety of marine and meat products is the total viable count (TVC). The laboratory test process takes a long time of 24–72 hours and is expensive for one test. Electronic nose (e-nose) technology has promising potential to be used in various fields. In recent years, e-nose has been developed and tested in the field of food processing for quality assessment. In the medical field, e-nose has also been developed for the diagnosis of diseases such as cancer and diabetes as well as bacterial infections in wounds. For these specific applications, the best sensor gas combination may vary depending on the volatile gas that is the biomarker of a sample. This study aims to develop an e-nose system and artificial intelligence for a fast and inexpensive system for testing the quality of marine products so that later it can be used by many parties to guarantee the quality of marine products. marine products with TKT 4 and HKI. While the additional output is one publication in a reputable international journal. This research also involves partners, namely PT. Anugrah Laut Indonesia (PT Ali Seafood) as a potential user of the products produced and a provider of samples of marine products. This activity also involves students as a forum for direct practice on real case studies in industry. The dataset generated in this study will also be used as material and cases in data science courses.

Planning

Background

The fishing industry is one sector that is expected to increase the country's economic growth. Therefore, in order to realize an advanced, independent, strong and national interest-based Indonesian fishery sector, Presidential Instruction Number 7 of 2016. The purpose of this policy is to improve the welfare of fishermen, cultivators, processing and marketing of fishery products, absorbing labor, and increasing foreign exchange. country [1]. Indonesia as a research summary of no more than 500 words containing the background of the research, the objectives and stages of the research method, the targeted output, and a description of the proposed research TKT. Maximum keywords 5 words Research background no more than 500 words containing background and problems to be researched, specific objectives and feasibility studies. In this section, it is necessary to explain the description of the specification of the relationship between the scheme and the focus area or research strategic plan of PT. Maritime countries have the potential of abundant marine and fishery resources that need to be accompanied by infrastructure facilities and infrastructure to optimize these resources. As is known, marine and fishery products are perishable commodities, so they require special treatment in handling. Therefore, we need a system that aims to increase the capacity and stability of the production and marketing system, strengthen connectivity between upstream production centers, downstream production and marketing efficiently, and improve the efficiency of supply chain management of marine and fishery products, as well as information from upstream to downstream. involving the synergy of various parties. The increase in capture fishery production was contributed by the increase in marine fishery production by 2.23% and inland public waters by 2.71% [2]. The export value of Indonesian fishery products until December 2020 reached USD 5.20 billion. Based on export destination countries, the United States (US) is still the largest market with a contribution of 40.30% or USD 2.1 billion. Currently, the Ministry of Maritime Affairs and Fisheries (KKP) continues to make various efforts to increase the export value of fishery products, whether live, fresh, cold, or processed. Strict export

		quality standards are a challenge in itself. As an example of the obstacles faced include [2]: 1. Some Indonesian fishery products are considered not to meet the quality standards of the Japanese market. 2. The United States is increasingly tightening the criteria and quality of its imported products, such as guarantees for the safety of fishery and non-IUU products, sustainability and traceability. Some of the efforts made by the KKP include improving the quality of marine and fishery products for export commodities of important economic value through feasibility certification and also Workshop on Remote Assessment in Fisheries Inspection and Certification. The official standard of testing to determine the freshness and safety of marine and meat products is the total viable count (TVC) [3]. The laboratory test process takes a long time of 24–72 hours and is expensive for one test [4]. For this reason, a fast, inexpensive, and easy to operate seafood product testing mechanism is needed to complement or even replace laboratory tests that take a long time and are expensive so that the frequency of testing becomes easier and more frequent to ensure the quality of fishery product commodities, especially for fishery products. export needs. Based on this background, this research proposal aims to develop a method for testing the quality/freshness of fishery product commodities, including prediction of microbial populations that are fast, inexpensive, and easy to operate using an electronic nose (e-nose) and artificial intelligence algorithms. The output of the first year of this research is HKI Application of e-nose interface based on mini PC device. Furthermore, the second year's output is a prototype e-nose system for testing the quality of marine products and publications in reputable international journals. This research also involves partners, namely PT. Anugrah Laut Indonesia (PT Ali Seafood) as a potential user of the products produced and a provider of samples of marine products.
Subject (Names & titles)	Initiator(s)	DEDY RAHMAN WIJAYA
	Leader(s)	DEDY RAHMAN WIJAYA
	Team members	1. Dr. TORA FAHRUDIN S.T, M.T 2. RINI HANDAYANI S.T, M.T
Environment	Nature/society	-
	Industry/market	PT. Anugrah Laut Indonesia
	Government/others	DIKTI
Resources	Human requirements	-
	Financial requirements	Grant Fund DIKTI
	Technological/other requirements	-
Mechanism	Strategic options available	-
	Their relative importance	-
	Their sequences for execution	1. E-nose hardware assembly 2. Acquisition of e-nose dataset 3. Development of machine learning algorithm 4. Integration of hardware and machine learning models 5. Laboratory environment testing 6. Finalization of system integration
Content		The proposed research method can be divided into several steps, including assembling the e-nose hardware, acquiring the e-nose dataset, developing machine learning algorithms, testing the lab environment, and finalizing system integration. Figure 4 shows the proposed research method and flow in detail.
Key points		marine products, quality test, electronic nose, artificial intelligence
Differences from traditional approaches		This project uses a new method or approach, resulting in better output. In addition, the application of information technology and IR 4.0 can increase efficiency and productivity.

Doing	
Launch date	
Responsible organization	TELKOM UNIVERSITY, PPM, DIKTI
Progress as of today	-
Problems in implementation	-
Approaches to solve the problems	-
Completion date, if completed	December 15, 2022
Seeing	
Impacts on students	Become the topic of the student's final project
Impacts on professors and university	Research results in addition to the Tel-U Nose (T-Nose) product involving lecturers and students have produced several publications in Q1/Q2 journals and presented at international conferences, of course increasing the reputation of the campus
Responses from industry/market	Respond well to the results of this study
Responses from government	The government's response is of course supportive because we have successfully passed research grants from the Directorate General of Vocational Education, Ministry of Education and Culture and research grants for Research and Innovation for Advanced Indonesia (RIIM) from BRIN-LPDP
Measurable output	Develop methods for testing the quality/freshness of product commodities fisheries including microbial population prediction that is fast, inexpensive, and easy to operate using electronic nose (e-nose) and artificial intelligence algorithms.
Cost-benefit analysis for effectiveness	according to the program carried out
Future Planning	
Where does the project go from here?	Developed an e-nose to detect samples such as meat, seafood and tea. e-nose research for marine products is funded by the Director General of Vocational Studies through a vocational product research (P2V) scheme with partner PT Anugrah Laut Indonesia. Meanwhile, e-nose for tea is funded by BRIN-LPDP through the RIIM scheme with partners from the Gambung Tea and Quinine Research Center (PPTK). It is hoped that the system developed can help the quality control department to ensure product quality quickly, cheaply, easily, and accurately.
Miscellaneous	
Exhibits, pictures, diagrams, etc.	 (a) (b)  <pre> graph LR ESB[E-nose Sensor Box] -- Wireless network --> SM[Sensor Middleware] SM -- Raw signals --> RSDB[(Raw signals DB)] RSDB --> LD[Labeled data] LD --> FSSP[Food Spoilage and Safety Predictor FSSP] FSSP -- Microbial population --> BG[(Bacterial growth)] </pre>
Reports, mimeos, monographs, books, etc.	
Others which may help explain the project	