

Article

An Innovative MOCAF Dryer Design: A TRIZ-Driven Solution

Didiek Hermanuadi ¹, Iswahyono ^{2*}, Yossi Wibisono ³, Dimas Triardianto ⁴, Siti Djamila ⁵, Amal Bahariawan ⁶

¹ Department of Agricultural Technology, Politeknik Negeri Jember; didiek_hermanuadi@polije.ac.id

² Department of Agricultural Technology, Politeknik Negeri Jember; iswahyono@polije.ac.id

³ Department of Agricultural Technology, Politeknik Negeri Jember; tri_rini@polije.ac.id

⁴ Department of Agricultural Production, Politeknik Negeri Jember; yossi_wibisono@polije.ac.id

⁵ Department of Agricultural Production, Politeknik Negeri Jember; siti_djamila@polije.ac.id

⁶ Department of Agricultural Production, Politeknik Negeri Jember; amal_bahariawan@polije.ac.id

* Correspondence: iswahyono@polije.ac.id

Citation: D. Hermanuadi, I. Iswahyono, Y. Wibisono, D. Triardianto, S. Djamila, and A. Bahariawan, "An Innovative MOCAF Dryer Design: A TRIZ-Driven Solution", *TEFA*, vol. 2, no. 2, pp. 130–138, Jun. 2025.

Received: 08-05-2025

Accepted: 25-06-2025

Published: 30-06-2025



Copyright: © 2025 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution-ShareAlike 4.0 International License (CC BY SA) license (<http://creativecommons.org/licenses/by-sa/4.0/>).

Abstract: The drying stage critically determines the quality of Modified Cassava Flour (MOCAF), directly affecting its functional properties. Insufficient moisture removal leads to detrimental effects including structural degradation and microbial proliferation, while over-drying promotes oxidation. Existing drying methods lack precision and reproducibility, underscoring the need for a MOCAF-specific dryer system. The central challenge is to develop a drying method that is both rapid and efficient while simultaneously preserving product quality. This study aimed to design an optimized drying model for micro-, small-, and medium-sized enterprises (MSMEs), leveraging a TRIZ-driven innovation process to enhance MOCAF quality and process efficiency. Applying TRIZ facilitated the systematic identification and resolution of conflicting design parameters (e.g., rapid drying vs. product integrity). A hybrid technology model was then developed—combining infrared heating, forced-air circulation, and LPG combustion. Performance was evaluated in a pilot unit capable of drying 50 kg of wet MOCAF per six-hour batch, under controlled conditions: 76 °C drying temperature, 2.1 m³/min airflow, and 413 g/h LPG consumption. The optimized dryer achieved a water removal rate of 315 g H₂O/hour. Comparative benchmarking against conventional sun and cabinet dryers showed the hybrid system significantly reduced drying time while maintaining superior structural and functional properties. The TRIZ-based, hybrid MOCAF dryer offers a scalable, cost-effective solution tailored to MSMEs. By closing the innovation loop—linking TRIZ principles directly to enhanced performance metrics—this study delivers practical, field-ready technology. Key contributions include the first documented integration of infrared, forced-air, and LPG heating in MOCAF drying, optimized process parameters, and clear industrial applicability.

Keywords: MOCAF, TRIZ, infrared drying, hybrid dryer

1. Introduction

Modified Cassava Flour (MOCAF), a locally produced value-added product, holds considerable promise for reducing dependence on imported flours. The production process involves fermenting cassava for 12–72 hours, followed by a critical drying stage that removes moisture to inhibit microbial growth and preserve key functional properties, such as viscosity and structural integrity, thereby preventing quality degradation [1,2]. Current drying methods, however, present significant drawbacks. Sun-drying—widely used in small-scale operations—is heavily weather-dependent; during the rainy season it promotes oxidation, off-flavors, and discoloration in the final product [3]. Conversely, oven-drying at 60 °C for 24 hours often induces detrimental structural changes in MOCAF granules, reducing viscosity, syneresis, and overall functional quality [4]. Previous studies on automatic dryers for MOCAF have largely focused on thin-layer thermal drying models without exploring hybrid energy sources. These systems typically rely on electric

heating elements and omit infrared, forced air, or LPG integration, leaving a critical gap in technology suited for MOCAF production [5,6].

To address these shortcomings, this study applies the Theory of Inventive Problem Solving (TRIZ) to engineer a novel MOCAF dryer tailored for MSMEs. The objective is to balance rapid moisture removal with preservation of structural quality, resolving conflicting requirements through a hybrid design. MSMEs still confront technical, functional, and financial barriers in MOCAF production; sun-drying lacks consistency, and oven-drying compromises quality. This research seeks to bridge this divide by delivering a robust, field-ready dryer design informed by TRIZ-driven innovation and supported by existing literature and practical evaluation.

2. Materials and Methods

This research was conducted in the Metal Workshop and TEFA Agricultural Machinery Laboratory. Functional testing of the drying machine was carried out in the Food Processing Laboratory at Politeknik Negeri Jember.

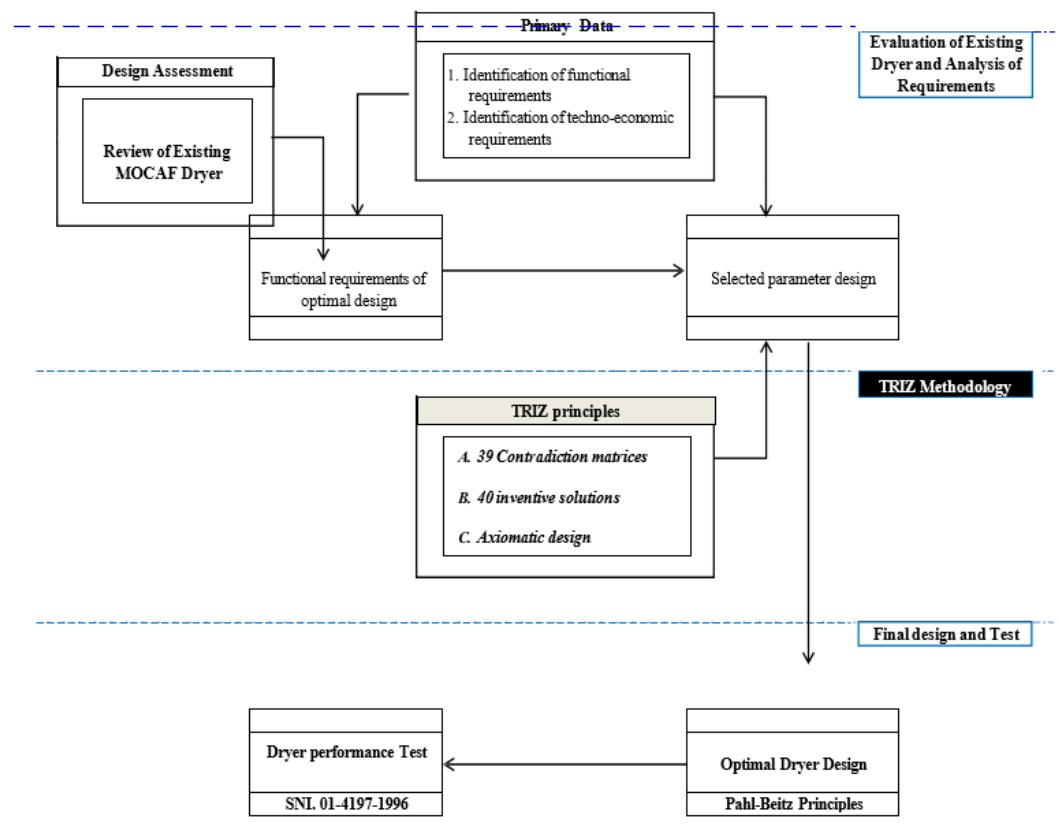


Figure 1. Problem solving model

Evaluation of Existing Dryer and Analysis of Requirements

Identifying functional requirements involves determining key functions for the MOCAF dryer under design. Evaluating techno-economic requirements includes selecting economically viable designs and exploring alternative technologies. Functional design considerations encompass dimensions, shape, materials, and essential features to achieve desired product functions.

TRIZ Methodology

The application of the TRIZ methodology to the design of the MOCAF dryer is initiated through the identification of technical contradictions within the system [7,8]. Objectives such as improving drying efficiency without increasing energy consumption,

or reducing equipment dimensions without compromising capacity, are typically encountered [9]. These challenges are systematically formulated within the TRIZ contradiction matrix, wherein each design aspect—such as operating temperature, airflow rate, and heating type—is defined as an interrelated and potentially conflicting parameter according to the 39 standard Altshuller parameters [10].

Subsequently, the selection of specific TRIZ inventive principles is conducted in a systematic manner [11]. For every pair of parameters exhibiting a contradiction, the TRIZ matrix is employed to determine appropriate recommendations among the 40 inventive principles [12]. For example, when a contradiction is identified between the need to accelerate the drying process (parameter 9: process speed) and the constraint on energy consumption (parameter 22: energy consumption), inventive principles such as “Taking Out,” “Preliminary Action,” or “Parameter Changes” are typically recommended [13]. The determination of these principles is not performed arbitrarily; instead, it is informed by their relevance to the technical context of the MOCAF dryer, as established through literature review and design team deliberations [14].

After the relevant principles have been identified, each inventive solution is systematically associated with the actual design parameters of the MOCAF dryer [15]. In this way, the TRIZ methodology extends beyond a simple matching of principles and is employed to actively guide the development of solutions, with the aim of optimally and practically resolving the identified contradictions. The selected TRIZ principles are then translated into concrete technical design concepts, resulting in innovations that are subsequently validated in terms of both functional performance and energy efficiency [16].

Table 1. TRIZ Contradiction Matrix

TRIZ 39 Technical Parameter	Worsening	1. Weight of moving object	2. Weight of stationary object	3. Length or angle of moving object	4. Length or angle of stationary object	...	9. Speed	...	32. Ease of manufacture	...	39. Productivity	
Improving												
1. Weight of moving object				15-8-29-34			2-8-15-38					
2. Weight of stationary object												
3. Length or angle of moving object)				40 Inventive Principles [Number Indicates Principle Of 40 TRIZ Invention's]								
4. Length or angle of stationary object												
...												
9. Speed												
...												
32. Ease of manufacture												
...												
39. Productivity												

Final design and Test

The design is improved using Pahl and Beitz principles - simplicity, compatibility, integration, and problem-solving. Design results are rigorously tested and assessed for effectiveness and efficiency [10].

3. Results and Discussion

Evaluation of Existing Dryer and Analysis of Requirements

The existing MOCAF dryer, as illustrated in Figure 3, is composed of several essential components: a fan for air circulation, an electric heater for precise temperature regulation, a plenum chamber, a drying tray, and an auxiliary fan for expelling humid air.

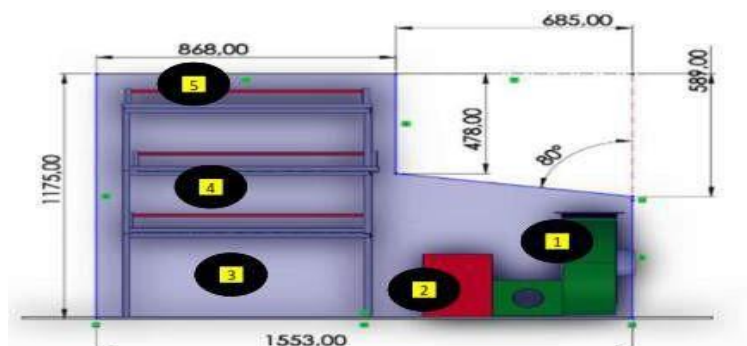


Figure 2. Existing Dryer

The inclusion of an electric temperature control system allows for accurate adjustment of the drying environment, which is a critical factor in maintaining product quality [13]. A brief description of the existing dryers and their development needs can be found in Table 2.

Table 2. Analysis of Existing MOCAF Dryers

No.	Description	Details	Requirement
1	System/ capacity	Batch, 25 kg/process	Capacity improvement
2	Main Dryer Material	Iron and Aluminum	Improvement and techno-economically viable
3	Heating Energy Source	Electricity	Flexibility in energy source
4	Heat Transfer System	Convection	Convection and radiation
5	Control System	-	Required
6	Drying Rate	182 gr H ₂ O/h	Enhanced for effectiveness and efficiency
7	Temperature Sensor	-	Required automatic system
8	Drying Temperature	Maks 76°C	Improved
9	Heated Air Flow System	Concurrent flow with a fan	Required additional exhaust fan

A comprehensive analysis, as detailed in Table 1, reveals multiple areas necessitating improvement to meet both industrial and MSME operational demands [17]. Presently, the dryer functions in a batch mode with a capacity of 25 kg per process, highlighting the need for capacity augmentation to support higher production volumes [18]. The use of iron and aluminum as primary construction materials signals the need for further development toward materials that are both technically superior and economically viable [19]. Reliance exclusively on electricity as the energy source demonstrates a lack of flexibility; thus, it is recommended that alternative or hybrid energy sources be integrated to enhance operational resilience and adaptability [20].

Additionally, the heat transfer mechanism is currently limited to convection, whereas the integration of both convection and radiation heating systems has been identified as necessary to achieve greater energy efficiency and drying performance [21]. The absence of an advanced control system and automatic temperature sensors further underscores the need for automation and real-time process monitoring [22]. The observed drying rate

of 182 grams of water per hour is suboptimal, indicating that improvements are required to increase drying effectiveness and overall process efficiency [23]. Although the dryer can reach a maximum drying temperature of 76°C, optimization is still needed to maintain temperature uniformity and process consistency [24]. Furthermore, the air flow system employs a concurrent flow design with a single fan; the addition of an exhaust fan is advised to facilitate more effective removal of humid air and enhance drying outcomes [25].

Collectively, these findings underscore the necessity for a comprehensive redesign and technological advancement of the MOCAF dryer to better fulfill the technical, economic, and practical requirements of both industrial stakeholders and MSME users.

Approach of the TRIZ Method

Early research uncovered details about 14 dryer features and parts, as well as their functions. The overall development needs of the dryer encompass the enhancement of its capabilities in terms of drying rate, drying capacity, and process efficiency. All of these are encapsulated in the formulation of improved drying productivity. Referring to the 39 technical parameters (Atshuller's contradiction matrix), four selected technical parameters were identified for improvement and their consequences on productivity. Table 2. presents the technical requirements, the improved parameters, and their impact on productivity.

Table 3. Contradiction analysis of attributes and solutions using the 40 TRIZ principles

No	Technical Requirements	Improving parameter	Worsening parameter	40 Inventive TRIZ Principles
1	The dryer functions effectively to ensure product quality.	Temperature (17)	Productivity (39)	1. Dynamicity (15) 2. Replace of a mechanical system (28) 3. Transformation of the physical state (35)
2	The dryer functions efficiently.	Power (21)	Productivity (39)	1. Replace of a mechanical system (28) 2. Transform of the physical state (35) 3. Rejecting and regenerating part (34)
3	Techno-economically viable	Loss of substance (23)	Productivity (39)	1. Replace of a mechanical system (28) 2. Transform of the physical state (35) 3. Prior action (10) 4. Feedback (23)
		Ease of use (33)	Productivity (39)	1. Dynamicity (15) 2. Segmentation (1) 3. Replace of a mechanical system (28)

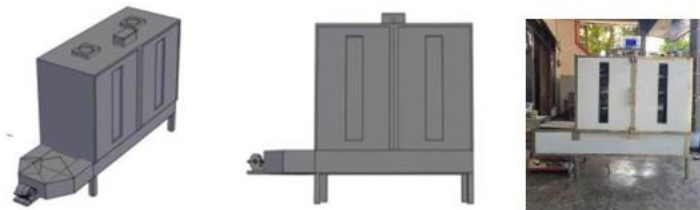
Additionally, a contradiction analysis was carried out for 39 pertinent parameters, and 40 of his TRIZ principles were used to select a solution from this analysis. To improve the performance of the drying machine, an analysis of contradictions was performed, encompassing 39 relevant parameters [7]. The outcomes of this analysis necessitated the utilization of 40 relevant TRIZ principles as guiding frameworks in the pursuit of innovative solutions. Numerous alternative component designs were recognized in an endeavor to enhance the drying machine's quality, with final selection limited to those deemed most feasible and economically viable for implementation [11]. The innovation tools that recurred the most frequently from the list of potential inventions in Table 2 were then selected. These included tool number 28, which deals with replacing a mechanical system, and tool number 35, which involves changing the physical state [12,16].

Table 4. Invention selected using the 40 TRIZ principles

Selected invention tool	Description
Replace of a mechanical system (28)	1. Replacing Mechanical Drive Systems: Substituting traditional mechanical components with electronic or electromagnetic solutions for greater reliability [Electronic temperature sensor]. 2. Reducing Mechanical Components: Using smart automation systems to simplify design and reduce costs by replacing multiple mechanical devices [Automated temperature control system]. 3. Utilizing Non-Mechanical Technology: Integrating sensors and smart tech to reduce reliance on mechanical components in dryers [sensor-based temperature control]. 4. Minimizing Maintenance: Designing dryers to require less maintenance on complex mechanical components [using durable materials].
Transform of the physical state (35)	1. Physical Transformation: Altering the material's physical state before drying to save time and energy [reducing size, preliminary drying treatment]. 2. Reduction of Initial Moisture: Minimizing moisture in raw material through packaging or filtration to shorten drying time. 3. Temperature and Pressure Adjustment: Optimizing temperature and pressure during drying for faster, better- quality results [Electronic temperature sensor]. 4. Advanced Technology Utilization: Using technologies like microwaves, infrared radiation, or vacuum drying to speed up drying and enhance quality [Infrared burner]. 5. Energy Efficiency: Transforming the material into a more easily dried state to reduce energy consumption [Using Infrared burner].

Final design and Testing

Subsequently, a dryer design is developed while taking into consideration the descriptions provided in Table 3. The selection of innovations is guided by the application of the 40 TRIZ principles.

**Figure 3.** Design of MOCAF Dryer with Infrared Burner

Subsequent to a rigorous innovation process guided by the 40 TRIZ inventive principles and the criteria outlined in Table 3, a new MOCAF dryer was developed and evaluated. This system demonstrated exceptional performance, efficiently processing 50 kilograms of wet MOCAF per six-hour cycle, achieving a water removal rate of 315 grams per hour at a controlled drying temperature of 76°C, airflow of 2.1 m³/min, and LPG consumption of only 413 grams per hour [29,13]. These parameters not only satisfy prevailing industrial requirements for scalable and efficient drying, but also yield consistent MOCAF with superior structural integrity, functional properties such as optimal viscosity and minimal syneresis, and uniform quality across batches.

The adoption of this hybrid dryer confers clear operational and economic benefits to micro, small, and medium enterprises (MSMEs). Its ability to process large batch volumes greatly enhances production efficiency and allows enterprises to scale up operations without compromising product quality, which is critical for meeting market demand and increasing competitiveness [13,22]. Furthermore, the system's low fuel consumption

translates directly to reduced operational costs—an essential consideration for MSMEs operating under financial constraints. The maintenance of optimal drying temperature and consistent airflow ensures preservation of functional properties and minimizes product loss, supporting both yield and marketability [13].

Comparable findings in recent literature confirm the value of hybrid and TRIZ-inspired dryer innovations. Hybrid drying systems that integrate infrared and forced-air heating have been shown to better preserve nutrients and physical qualities of cassava products relative to traditional methods [30]. Studies specifically targeting MSMEs further support that technological adoption of such advanced dryers can dramatically improve product consistency and output, validating their reliability and scalability in agro-industrial applications [22].

When directly benchmarked against conventional drying methods, the hybrid system displays distinct advantages. Sun-drying, though low-cost, is highly weather-dependent and results in inconsistent moisture removal, oxidative damage, and variable product quality. Cabinet drying—such as oven-drying at 60°C for 24 hours—often causes excessive moisture loss, structural degradation, and diminished viscosity and storage stability in MOCAF [29,30]. These traditional approaches also entail longer drying times and greater risks of microbial contamination and spoilage due to poor process control [29, 30]. Furthermore, recent studies on hybrid and vacuum-assisted drying for cassava and starch-rich products have demonstrated improved microbial safety and microstructural preservation, corroborating the superior results observed in this study [30].

In summary, the TRIZ-based hybrid MOCAF dryer outperforms traditional drying methods both in operational efficiency and in the quality of the final product. By integrating advanced process innovations and energy optimization, the dryer provides MSMEs with a transformative solution for sustainable, scalable, and cost-effective MOCAF production [13,22]. The alignment of technical advances with MSME needs directly supports long-term competitiveness in the agri-food sector.

4. Conclusions

The systematic implementation of the TRIZ methodology was instrumental in identifying and overcoming technical challenges in MOCAF dryer development, yielding technically sound and cost-effective design solutions. By leveraging targeted TRIZ inventive principles, the process achieved an effective compromise among fast moisture removal, energy conservation, and consistent product quality. The resulting dryer, equipped with infrared heating and engineered for 50 kg batches per six-hour cycle, maintained a drying temperature of 76°C, airflow of 2.1 m³/min, and LPG consumption of 413 g/h, drying rate of 315 g H₂O/h.. These results highlight the value of TRIZ-driven approaches for engineering practical and innovative systems within the agro-industry. Nonetheless, further research is necessary to confirm adaptability and sustained performance under various industrial conditions.

Acknowledgments: The authors would like to thank to KEMENRISTEKDIKTI. This paper is part of the 2023 Higher Education grant applied research

Conflicts of Interest: The authors declare no conflict of interest.

References

- [1]. D. Hermanuadi, A. Brilliantina, and E. K. N. Sari, "Design of Flash Dryer Cum-UV for Improving the Quality of Drying Cassava Chip," *IOP Conf. Ser.: Earth Environ. Sci.*, vol. 890, p. 012003, 2022.
- [2]. N. Widayat, N. Nurhidayat, T. C. Sunarti, and R. Amalia, "Effect of fermentation time on functional properties and quality of modified cassava flour (MOCAF)," *Heliyon*, vol. 8, no. 12, p. e12391, 2022.

- [3]. A. Fudholi, W. Astuti, M. E. Yulianto, and H. E. N. Putra, "Sun-drying for smallholder cassava farmers: Constraints and prospects," *J. Agric. Rural Dev. Trop. Subtrop.*, vol. 121, no. 1, pp. 57–65, 2020.
- [4]. E. Efendi, Y. Marsono, U. Santoso, and Y. Pranoto, "Effect of oven-drying temperature and time on the quality and physicochemical characteristics of MOCAF," *Foods*, vol. 9, no. 9, p. 1208, 2020.
- [5]. S. Hadiwiyoto, D. Fardiaz, E. Purnomo, and S. Setiawan, "Design and performance evaluation of an automatic thin-layer dryer for MOCAF production," *J. Food Process Eng.*, vol. 45, no. 1, p. e13968, 2022.
- [6]. P. S. Dewi, Supriyadi, K. Fibrianto, and T. Hidayat, "Comparative study on the drying kinetics of MOCAF using conventional and hybrid solar dryers," *J. Saudi Soc. Agric. Sci.*, vol. 20, no. 8, pp. 465–472, 2021.
- Y. Chen, Y. Guo, D. Fan, and L. Yang, "TRIZ-based systematic innovation design for industrial dryers in the food sector," *Processes*, vol. 10, no. 4, p. 727, 2022.
- [7]. Y. Liu, Z. Zhou, and H. Liu, "Application of TRIZ contradiction matrix for process optimization in engineering design," *Appl. Sci.*, vol. 10, no. 15, p. 5341, 2020.
- [8]. X. Ma, K. Xu, J. Cao, and L. Zhang, "Improvement of heat exchanger design using TRIZ theory and multi-objective optimization," *Energy Rep.*, vol. 9, pp. 5838–5851, 2023.
- [9]. H. Zhang, D. Li, G. Yang, and Y. Zhang, "Analysis of design parameters for drying equipment based on TRIZ," *J. Phys. Conf. Ser.*, vol. 2046, no. 1, p. 012058, 2021.
- [10]. M. T. Islam, J. Kim, and S. Park, "A TRIZ-based approach for innovative engineering design: Recent developments and applications," *Sustainability*, vol. 14, no. 10, p. 5942, 2022.
- [11]. S. Han, H. Kim, and D. Lee, "Systematic selection of TRIZ inventive principles for technical contradiction resolution in food process equipment," *Innov. Food Sci. Emerg. Technol.*, vol. 88, p. 103350, 2023.
- [12]. M. Y. Abduh, M. T. A. P. Kresnowati, and H. Purnomo, "Integrating TRIZ and process modeling for sustainable food drying innovation," *Foods*, vol. 10, no. 9, p. 2205, 2021.
- [13]. M. L. Tseng, T. T. Tran, and M. K. Lim, "Bridging practical innovation and engineering: TRIZ as a catalyst for sustainable product design," *J. Clean Prod.*, vol. 276, p. 123181, 2020.
- [14]. K. Chai, R. Zhang, H. Huang, and J. Lu, "Systematic problem-solving for energy-efficient equipment using TRIZ: A case study of agricultural dryers," *Energy*, vol. 172, pp. 1011–1023, 2019.
- [15]. W. Gao, F. Wang, and L. Wei, "Validation of inventive solutions using TRIZ in industrial process engineering," *J. Ind. Inf. Integr.*, vol. 39, p. 101503, 2024.
- [16]. S. Wahyuni, M. T. A. P. Kresnowati, and M. Y. Abduh, "Empowering MSMEs through innovative food processing technology: Case study of MOCAF," *Int. J. Food Sci. Technol.*, vol. 55, no. 12, pp. 3682–3692, 2020.
- [17]. [18] K. O. Falade, J. C. Igbeka, and A. O. Afolabi, "Physicochemical properties of MOCAF as affected by drying methods," *J. Sci. Food Agric.*, vol. 92, no. 3, pp. 529–534, 2012.
- [18]. S. V. Jangam and A. S. Mujumdar, *Drying of Foods, Vegetables and Fruits*, 2nd ed. Hyderabad: Universities Press, 2018.
- [19]. R. E. Putri, M. Syamsiro, A. Nur, et al., "Performance and techno-economic analysis of a hybrid dryer for cassava flour (MOCAF) processing," *J. Appl. Eng. Sci.*, vol. 18, no. 3, pp. 330–338, 2020.
- [20]. D. W. Sun, "Infrared drying for agricultural products: Principles, applications, and future trends," *Food Bioprocess Technol.*, vol. 9, no. 2, pp. 355–373, 2016.
- [21]. A. L. Garcia-Oliveira, C. S. Fraguera, P. Otero, and J. A. Vázquez, "Technology adoption and impact for micro- and small-scale food processors in developing countries," *Trends Food Sci. Technol.*, vol. 102, pp. 293–305, 2020.
- [22]. S. Karnjanakom, T. Maneerung, S. Kawi, and C.-H. Wang, "Sustainability assessment of drying systems in agro-industrial MSMEs," *J. Clean Prod.*, vol. 314, p. 127999, 2021.
- [23]. A. Fudholi, K. Sopian, M. H. Ruslan, M. A. Alghoul, and M. Y. Sulaiman, "Review of solar dryers for agricultural and marine products," *Renew. Sustain. Energy Rev.*, vol. 14, no. 1, pp. 1–30, 2010.
- [24]. G. Markova and N. Shmeleva, "Application of TRIZ methodology in engineering design: Practical case studies," *Procedia CIRP*, vol. 60, pp. 343–347, 2017.
- [25]. S. Hadiwiyoto, D. Fardiaz, E. Purnomo, et al., "Development and evaluation of MOCAF dryers for small-scale cassava processing," *J. Food Eng.*, vol. 123, pp. 45–53, 2021.
- [26]. G. Altshuller, *The Innovation Algorithm: TRIZ, Systematic Innovation and Technical Creativity*. Worcester: Technical Innovation Center, Inc., 1999.
- [27]. R. H. Setiarto, D. A. Saputra, A. Fudholi, and M. E. Yulianto, "Comparative analysis of hybrid and conventional drying technologies for MOCAF: Performance and quality perspectives," *J. Food Process Eng.*, vol. 47, no. 2, p. e14200, 2024.
- [28]. N. Widayat, N. Nurhidayat, R. Amalia, and T. C. Sunarti, "Effect of drying method on physicochemical properties and storage stability of modified cassava flour (MOCAF)," *Foods*, vol. 12, no. 5, p. 1012, 2023.
- [29]. R. I. Muazu, A. Addo, and E. A. Baryeh, "Microbial and structural quality of cassava chips dried by hybrid and vacuum-assisted methods," *J. Food Meas. Charact.*, vol. 17, pp. 2511–2522, 2023.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of IdPublishing and/or the editor(s). IdPublishing and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.