

From Waste to Rupiah: Simple Bookkeeping and Zero-Waste Milkfish Product Diversification as a Strategy to Strengthen the Msme Economy in Village Tematik Bandeng Mangkang Wetan Semarang

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ABSTRACT

Village Tematik Bandeng Mangkang Wetan holds significant economic potential through milkfish (bandeng) processing, given its position as one of the milkfish farming and processing centers in the city of Semarang. However, limited product variety, inadequate management of production waste, and a still-rudimentary financial record-keeping system remain obstacles to increasing the economic value of local community businesses. This community service activity aims to develop the capacity of micro, small, and medium enterprise (MSME) actors by providing training on basic bookkeeping, cost-of-production calculation, and the application of zero-waste principles in diversifying milkfish-based products. The implementation method comprised four stages: socialization, hands-on training, mentoring/guidance, and assessment/evaluation. The results show that business actors experienced improved understanding of simple financial record-keeping as well as more accurate methods for calculating the cost of production. In addition, the activity produced environmentally friendly, waste-free milkfish product variations, namely nuggets made from filleted milkfish meat and sticks made from milkfish bones, and it fostered greater awareness of cost efficiency and product value addition. Overall, this activity has contributed to strengthening business sustainability, opening new marketing opportunities, and supporting increased income for residents of Village Tematik Bandeng Mangkang Wetan.

Keywords: Simple bookkeeping, product diversification, milkfish, *zero waste*, MSME, cost of production.

INTRODUCTION

Semarang, as the capital city of Central Java Province, is home to several milkfish farming and processing centers, one of which is Village Tematik Bandeng Mangkang Wetan, located in Tugu Subdistrict. This area has been designated by the Semarang City Government as a themed village (Village tematik) focused on the production and processing of milkfish, with the aim of driving the local community's economic growth while strengthening the area's identity as a leading center based on local potential. This designation is in line with local government policy directions for developing a people-based economy rooted in natural resources and local wisdom, so that the presence of a milkfish-processing center is expected to become one of the drivers of the economy at the sub-district (ward) level.

Village Tematik Bandeng Mangkang Wetan has considerable potential, with more than 50 business units ranging from household-scale to small-scale enterprises. Kelompok Tani Tunas Harapan (the "Tunas Harapan" Farmers' Group) is one of the milkfish farming groups that has been operating for 10 years, cultivating approximately 30 hectares of land with an average productivity of 1.5-2 tons per hectare per growing season (Handayani et al., 2025). Besides farming activities, this group has also processed milkfish into a variety of products, although the processing methods remain relatively simple, such as presto (pressure-cooked) milkfish,

pepes, otak-otak, and burgers (Radar Semarang.id, 6 December 2021). This diversity of processed products reflects fairly strong social capital and skills among residents; however, business actors still face a range of problems, particularly in financial management and in optimizing the use of waste generated from milkfish processing.

Most business actors already record their costs to some extent, but only a few keep detailed records of all expenditures, from the purchase of raw materials through to the processing of finished products. As a result, they find it difficult to determine profit and loss accurately, which can hinder them when applying for capital from financial institutions or business partners. In fact, sound financial record-keeping is one of the key requirements in the loan application process, since financing institutions generally need a clear picture of cash flow and financial performance as a basis for assessing business feasibility. Business owners therefore need to record all expenditures and income comprehensively, so that financial management, including the accounting and bookkeeping process, becomes easier, more transparent, and more accountable (Wardiningsih et al., 2020).

Based on the results of a preliminary survey conducted by the community service team, three main problems were identified. First, many business actors have not implemented a regular financial record-keeping system, making it difficult for them to know their business's financial condition accurately. Second, there is still a lack of variety in milkfish-based processed products that could increase economic value, so that broader market potential has not been optimally utilized. Third, waste from milkfish processing, such as bones, scales, heads, and liquid waste, has not been optimally utilized; besides posing a risk of environmental pollution, this condition also reflects a missed opportunity for economic value addition that could actually be derived from parts of the fish that have so far been considered worthless.

Bookkeeping is the activity of documenting various financial transactions in relevant records. Financial record-keeping can be carried out in various ways, ranging from the most basic to the most complex. When someone records their expenses in a daily journal, they are in effect already practicing a simple form of financial record-keeping. Financial record-keeping is important for both small-scale business actors and those that have grown larger. Its purposes include separating personal assets from business assets, gaining a comprehensive understanding of one's financial situation, accurately calculating the cost of production, and making more rational and measured business decisions.

Until now, business actors have generally calculated production costs based solely on the raw materials purchased, without taking into account labor costs and other overhead costs (Handayani et al., 2025). This can certainly affect the profit actually earned, because the selling price set does not reflect all the cost components that have actually been incurred. Business actors therefore need to calculate the cost of production accurately, so that the resulting products can be sold at competitive prices while still ensuring business sustainability, and with quality that can compete in the marketplace (Simanjuntak et al., 2018).

On the other hand, the zero-waste concept in the fish-processing industry refers to the utilization of all parts of the fish, including parts that are typically discarded, into economically valuable products. Applying this concept not only has an impact on increasing the income of business actors, but also contributes to environmental sustainability by reducing organic waste discharged into the surrounding environment. Various studies have shown that zero-waste-based product diversification can significantly increase the added value of fishery products, while also opening up new business opportunities for coastal communities and fishery centers (Brillyantina et al., 2025).

Based on this background, the community service team initiated a simple bookkeeping training activity combined with the introduction of a zero-waste-based milkfish product diversification concept. In general, this activity aims to enhance the capacity and competence of business actors in carrying out bookkeeping and accurately calculating the cost of production. Specifically, this activity aims to: (1) improve participants' understanding of the importance of simple bookkeeping for business sustainability; (2) provide practical skills in preparing a daily cash book and calculating the cost of production; and (3) introduce zero-waste-based milkfish product diversification as an effort to increase value addition and production cost efficiency.

LITERATURE REVIEW

Simple Bookkeeping for Micro Business Actors

Simple bookkeeping is one of the most basic forms of financial record-keeping, yet it plays a highly strategic role in the sustainability of micro and small businesses. Wardiningsih et al. (2020) assert that financial management is one of the important aspects that determines the success of a micro or small business. With good financial management, business actors can clearly determine the amount of profit earned, which then becomes the basis for making more appropriate business decisions. The absence of adequate bookkeeping is often a major reason why micro business actors find it difficult to grow the scale of their business, since they lack sufficient data to evaluate business performance or to meet the administrative requirements for obtaining capital.

Cost of Production and Selling-Price Determination

Cost of production is the accumulation of all costs incurred in the process of producing a product, generally consisting of three main components: raw material costs, labor costs, and factory overhead costs (Wuryandini et al., 2025). Simanjuntak et al. (2018) explain that an accurate calculation of the cost of production enables business actors to set a competitive selling price without sacrificing product quality or business sustainability. Errors in calculating the cost of production, for example taking into account only raw material costs while excluding labor and overhead costs, can result in a selling price that is set too low, causing the business to potentially suffer losses in the long run.

The Zero-Waste Concept in Fishery Product Processing

The zero-waste concept in the fish-processing industry emphasizes the optimal utilization of every part of the fish, including parts conventionally regarded as waste, such as bones, heads, scales, and skin. Brillyantina et al. (2025), in their research on zero-waste-based innovation in processed milkfish products, show that applying this principle can significantly increase the added value of fishery products while also serving as a solution to environmental pollution problems caused by fish-processing waste. This approach is consistent with the principle of a circular economy, in which waste generated from one production process is directed to become an input for another production process, thereby creating resource efficiency alongside the creation of new economic value.

Diversification of Processed Milkfish Products

Previous research conducted by Handayani et al. (2025) on waste-free milkfish product diversification shows that filleted milkfish meat can be processed into nuggets, while the bones, heads, and skin that have been presto-cooked can be processed into sticks ("stik"). This kind of diversification not only broadens the range of products offered to consumers, but also improves the efficiency of raw material use, since almost every part of the fish can be turned into a product with sale value. It is this combination of strengthened simple bookkeeping and zero-waste-based product diversification that forms the foundation of this community service activity.

Implementation Method

The method used in this community service activity consisted of counseling and training in simple bookkeeping and zero-waste-based milkfish product diversification, aimed at housewives who are members of the milkfish farmers' group. The number of training participants was 10 people. The activity was carried out at the home of the Chairperson of Kelompok Tani Tunas Harapan, located on Jalan Gang Bandeng, Mangkang Wetan Sub-district, Tugu District, Semarang City. This location was chosen based on considerations of accessibility for participants and its proximity to the center of the milkfish-processing production activities already under way.

The implementation of this community service activity consisted of four main stages: preparation, socialization, training and mentoring, and assessment/evaluation. These four stages were designed sequentially so that the material delivered could be absorbed gradually by participants, starting from the introduction of concepts through to direct application in the field.

No	Stage	Description of Activity
1	Preparation	Initial survey of the partner location, coordination with the Chairperson of Kelompok Tani Tunas Harapan, identification of training needs, and preparation of training materials and modules on bookkeeping and product diversification.
2	Socialization	Introduction of the program to all group members, explanation of the objectives and benefits of the activity, and preparation of an implementation schedule together with the partner.
3	Training and Mentoring	Counseling on the benefits and framework of simple bookkeeping, hands-on practice preparing a daily cash book, training on calculating the cost of production and selling price, and practical processing of the diversified products (nuggets and sticks) based on the zero-waste concept.
4	Assessment and Evaluation	Completion of pre-test and post-test questionnaires, direct observation of record-keeping and product-processing practices, and evaluation of the sustainability of the training outcomes applied by participants.

During the preparation stage, the community service team conducted an initial survey to map the existing condition of the businesses, including the record-keeping patterns used so far and the types of processed milkfish products already being produced. The results of this survey then formed the basis for preparing training materials suited to participants' needs and level of understanding. During the socialization stage, the team introduced the program comprehensively to the farmers' group members, including explaining the background, objectives, and expected benefits of the activity, so that participants had adequate initial understanding and motivation to take part in the full series of activities.

During the training and mentoring stage, material was delivered progressively through lectures, interactive discussion, and hands-on practice. The simple bookkeeping material covered explanations of the benefits of keeping records, the bookkeeping framework, determination of the cost of production, selling price, and profit calculation. In addition, participants were directly mentored in practicing the processing of the diversified, zero-waste-based products, nuggets from milkfish fillets and sticks from milkfish bones, from the stage of preparing ingredients through to packaging the finished product. This mentoring was carried out so that participants would not only understand the concepts in theory, but would also be able to apply them independently after the community service activity had ended.

During the assessment and evaluation stage, the community service team used a pre-test questionnaire instrument to measure participants' initial level of understanding of bookkeeping and cost-of-production calculation, while also conducting direct observation of changes in financial record-keeping behavior and product-processing practices during and after the activity. This evaluation was important to measure the effectiveness of the program and to serve as a consideration for the sustainability of mentoring activities in the future.

RESULTS AND DISCUSSION

Characteristics of Participants

The participants in this community service activity were residents aged over 40, consisting of eight women and one man. In terms of educational attainment, most participants had a lower-secondary education or below: 33.33% were primary school (SD) graduates, 11.11% were junior high school (SMP) graduates, 33.33% were

senior high school (SMA) graduates, and 22.22% held a diploma or bachelor's degree. These characteristics indicate that the majority of participants are household business actors who have learned to manage their businesses in a largely self-taught manner, so that the training approach used needed to be adapted to varying levels of understanding, for example by using simple language and case examples relevant to their day-to-day business activities.

Participants' Initial Understanding of Bookkeeping

The results of the training program on simple bookkeeping provided business actors with insight and knowledge on how crucial it is to record every transaction that takes place, and to separate personal assets from assets acquired through the business. By keeping organized financial records, business actors can more easily understand the growth of their business, cash-flow fluctuations, and the profit earned over time. Initial observations indicated that many milkfish-processing business actors had already been keeping regular records using a daily cash book, although the records kept were not yet fully complete.

This can be seen from the results of a pre-test questionnaire completed by nine respondents, which showed that 88.89% of respondents stated that they kept records, but only 11.11% recorded all financial activities of the business completely, from the purchase of raw materials and payment of labor through to product sales. 66.67% of respondents had calculated the cost of their products, while only 33.33% calculated the selling price separately. These data indicate a gap between the record-keeping practices already in place and the completeness and accuracy of record-keeping that would ideally be applied in business management.

These results indicate that there is still a need to improve the recording of all transactions that occur, so that the cost of products can be determined accurately, which will ultimately affect the determination of selling price and the amount of profit earned. This is consistent with the research of Wardiningsih et al. (2020), which states that financial management is one of the important aspects in determining the success of a small or micro business. With good management, a clear picture of profit is obtained, which can then serve as the basis for more appropriate business decision-making.

Training in Preparing a Daily Cash Book

The simple bookkeeping training material delivered to participants comprised two main components: counseling on the benefits of keeping simple records, and hands-on practice in preparing a daily cash book. The daily cash book was designed to be simple so that it would be easy for participants, most of whom did not have an accounting background, to understand and apply. The daily cash book format introduced included columns for date, transaction description, cash in, cash out, and balance, as presented in the table below.

Table 1: Example of a daily cash book

Date	Description	Cash In (Rp)	Cash Out (Rp)	Balance (Rp)
1 Sept 2025	Purchase of fresh milkfish	-	-	-
1 Sept 2025	Purchase of gas and packaging	-	-	-
...	...	...	...	...

Through the practice of filling out the daily cash book, participants were trained to record each transaction in real time, so that a habit of record-keeping could be formed gradually. Mentoring was carried out by giving examples of real transactions from participants' own businesses, such as the purchase of fresh milkfish, the purchase of gas and packaging, and the receipt of sales proceeds, so that participants could directly apply the format to their own respective businesses.



Calculating the Cost of Production

In addition to bookkeeping training, participants were also given material on how to calculate the cost of production of processed milkfish products, as a continuation of the bookkeeping material previously delivered. The components of the cost of production introduced to participants comprised three main elements (Wuryandini et al., 2025), namely:

Raw Material Costs

Raw materials are the basic materials processed into a finished product that will be sold. In the context of processed milkfish products, the main raw material is fresh milkfish, along with other supporting materials such as seasonings, flour, and other complementary ingredients.

Labor Costs

Labor costs are the costs incurred to pay the workers directly involved in making the products. Labor costs include the wages or salaries paid to workers in the production process to produce the goods that will be sold, including overtime pay where required.

Factory Overhead Costs

Factory overhead costs (FOC) are production costs other than raw material and labor costs that cannot be directly traced to a specific product or activity, for example gas costs, packaging costs, and the cost of depreciation of production equipment.

Cost Calculation Practice for Nugget and Milkfish-Bone Stick Products

The ingredients required to make milkfish nuggets and sticks in this training activity consisted of 4.3 kg of fresh milkfish priced at Rp35,000 per kilogram, giving a total fish raw-material cost of Rp150,500. The filleted milkfish yielded 2.1 kg of clean meat, which was then processed into nuggets and could be cooked into 7 recipe batches. Meanwhile, the waste (heads, skin, and bones) after the presto (pressure-cooking) process yielded 1.7 kg, which was processed into sticks and could be cooked into 22 recipe batches. Details of the ingredients required to cook one recipe batch of nuggets and sticks are presented in the tables below.

No	Ingredient	Weight (grams)	Unit Price (Rp)	Amount (Rp)
1	Milkfish fillet	300	59,000/batch	17,700
2	Nutmeg	1.14	15,000/37 g	462
3	Pepper	3	1,000/2.5 g	1,200
4	Mushroom stock powder	4	12,000/400 g	120
5	Salt	7	3,000/250 g	14
6	Sugar	5.3	19,000/1 kg	100
7	Baking powder	3.12	6,000/45 g	416
8	Garlic	30	44,000/1 kg	1,320
9	Cornstarch	37.38	6,000/250 g	897
10	Eggs	2 pcs	2,000/egg	4,000
11	Margarine	24.16 g	6,300/200 g	785
12	Wheat flour	100	12,800/1 kg	1,250
13	Water	70	5,000/16 L	18
14	Cooking oil	1000	42,000/2 L	21,000
	Total Raw Material Cost			49,352

source: primary data, as processed

In addition to raw material costs, the community service team also introduced participants to the concept of depreciation costs for production equipment, given that the business requires a number of long-term investment tools to support production, as presented in the following table.

No	Description	Value (Rp)
1	Stick-molding machine	1,880,000
2	Pressure cooker	570,000
3	Noodle-milling machine	1,380,000
4	Chopper	702,155
5	Plastic packaging sealer	755,200
6	Renovation of business premises	300,000
7	Total fixed capital	5,587,355
	Total Equipment Value	5,852,355

Source: primary data, as processed

Based on this equipment value, monthly depreciation can be calculated as Rp5,587,355 divided by 12 months, i.e. Rp465,612.92, and daily depreciation as Rp465,612 divided by 30 days, i.e. Rp15,520.43. This depreciation calculation is important to include as part of factory overhead costs, so that the resulting cost of production truly reflects all costs incurred in the production process.

No	Ingredient	Weight (g)	Unit Price (Rp)	Amount (Rp)
1	Milkfish waste (bones/head)	75	-	-
2	Cakra Kembar flour	225	12,000/1 kg	2,700
3	Eggs	1 pc	8,000/250 g	2,000
4	Tapioca starch	25	12,000/1 kg	300
5	Baking powder	1	6,000/45 g	133.33
6	Garlic	20	44,000/kg	880
7	Margarine	20	8,000/150 g	649.83
8	Salt	4	3,000/1 kg	48
9	Pepper	4	1,000/250 g	1,600
10	Powdered stock	2	12,000/250 g	60
11	Cooking oil	1,000	42,000/2 L	21,000
	Total Raw Material Cost (Sticks)			29,371.16

source: primary data, as processed

A recapitulation of the total production costs for both products, nuggets and milkfish-bone sticks, is presented in the table below, covering raw material costs, labor costs, and factory overhead costs for each recipe batch.

Cost Type	Nugget: Cost/Batch (Rp)	Nugget: Production Units	Nugget: Total Cost (Rp)	Stick: Cost/Batch (Rp)	Stick: Production Units	Stick: Total Cost (Rp)	Total
Raw Material Cost	49,352	7	345,464	29,371.16	22	646,165.52	
Labor Cost	2,000	7	14,000	2,000	22	44,000.00	
Factory Overhead Cost	19,656.43	7	137,595.01	4,136*	22	90,992.00	
Total	71,008.43	7	497,059.01	35,507.16	22	781,157.52	

Source: primary data, as processed

The breakdown of factory overhead costs consists of gas costs of Rp1,136, packaging costs of Rp3,000, and depreciation costs of Rp15,520.43, with the note that the by-product (sticks) is not charged with depreciation costs, so the total factory overhead cost for the nugget product is Rp19,656.43.

Cost of Production per Package

One recipe batch of nuggets yields 644 grams of dough, so that when multiplied by 7 batches, a total of 4,508 grams is obtained. With a nugget weight per package of 200 grams, this yields 22 packages (4,508 grams divided by 200 grams). The cost of production for nuggets per package is Rp497,059.01 divided by 22 packages, i.e. Rp22,594, which is then rounded up to Rp23,000.

Meanwhile, one recipe batch of milkfish-bone sticks yields 400 grams of dough, so that when multiplied by 22 batches, a total of 8,800 grams is obtained. With a stick weight per package of 100 grams, this yields 88 packages (8,800 grams divided by 100 grams). The cost of production for milkfish-bone sticks per package is Rp781,157.52 divided by 88 packages, i.e. Rp8,876.79, which is then rounded up to Rp9,000.

Selling-Price Determination

After obtaining the cost of production, participants were then introduced to a method for determining the selling price based on a desired profit margin target, in this case set at 30% of the cost of production. Details of the selling-price calculation for both products are presented in the table below.

Description	Nugget (22 packages @200 g)	Stick (88 packages @100 g)
Cost of production	Rp497,059.01	Rp781,157.52
Desired profit (30%)	Rp149,117.70	Rp234,347.26
Selling price	Rp646,176.71	Rp1,015,504.78
Rounded	Rp647,000	Rp1,016,000
Selling price per package	Rp29,409.09	Rp11,545.45

Source: primary data, as processed

Following this calculation method, the selling price of milkfish nuggets was set at around Rp29,000 per package, while the selling price of milkfish-bone sticks was set at around Rp11,500 per package. Setting the selling price based on an accurate calculation of the cost of production is expected to ensure that business actors obtain a fair profit margin while remaining competitive in the marketplace.

Zero-Waste-Based Product Diversification

The community service activity in Village Tematik Bandeng Mangkang Wetan also provided education on zero-waste-based milkfish product diversification. The zero-waste concept introduced emphasized the utilization of every part of the milkfish, with nothing going to waste. The products produced in this training included nuggets made from filleted milkfish meat, and sticks made from presto-cooked fish bones. Most respondents stated that they had frequently processed milkfish, albeit still using conventional methods such as pepes, otak-otak, and presto milkfish, but they showed a high level of enthusiasm in taking part in this zero-waste-based milkfish product diversification training.

This enthusiasm was reflected in participants' active engagement in every stage of the practical work, from filleting the fish, processing the meat into nugget dough, through to processing the bones into crunchy sticks. This kind of product diversification provides a double benefit: increased income through the sale of new products, and reduced waste that would otherwise have been discarded needlessly or could even have polluted the surrounding environment.

Discussion of the Link between Bookkeeping and Product Diversification

The results of this community service activity show that there is a close relationship between simple bookkeeping capability and the success of zero-waste-based product diversification. Without good bookkeeping, business actors would find it difficult to know whether the product diversification undertaken is genuinely providing economic added value, or is instead unknowingly adding to production cost burdens. Conversely, without product diversification and waste utilization, the potential added value that can be derived from the milkfish commodity would not be optimal, even if bookkeeping were being carried out well. Both aspects therefore need to be developed in tandem, as has been done in this community service activity.

Economic Impact Of the Activity

Based on the evaluation results, after taking part in the training on simple bookkeeping and cost-of-production calculation, participants began to realize how crucial it is to record all business income and expenditure. In addition, they began to separate personal assets from business assets, so that business growth could be identified more clearly for each period. This awareness represents a very important first step toward more professional and sustainable business management.

Product diversification not only broadens the range of products offered to consumers, but also has the potential to reduce the amount of waste generated from the production process. Utilizing waste, such as turning milkfish bones and heads into stick products, can provide additional benefits, increase the sale value of goods, and reduce overall production costs, since material that was previously discarded can now be processed into a product with sale value. The combination of simple bookkeeping and product variation has made business management more efficient and sustainable, both economically and environmentally.

More broadly, the economic impact of this activity also has the potential to be felt across the economy of Village Tematik Bandeng Mangkang Wetan as a whole. As more business actors adopt simple bookkeeping and zero-waste-based product diversification, this area stands to become better known as an innovative and sustainable center for processed milkfish products, thereby attracting tourists and buyers from outside the area, while also strengthening the bargaining position of business actors within the processed-fishery-product supply chain.

Challenges and Solutions in Implementation

In its implementation, this community service activity was not without a number of challenges. First, time constraints among participants, most of whom are housewives busy with family and daily business affairs, meant that the training schedule needed to be adapted to participants' available free time. Second, participants' varying levels of education affected how quickly they understood technical accounting and bookkeeping terminology. Third, the limited production equipment owned by the business group affected the scale of production during the practical product-diversification sessions of the training.

To address these challenges, the community service team applied a number of solutions. Training sessions were scheduled at times agreed upon with participants, so as not to disrupt their routine activities. Bookkeeping material was delivered in simple language and using real case examples drawn from participants' own businesses, making it easier to understand without needing to master formal accounting terminology. In addition, the team provided intensive and ongoing mentoring, so that participants who needed more time to understand the material could still follow the entire series of activities properly. With regard to equipment limitations, the team also provided assistance in the form of some production equipment to support the continued practice of product diversification by the partner group.

CONCLUSION AND RECOMMENDATIONS

The community service activity in Village Tematik Bandeng Mangkang Wetan successfully improved the understanding and skills of MSME actors in simple bookkeeping and in applying the zero-waste concept to milkfish product diversification. This program has contributed to increasing the economic value of products, business efficiency, and environmental sustainability, as reflected in participants' improved understanding of financial record-keeping, their ability to calculate the cost of production, and their skills in processing new products based on the utilization of milkfish waste.

Based on the results of this activity, the community service team offers several recommendations. First, ongoing periodic mentoring is needed so that the application of simple bookkeeping and product diversification can proceed consistently and sustainably. Second, support is needed from local government and related institutions in the form of digital marketing training, so that the diversified processed milkfish products can reach a wider market. Third, a simpler and more applicable bookkeeping module should be developed, for example in the form of a guidebook or a simple smartphone-based record-keeping application, so that business actors can more easily apply bookkeeping independently in the future.

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