Market development of local peatland commodities to support successful peatland restoration

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Abstract. Peatland degradation and community livelihood are often driven by market forces. Successful peatland restoration including community livelihood improvement programs is therefore highly correlated with market development of various local peatland commodities that are introduced to replace fire-using farming activities. However, since the development of local peatland commodities is often under subsistence marketplaces, investigation of their market is not attractive and has received little attention. This paper investigates the market structure of the local peatland commodities developed by the local community under peatland livelihood programs using Rapid Market Appraisal (RMA) technique and market structure analysis to quickly draw challenges and opportunities of market development of peatland commodities. We also analyze a business model applied by the local community, particularly their strategy to adapt to market dynamics and to secure market competition. The information is essential to serve as a basis for formulating appropriate interventions needed to develop a more established market of local peatland commodities, which as a consequence will prevent peat forest conversion. The investigation finds that at least three types of peatland commodity market structures are evolving in the research site. Each of them has different challenges and needs different interventions to make the livelihood programs more sustainable. Meanwhile, the local community is more oriented towards sales than the marketing of peatland products. They have not prepared a specific strategy yet to adapt to and win the dynamic market competition. It needs significant efforts to change its business culture if relevant stakeholders intend to develop the local peatland commodity market as a part of peatland restoration and community livelihood improvement programs.

1. Background
Indonesia is home to the world’s second-largest tropical peatland ecosystem, reaching around 13,433 million hectares (MH) [1]. The ecosystem has faced the threat of increasing deforestation and degradation nevertheless, particularly caused by anthropogenic factors such as logging, fire, and unsustainable agricultural practices. This has degraded the important role of Indonesian peatlands in economic development and climate change mitigation. Degraded peat forests in Indonesia are estimated...
to reach approximately 0.604 Mha between 1990 and 2000 and by 0.612 MHa between 2000 and 2010 [2]. Moreover, only approximately 7% of the total peatlands in the Kalimantan Island, the second-largest peatland area only to Papua, remain in a “pristine” state in 2015 [3], while [4] disclose that most of the degraded forests in East Kalimantan constitute peat-swamp forests. It causes the role of peatlands in mitigating climate change and providing a livelihood for the local community to be disrupted.

Measures of restoring peatland are regarded as a policy that can accommodate economic development and climate change mitigation purposes [5]. The peatland restoration measures taken by the Indonesian Government are carried out through three approaches, rewetting, revegetation, and revitalization or community livelihood improvement. Those are done by developing hydrological management to keep the peat wet; re-growing native peatland species suitable with the existing natural condition of the peatland and having a high economic value, a so-called paludiculture system; and providing livelihood options for the local community living around peatland ecosystems.

Paludiculture becomes a key approach to increasing participation and well-being of the community under the revitalization program [6]. The local community grows local perennial trees such as swamp jelutung, gelam, gemor, pulai, terentang, kemparas, tengkawang, candlenut, rambutan, durian, and mangosteen, combined with horticultural crops like pineapple, dragon fruit, chilies, eggplants, and tomatoes. Those various local peatland species are introduced to replace fire-using farming activities. However, in addition to an inappropriate paludiculture concept, implementation of the paludiculture system on the ground still faces challenges, in which market absorption of paludiculture-based commodities and business skills of the local community are still limited [7]. Farmers often find it hard to develop a competitive market for their paludiculture-based commodities, hence they only sell their products to their surrounding neighbour in small quantities. Moreover, farmers’ limited access to the market leads to their low bargaining position in light of the pricing decision process. The presence of middlemen causes the price of peatland commodities at the farmer level to be lower than the actual price in the market [7]. This results in an increased risk of unsustainable community participation or their reluctance to participate in peatland restoration.

A deep investigation on the potential of peatland friendly commodity market is essential to support the continuity of peatland restoration efforts [8,9]. The market of peatland restoration products is also important to make the restoration cost-effective and to provide sources of funding for the peatland restoration activities that often require high cost [10]. The information gained from the market analysis can become one of the considerations for determining appropriate commodities to be developed under the revitalization programs in a specific area with a typical community culture [11].

This paper is focused to scrutinize the market structure of peatland commodities developed by the local community under the peatland livelihood programs and exploring business models applied by the local community, particularly their strategy to adapt to market dynamics and to secure market competition. Market structure is the key to identifying general patterns of behavior of sellers and buyers in the market including the pricing behavior [12,13]. The information is essential to serve as a basis for formulating appropriate interventions needed to develop a more established market of peatland-friendly commodities, which as a consequence will prevent peat forest conversion.

2. Method
The Rapid Market Appraisal (RMA) technique and market structure analysis are employed to quickly draw challenges and opportunities of market development of peatland commodities, while the analysis of business models refers to the business model approach proposed by [14]. The steps to scrutinize market structure include (1) identifying peatland commodities developed by the local community in the research location, (2) performing rapid market appraisal (RMA) to identify the structure of market demand and how the market works in response to the development of the commodities.

The business model according to [14] highlights how a business organization creates value and establishes a framework so that it can enhance business focus, have strong competitiveness, and can continue to survive even though the business industry is not well developed. The business model analysis is used to examine the focus and business framework of peatland farmer groups whether or not they
have adequate market adaptability and competition. Market adaptability and competition are two important factors in the independence of a business. The business model analysis focuses on key information related to a) efforts taken by peatland farmer groups to understand the characteristics and needs of buyers/markets, b) response of peatland farmer groups to the development of a product, c) strategies of peatland farmer groups to adapt to market conditions and needs, d) strategies to win the competition market, and e) financial and human resources management.

3. Result and discussion
3.1. Trading systems of local peatland commodities in Pulang Pisau, Central Kalimantan
Various local commodities have been developed in Pulang Pisau Regency under the community economic revitalization programs that are initiated by many different parties such as the central government, regional governments, Peatland Restoration Agency, and some NGOs. Commodities developed vary from agricultural commodities, forestry, inland and peatland fisheries, as well as ecotourism. Some commodities developed in Pulang Pisau under the revitalization programs are sengon, gelam, purun, rattan, fish, swallow's nest, jelutung, coffee, crystal cassava, oyster mushroom, bajakah, lemba onion, and noni. However, these commodities do not thoroughly support the paludiculture program, given not all of them are native peatland species that are acid and waterlogging tolerant. Most local communities grow the species less tolerant to acid and waterlogged conditions on mineral soil, thin peat, or degraded peat. Meanwhile, the commodities that are more tolerant to acid and waterlogged conditions such as purun, gelam, and jelutung are usually not cultivated by the local community, but naturally grow on peatlands. The local communities collect them directly from nature. Only a few are deliberately planted by some local communities close to where they live, such as some of Purun and Jelutung in Tumbang Nusa.

The various local commodities become sources of local community livelihood. Some commodities are directly sold without being processed, but some are traded as intermediate or end-products. The community usually adopts a sale orientation than a market orientation in developing their peatland commodities-based business. Several factors encourage the community to develop these commodities, including market demand, great sales gained by fellow farmers, facilities/assistance from the government or NGOs, or following in their ancestors’ steps. Most businesses developed by the community are also still subsistence, only aimed at fulfilling the daily needs of the household. Subsistence businesses are characterized by low-literate consumers and entrepreneurs [15]. On the other side, the business actors that have already adopted a market-oriented trading system in Pulang Pisau are wholesalers and industry level.

In general, the peatland commodity trading systems evolved in Pulang Pisau can be grouped into three following categories:

a. Simple/short trading system
A simple or short trading system occurs in basic commodities that can be directly consumed or utilized by individual consumers. It is generally a simple or short trade chain because consumers are generally located close to sellers or producers. The commodities that are marketed under the short trading system are gelam, oyster mushrooms, crystal cassava, coffee, fish, jelutung seeds, lemba onions, and noni. The communities usually sell these commodities in local markets, and they have not yet reached other domestic markets such as the markets at district or province levels. Nevertheless, markets for these commodities are still potential to be developed, particularly if the communities are facilitated by third parties to widen their marketing. The general trading structure of these commodities is presented in Figure 1.

The advantages of these commodities are affordable prices without a complicated transaction system, while consumers do not require high-quality products. They are developed in subsistence marketplaces leading to low power to enter into industry level. The market is largely determined by the behavior and needs of consumers that can change quickly. Maintaining consumer behavior and needs is, therefore, crucial to stabilize marketplaces for such kinds of commodities.
b. **Moderate trading system**

A moderate trading system usually occurs in raw material commodities that supply the industry’s needs and will be further processed by the industry into various derivative products. The commodities that are marketed under this system are sengon, jelutung sap, swallow’s nest and bajakah. Processing industries can be located either around or outside local community settlements. In this mechanism, the price is usually determined by industries. When the local community resumes the price is too low or no longer attractive, they will cease selling the commodities. The general trading structure of these commodities is presented in Figure 2.

![Diagram of moderate trading system](image)

**Figure 2.** General trading structure of raw material commodities in Pulang Pisau.

This type of trading system refers to such an oligopsony market where buyers have more power to control market price while producers usually have a weak bargaining position in determining prices [16]. In this trading system, a middleman plays a crucial role as a community’s patron, a provider of market information, and a major underwriter that bears market transaction costs. Even though the industry is close to the communities, the communities generally prefer to sell their products to middlemen. This is due to the difficult administrative requirements from the industry, such as requirements to fulfill certain quantities, ownership of tax ID number, non-cash and carry payments. In some cases, the communities also have ties to the middleman since the middlemen give some assistance such as fertilizer, nursery, initial capital, etc. It causes the communities do not have a choice to sell their products to others. In many cases, middlemen play important roles that other institutions find difficult to replace. Middlemen provide complete market information and bridge local communities to meet the demand from end-users. They seek to map the supply and demand of various products with various qualities in a certain market. These roles need adequate skill and sufficient capital, which is somehow difficult to meet individual local community or government institutions.

Furthermore, the communities have limited access to the end market and limited financial resources to carry out further processing stages. The industry sells intermediate or end products to both domestic and global (export) markets. In this trading system mechanism, the industry is central to determining a price in the marketplace. Furthermore, the price determined by local industry is generally much lower than that outside the region. For example, the price of sengon wood in Pulang Pisau is much lower than the price in Java. The market for these commodities is likely sustainable when consumers both at domestic and international markets still require the intermediate or end products produced by the industry. These commodities are likely well developed when there is less competition with similar, cheaper commodities (eg jelutung gum or resin competes with synthetic rubber).
c. **Long/complex trading system**

Artistic commodities that are classified as fancy products or added value-having products (eg eco-friendly) have a more complex trading system. This occurs in the trading system of processed rattan and purun (*Heleocharis fistula*) such as eco-straw, purun mat, and rattan wicker. Some farmers or craftsmen who have adequate resources can cut the trade chain shorter and directly access the end markets. Fancy products have been marketed through more modern mechanisms, including through resellers/dropships as well as online marketplaces so that they can reach wider consumers. However, the long trading chain reduces the profits received by the farmers or craftsmen. The general trading structure of the fancy commodities is presented in Figure 3.

![Figure 3. General trading structure of fancy commodities in Pulang Pisau.](image)

Problems that often occur in this commodity trading system encompass the limited supply of raw materials, more complicated requirements for product processing stages, and trading transaction systems. Raw materials for some fancy products are limited since the communities do not cultivate them. Meanwhile, further processing stages usually require sufficient capital, appropriate technology, a worker’s perseverance, and skills. In contrast, most local communities are not risk-takers and are accustomed to simple processes such as cash and carry payment systems or straightforward product processing.

In addition, potential markets that appear in this commodity trading system do not completely turn into real markets. In the case, that occurs consumers only explore information related to the products but in the end, there is no real transaction of buying and selling. Requirements for quality, quantity, and product continuity from consumers often could not be met by the local communities. Internet network issues are also often faced by the local communities in performing online marketing. This has caused some communities to be reluctant to continue developing their business. The condition in which most local communities bear all activities themselves from planting, producing to marketing processes at their own risk has caused their business to be at high risk of stagnancy when they face a challenge since their capacity and resources are still limited. Partnership with third parties to share their burden are therefore necessary to support their business sustainability.

3.2. **Business models applied by the local community**

Local communities in Pulang Pisau perform their peatland commodities-based business individually or in a group. The businesses performed in a group, in most cases are encouraged by facilities or
intervention programs executed by the government, by which the programs encourage the local communities to form a business group. Characteristics of the business models developed by the local communities in Pulang Pisau, either as an individual business or in a group, are generally conventional business models. It is shown by their capital system, resources management, productivity, and marketing systems. Moreover, middlemen play as the main channel to get various customer segments. Most of the customers are local and domestic users including peat restoration projects, but global markets are still potential to be reached, particularly for some products such as purun weaving and jelutung latex. Table 1 summarizes the business models evolving in Pulang Pisau.

| Business elements            | Individual business                                                                 | Business Group                                                                 |
|------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Consumer orientation         | • Do not understand consumer’s characteristics and needs                           | • Third parties or middlemen provide information about consumer’s needs, but often hard to meet the consumers’ expectation |
| Marketing strategies         | • No specific strategy, they produce products when markets are available           | • A few do online marketing and product diversification facilitated by third parties |
| productivity continuity      | • low to moderate, depending on the market, production equipment, and skill        | • low to moderate, depending on the market, production equipment, and skill |
| Financial management         | • individual capital                                                               | • Capital supported by third parties’ programs                                  |
|                              | • finance is managed directly by the individuals                                  | • the group has a treasurer to conventionally manage its finance                |
| Human resources management   | • No action                                                                        | • The lead of the business groups divides available work or tasks to their members, but often leading to a conflict amongst the members |

Most of the peatland commodities-based businesses run by the local communities are subsistence scales with low bargaining positions in market dynamics. The local communities have not prepared a specific strategy yet to adapt to and win the dynamic market competition. Both individual or in a group-business have not applied strategies to understand consumers’ needs and satisfy the consumers to win the market competition. This is in contrast to principles of a self-sufficing business that always develops the uniqueness of their products and seeks consumer preferences and adapts to changing markets when competitors threaten. The local communities in Pulang Pisau often find challenges in meeting consumers’ expectations since they are not equipped with adequate production equipment and skill. This is exacerbated by their less painstaking nature. Moreover, in a group-business often face obstacles due to conflicts amongst the members which are usually driven by disagreement or disobedience of the members in the division of tasks and work time.

3.3. Interventions needed to develop local peatland commodity market
Market structure and characteristics of business models applied by the local commodities become key factors in determining interventions required to support the market development of local peatland commodities. The two factors are interrelated. Given the aforementioned narration about the two factors, interventions need to enhance and expand the peatland commodity markets should vary, depending on the different natures of the two variables. Moreover, it is crucial to change the business cultures of the communities first when relevant stakeholders intend to develop local peatland commodity markets as a part of peatland restoration and community livelihood improvement programs. Empowering local communities to be more open-minded and adaptive to changes and enhancing the social capital of the
local communities play important role in revitalization programs [17,18]. However, changing their business culture does not mean forcing the communities to drastically change their business behavior. The key change that should occur is their orientation to meet consumers’ requirements in the light of quality and quantity aspects. The communities should not be burdened by marketing or other performances, only focused on production.

The interventions to improve or strengthen the existing businesses carried out by local communities need to be executed gradually. In terms of the business actors, they might be separated into production and marketing orientation. The local communities that are closed to farming and production activities (farmers groups) should focus on production, while those that collect the products from primary producers focus on marketing activities. They then should collaborate in developing the business to adapt and win the market competition. Furthermore, the interventions to improve the performance of peatland commodity markets can be carried out from supply-demand approaches. The supply approaches are taken to strengthen the role of the local communities as producers so that their products can reach the market well in terms of quality, quantity, and continuity. Meanwhile, the demand approaches are all activities that are sought to ensure the sustainability of the demand for the product so that the market remains developed.

The supply approaches can be carried out in several ways including improving production quality by providing quality seeds, increasing the capacity of local communities in cultivation and processing stages, providing adequate equipment, improving packaging quality, preparing product certification if necessary, and strengthening horizontal integration with various community groups that perform similar business. Meanwhile, the demand approaches can be done by providing market information systems for local communities, creating vertical integration between local communities and local traders or local companies, as well as with industry or end buyers. Vertical integration between business actors needs to be strengthened by the existence of contract farming to regulate standards and conditions agreed upon by the parties, to guarantee certainty of the product acceptance by consumers. The existence of contract farming will also encourage local communities to continuously produce quality products in certain volumes as agreed between the local communities and the buyers. Another demand approach can be done through market expansion outside the region.

In more detail, the interventions needed to enhance the small and medium business of local peatland commodities, particularly in Pulang Pisau Central Kalimantan, are specific for each type of trading system. The simple/short trading system needs expansion of market segments that might be supported by product diversification. Product diversification will also prevent consumers from getting bored. The government also plays a central role in expanding the markets. Maintaining government projects that require a supply of commodities from local commodities will sustain markets for the commodities that are categorized under this trading system. For instance, rewetting construction projects that use galam or peatland restoration projects that need jelutung seeds can sustain markets for the commodities. Since the business is related to food production, the government needs to facilitate the local communities to obtain a food product certification system. Furthermore, it is necessary to develop a superior commodities-based regional cluster system to prevent the excess supply of certain products.

Meanwhile, the interventions that can be done to strengthen the second type of trading system are to expand global trading (export) or strengthen the downstream processes of intermediate or end products performed by industries. The market for these commodities basically will keep growing if the intermediate or end products are still used by domestic or global consumers, and there is no competition with similar, cheaper commodities (eg jelutung gum or resin is hit by synthetic rubber). Furthermore, it is necessary to build or strengthen village government-owned enterprises (BUMDES) managed professionally so that they can take over the aforementioned roles of middlemen. The enterprises can help the farmer groups make transactions with and meet the quality and quantity-related demand from industries as end consumers.

The farmer groups as producers in the third type of the trading systems should be intensively assisted to meet the supply (aspects of cultivation and production), as well as to strengthen the business management including financial and human resources management. Given that the consumers under
this trading system set high requirements for product quality, quantity, and continuity as well as a more complicated trading transaction scheme, intermediary institutions are needed to tackle relevant marketing processes, while farmers or producers can focus on improving the quality, quantity, and continuity of their production.

On the other side, intermediary institutions such as BUMDES or other forms of local government-owned enterprises (BUMD) should focus on strengthening and expanding markets, providing market information for the farmer groups, acting as risk-taker, controlling the product quality. This means they take over the roles of the middlemen. BUMD or BUMDES is the potential to take over the middlemen’s roles since they are located close to the farmers and their capital is supported from village funds and APBDes (village budget). Nevertheless, they need to be separated from village government management and must be managed professionally as a business agency. Its management must have an entrepreneurial spirit. Their capacity in making trading contracts and other relevant marketing measures need to be strengthened. Through these enterprises, the government can expand the market outside the region or establish business integration or bundling between the farmer groups with industries. Strengthening marketing skills can be provided for the farmer groups, but specifically for those who are under the first type of trading systems, where small producers can directly make transactions with their consumers and the market does not set high quality, quantity, and continuity requirements.

To expand markets for the commodities under the third type of trading system, it is necessary to strengthen promotions directed at consumers who have a high awareness of the environment. It is important to develop a green brand for these commodities by emphasizing the image of environmentally friendly products that significantly contribute to the improved community livelihood and peatland sustainability. Integration of these commodities with the development of other regional development programs such as tourism development programs can be an effective instrument to expand the markets. The commodities can become a typical product or a brand of the region, as souvenirs for tourists. Moreover, the local government can facilitate a showroom for displaying the products in the business central area that can be easily reached by consumers.

If optimizing the role of the enterprises or intermediary institutions is less possible, interventions can be focused to improve a relationship between farmers/communities and middlemen to promote equal business transactions and improve the bargaining position of the farmers. The farmers can have an equal role with the middlemen to determine a price based on the real calculation of business cost structure. Interventions to the middlemen should be played by the government that holds authority in commodities trading arrangements, and the government should provide facilitation to the middlemen, particularly to enhance their capital so that they can expand their business scale.

4. Conclusion
Market development of local peatland commodities is central to sustainable peatland restoration programs in the sense of communities’ participation. It however depends on the accountability of the businesses of peatland commodities developed by local communities that usually constitute subsistence scales. Expanding markets of local peatland commodities should be carried out in parallel with enhancing the business cultures of local communities. Interventions that might be executed by various parties that have concerns about peatland restoration programs should embrace both aspects, otherwise, the programs will get less interest from local communities. Furthermore, given the nature of the local communities, particularly in Pulang Pisau it is necessary to bridge the local communities that play a role as primary producers with end buyers through a professional business agency associated with a local government unless otherwise the role of middlemen can be controlled to build vertical integration and mutual partnership with local communities.

References
[1] Anda M, Ritung S, Suryani E, Sukarman, Hikmat M, Yatno E, et al. Revisiting tropical peatlands in Indonesia: Semi-detailed mapping, extent and depth distribution assessment, ..., Geoderma [Internet]. 2021;402(November):115235. Available from:
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