



POLICY BRIEF

A publication of the Policy Advocacy Group (PAG) of the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD)



Development of an R&D Framework for Underutilized Fruits (Guava, Soursop, Sugar Apple, and Tamarind) in the Philippines

The Philippines is home to 300 edible fruits and nuts, where only 20 fruits are commercially grown, while the rest remain minor and underutilized. Because of low market incentives, farmers of underutilized fruits are often discouraged from adopting new technologies and improving their cultural management practices. At present, underutilized fruits are only deemed as additional sources of income, however, exploring their market potential may

increase their economic value and generate more livelihoods for Filipino farmers.

The Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD) conducted a rapid market appraisal (RMA) on four underutilized fruits (guava, soursop, sugar apple, and tamarind) to assess their

industry and market status. It was revealed that a significant decline was observed in the yields of underutilized fruits due to the reduction of production areas over the years. Guava, soursop, and tamarind are mostly scattered across the country and usually found in backyards or small-scale farms, while sugar apple production is only concentrated in Pampanga and Batangas (Fig. 1).

Moreover, the lack of market linkages among farmers, traders, and processors resulted in profit loss and fruit wastage.

Nevertheless, findings showed a strong domestic and international market potential for underutilized fruits. With nutritional and medicinal benefits, the demand for fresh fruits and value-added products (e.g., jams, wines, concentrates, tea, candies, ice creams) continue to increase. There is a need to create more market incentives for farmers to encourage increased production. With this, a research and development (R&D) framework was developed to address the identified issues and recommend appropriate programs and policies for promoting production and market interventions to fully maximize the potential of underutilized fruits in the Philippines.

A REVIEW ON THE UNDERUTILIZED FRUITS INDUSTRY

Challenges Faced by Underutilized Fruits Industry

Throughout the years, the underutilized fruits industry in the Philippines faced different challenges in terms of production, marketing, supply, price, practices, logistics, etc. These challenges are briefly discussed below:

Existing supply cannot meet volume requirement.

The decline in areas devoted to underutilized fruits has relatively affected the volume of production of guava, soursop, sugar apple, and tamarind in the country over the past decades. Guava production (Fig. 2) generally declined in its annual

production by 1.10 percent (%), which translated to an average of 12,100 ton (t) from 2008 to 2012. Similarly, area planted averaging 6,100 hectares (ha), had significantly decreased from 2008 to 2012 by 0.73% (Espino and Espino 2014). The average annual yield of guava has been declining by 0.37% each year from 2008 to 2012 ranging from 1.99 t/ha to 2.2 t/ha.

Meanwhile, productivity of sour-type soursop, which is the most common variety in the Philippines, has an average yield of 24 kilograms (kg) per tree that is harvested every season (Coronel 2011). According to the Philippine Statistics Authority (PSA), the country produced 7,807 t of soursop in 2018. The volume decreased compared with the production in 2016 with 7,906 t.



Fig. 1. Sugar apple production in Lobo, Batangas. (RMA Fruits Project Team 2019)

Similarly, sugar apple production generally had a decreasing trend since 2000. Annual peak production was experienced in 1997 with 10.2 t, while in 2018, annual production decreased to only 2.27 t (PSA 2019). Similar to soursop, there had been no record of imports and exports of sugar apples (PSA 2015).

Lastly, tamarind had experienced a drop in its annual production of about 8.7% from 2015 (7,436 t) to 2018 (6,638 t). The decreasing trend in tamarind production is because of tree cutting in some areas in the Philippines. The present tamarind production system is fragmented and unorganized with many intermediaries from farm-to-market or farm to processing entities. Most of the existing trees, particularly the sour types, are grown in the backyard or small-scale (DA-RFO III 2012).

As observed in the field, when the prices of fruits decline in the market or when the volume of production is decreasing, the common resort of guava and tamarind farmers are unabated cutting of trees and turning the cut trees into charcoal. These were observed in various study areas.

In Candelaria and Tiaong, Quezon, native guava trees were cut and replaced by citrus and cassava as the farmers perceive these crops as more marketable compared to guava fruits. On the other hand, there

are few buyers of tamarind in Amulung, Cagayan and the price offered is only from P5.00/kg to P10.00/kg of fresh tamarind. Because of its low price, farmers do not consider tamarind as an important crop and they focus on other crops like rice and corn.

In addition, many of the farmers cut the trees and use them as charcoal. In Lobo, Batangas, farmers resort to cutting tamarind trees and use them as charcoal since they believe that tamarind as a fruit is not profitable anymore.



Fig. 2. Guava production in Cabanatuan City, Nueva Ecija.
(RMA Fruits Project Team 2020)

Value-adding activities and other efforts that will help increase the prices of guava and tamarind should be explored as this will encourage farmers to keep the trees and minimize cutting.

Poor pest management.

Pests like ants, mealybugs, and fruit flies are major concerns for underutilized fruits but majority of the farmer-respondents do not apply pesticides. At most, only leftover pesticides used in major crops (e.g., rice, banana, coconut, cacao) are being used by farmers. Moreover, lack of knowledge on effective pest control and management practice hinders the maximization of farmers' harvest. Soursop farmers reported that the crop's sensitivity to pesticides requires proper knowledge of the exact dose of application. In guava production, the country lags behind Vietnam, which employs seedling grading followed by use of antagonistic fungus to combat nematodes and other soil-borne diseases. These pests are among the most prevalent in the municipalities of South Cotabato. Farmers opt to uproot infected seedlings, however, it would require additional labor and costs.

Guava farmers also practice fruit bagging to reduce damages from the fruit pests. It is done by wrapping the fruit with an old newspaper and covering it with a plastic bag to provide a liquid-proof layer. These plastic bags are removed and thrown away after harvesting. Since plastic bags are

nonbiodegradable and their production causes emission of greenhouse gases, there is a need for an alternative fruit bagging material to avoid the hazards it may entail.

Minimal cultural practices applied.

One of the most commonly applied cultural management practices for underutilized fruit trees is weeding or clearing. This cultural practice is done to remove unwanted weeds that compete with the nutrient uptake of the fruit crops. On the other hand, guava farmers in Cabanatuan City, Nueva Ecija and in Banga, South Cotabato, apply organic and inorganic fertilizers and pesticides to increase the volume and quality of production since guava farming is considered a major income source. However, among the tamarind farmer respondents, only 5% apply fertilizer to their trees. Fertilizer application was usually done together with the common intercrops such as mango, coconut, and banana, among other major crops.

Moreover, there are limited production guides on planting to harvesting. Majority of the farmers rely only on their knowledge and experience in production and handling underutilized fruits. There were also minimal efforts from the government and other organizations to improve farmers' knowledge in underutilized fruit production through seminars, trainings, and technical assistance.

Very low farm prices and incentives.

The low farm price of guava, soursop, sugar apple, and tamarind is a disincentive for farmers to improve production. Since they consider growing of underutilized fruits only as a secondary source of income, farmers tend to neglect the production. Even the practice of sorting/grading does not give high incentives for farmers. The Bureau of Agriculture and Fisheries Product Standards has set a Philippine National Standard (PNS) for grading and classification of fresh fruits in the country. Despite this, majority of the underutilized fruit farmers do not practice sorting/grading because of the lack of added benefits, particularly in profit. It was also found that 42% of guava farmers who practice sorting/grading earn only P0.21/kg more than farmers who do not. Meanwhile, soursop farmers stated that they do not practice sorting/grading since the traders they transact with were only concerned about the maturity of the fruit, wherein the separation of spines (thorns) is being used as an indicator of maturity. Lastly, only 5% of tamarind farmer-respondents practice sorting/grading. This provides them with an additional P4.68/kg profit.

Limited market outlets and lack of market information.

Absence of guaranteed buyers discourages farmers from harvesting underutilized fruits. Majority of the soursop farmers in the study stated that unless they have assured buyers,

they would rather not harvest and leave them to rot to avoid added costs. Moreover, there are limited outlets where underutilized fruits can be offered such as local markets and fruit stands along the roads or near the vicinity of the market (Fig. 3). However, some farmers establish trading relationships with traders to ensure regular buyers of their produce.

Lack of market outlets result in unreliable market information. The difficulty compels the farmers to take the prices as dictated by the traders who are the assemblers, 'viajeros,' wholesalers, and contract buyers.

With no clear sources of price information, farmers become fully dependent on these traders in their respective areas.

Logistical issues due to product perishability and delays in distribution.

Some of the major concerns in transporting underutilized fruits are the market accessibility and poor quality of roads since farms are commonly located in hilly or mountainous areas. These areas may only be accessed through horse or 'habal-habal.' Furthermore, lack of available transport vehicles delays delivery of these fruits to the market. With such delays, farmers are

forced to place the fruits in storage facilities to extend their shelf life.

No specific government and development programs for guava, soursop, and sugar apple.

Among the underutilized fruits, only tamarind has an R&D program that is being pursued by an R&D center located at the Pampanga State Agricultural University (PSAU) (Fig. 4). Such program is important in accelerating the growth of the industry. This will help focus on the identification and solution of specific problems to optimize domestic and international market potentials of the fruits.



Fig. 3. Soursop being sold along the roads and vicinity of the market. (RMA Fruits Project Team 2020)



Fig. 4. Interview with Tamarind R&D Center staff in PSAU. (RMA Fruits Project Team 2019)

Current Supply Chain Affecting the Market System of Underutilized Fruits

Through market mapping, identified key players among the underutilized fruits industry are the farmers, traders (i.e., assembler-viajeros [Fig. 5], assemblers, wholesaler-retailers, retailers, contract buyers, and/or cooperatives/associations), and key customers (i.e., spot market, processors, and institutional markets such as restaurants). Identified marketing channels showed no circuitous

flow or inefficiency in the flow of the underutilized fruits and the roles of each intermediary along the chain.

However, despite the presence of key players in the industry, demand and supply of underutilized fruits were still not met due to limited linkages between farmers and their key customers. Farmers often fail to see the potential of underutilized fruits as major crops because of the minimal market incentives received

from growing them and the difficulty to secure buyers of their produce. On the other hand, processors experience undersupply of underutilized fruits due to limited number of farmers and traders. Processing companies are one of the major players in the underutilized fruits industry as they process huge volumes to meet their processing requirements. However, when volume requirements are not met, manufacturing of their products is often discontinued.



Fig. 5. Assembler-viajeros of sugar apple in Lobo, Batangas. (RMA Fruits Project Team 2019)

Market Opportunities to Strengthen the Underutilized Fruits Industry

Underutilized fruits, either as fresh fruit or processed product, are exportable commodities in the long run, therefore, the following market opportunities need to be explored to strengthen the underutilized fruits industry in the country:

Various value-adding activities.

Processing value-added products prolong the shelf life of underutilized fruits and increase their market value. Underutilized fruits processed as jams, wines, concentrates, tea, candies, and ice creams are among the products that continue to gain popularity, especially with their nutritional and medicinal benefits. Still, there is a need

to diversify and develop more products to avoid wastage and widen consumption of underutilized fruits.

Increasing demand for fresh fruits.

Like fresh fruits, underutilized fruits offer unique tastes and dietary benefits that attract consumers to include them in their diet. However, high perishability of these fruits demand better handling practices and facilities including packing houses. These could satisfy the demand for fresh fruits making them accessible and available to more market outlets in a prolonged period.

Technological innovation.

Advancements in agriculture have greatly contributed to the practices that farmers employ to improve the yields and quality

of major crops in the Philippines. Technological innovations can be used to help farmers in the efficient production of underutilized fruits. During this time of pandemic, presence of digital marketing can further support farmers in underutilized fruits promotion and distribution towards potential market outlets. Advanced equipment and techniques can also aid in developing and diversifying more value-added products.

Presence of multinational processor companies.

Multinational processor companies in the country provide an entry to a larger market for the underutilized fruits industry as they can help in its introduction, distribution, and promotion to domestic and international markets.

Processing companies (Fig. 6) are one of the major players in the underutilized fruits industry as they procure huge volumes to meet their processing requirements. This opportunity requires interventions to increase yield and harvest of underutilized fruits and create more market linkages between farmers and processors.

Export potential. Aside from having high nutritive value, these underutilized fruits are potential export commodities

as fresh fruits or processed products (Fig. 7). Underutilized fruits as export quality crops will encourage entrepreneurship that will consequently create more employment in rural areas where these fruits can be found. In line with this, the Department of Trade and Industry crafted the Philippine Export Development Plan (PEDP), which aims to address the challenges and opportunities in the export sector through diversifying into new markets and products. PEDP also targets to identify

and develop export capabilities in products with increasing global market demand, address bottlenecks that undermine competitiveness of exports, and harness the potential of goods and services where the Philippines can be competitive (Castillo 2002, Aquino et al. 2013, and EDC 2015). Given the development of underutilized fruits into export quality commodities, its potential in the international trade industry can be maximized.



Fig. 6. Interview with tamarind processor in Pampanga. (RMA Fruits Project Team 2019)

R&D FRAMEWORK FOR UNDERUTILIZED FRUITS IN THE PHILIPPINES

The R&D framework for underutilized fruits (Fig. 8) was designed to specifically target the issues identified in the study and create initiatives to explore opportunities that underutilized fruits can offer. Moreover, the framework puts forward an agenda on R&D, policy, and marketing to develop the underlying processes and systems in the underutilized fruits industry. The following recommendations will require participation of multiple sectors, especially those involved in the supply chain:

R&D Agenda: Technical and Strategic R&D

Technical R&D pertains to the applied research, programs, and activities that can help develop and improve the production of underutilized fruits.

These technical R&D programs and activities aim to address poor pest management and limited cultural production practices and management standards:

- Varietal improvement of underutilized fruits such as pest-resistant and high-yielding crops to further fit the consumer needs and enhance the fruits into export quality commodities; and
- Promotion of PNS in the production guides of underutilized fruits to inform farmers on the qualities of underutilized fruits suitable for the market.

On the other hand, strategic R&D pertains to basic research, programs, and activities that can help in industry development of underutilized fruits. The following strategic R&D programs and activities aim to aid the lack of

strategic roadmaps and lack of R&D center for underutilized fruits:

- Inclusion of underutilized fruits in the DOST-PCAARRD's Industry Strategic Science and Technology Programs (ISP);
- Inclusive value chain development research to highlight the viability and potential of underutilized fruits where processors will serve as the private sector and the value-chain will be developed to meet their requirements;
- Initiate regional collaboration (Southeast Asia) for the development of a regional collaborative program to better understand each other's processing techniques, market information, innovation strategies, and to learn more about their R&D programs for underutilized fruits.



Fig. 7. Processed guava jam, soursop drink, and tamarind wine. (RMA Fruits Project Team 2019)

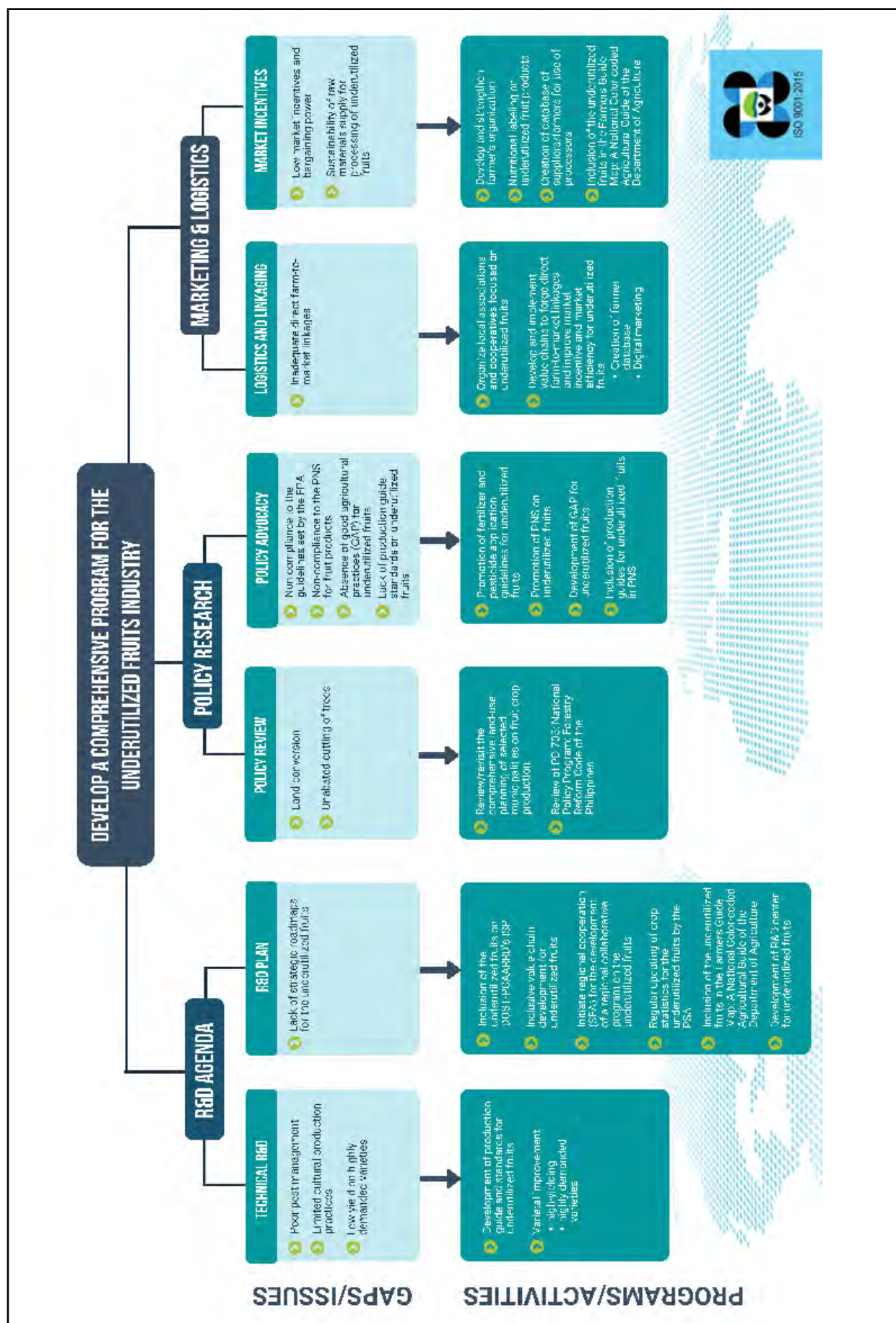


Fig. 8. R&D framework for underutilized fruits (guava, soursop, sugar apple, and tamarind) in the Philippines. (RMA Fruits Project Team 2020)

This effort can strengthen the market potential of the underutilized fruits industry towards food security and dietary diversity in Southeast Asia; and

- Inclusion of underutilized fruits in the Farmer's Guide Map: A National Color-coded Agricultural Guide of the Department of Agriculture.

Policy Research: Policy Review and Policy Advocacy

Policy review pertains to the assessment of relevant policies that have implications and external influences in the underutilized fruits industry. It aims to evaluate policies that can help address land conversion and unabated cutting of trees. Here are some recommendations:

- Examine the issues and relevant policies on land-use conversion and recommend measures to minimize conversion of area planted to underutilized fruits for other purpose; and
- Examine the issues and relevant policies related to cutting trees in private land and recommend measures to minimize this practice. Relevant policy such as the Forestry Reform Code of the Philippines or the Presidential Decree No. 705: Revising Presidential Decree No. 389 Section 68, which states that forest products and trees that are not among the premium trees listed are

still regulated and permits may still be required for cutting and/or clearing them from private land. In essence, Presidential Decree No. 705 prohibits the cutting of trees. Proper implementation of this policy is among the sought solutions of guava and tamarind farmers in the conversion of guava and tamarind farms into other high-value crops in the study areas.

Policy advocacy pertains to the improvement and enhancement of government programs to strengthen the underutilized fruits industry. Policy advocacy programs and activities aim to address the non-compliance to the Fertilizer and Pesticide Authority (FPA) Guidelines, the PNS fruit products, and the limited production guide standards. Some points to be considered are the following:

- Promotion of fertilizer and pesticide application guidelines for underutilized fruits;
- Promotion of the PNS on underutilized fruits to encourage compliance during product sorting/grading. There should be a review on standards for each fruit including grading, size classification, tolerances, packaging, contaminants, and hygiene to ensure quality of the fruits for export; and
- Inclusion of production guides in the PNS.

Marketing and logistics.

The need to increase visibility of underutilized fruits in the market emphasized the need to identify programs and activities under marketing and logistics through establishing direct farm-to-market linkage. On the other hand, programs and activities on market incentives aim to address gaps such as low market incentives for producing underutilized fruits and low bargaining power of farmers.

Logistics and linkaging.

Local associations and cooperatives focused on underutilized fruits must be organized to encourage empowerment and capacity development among its key players and stakeholders. It is also recommended to develop and implement projects designed to forge direct farm-to-market linkages for underutilized fruits through social media advertising and digital marketing.

Market incentives. To further attract consumers into choosing healthier products, packaging of underutilized fruits must have a nutrition label. IEC materials about the nutritional value and other uses of underutilized fruits should be created to help address the issue of farmers and traders in bargaining power.

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EDITOR'S NOTE

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