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Article Title

River Rock Gathering Practices and Their Impact on the Taliabo Village Community

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ABSTRACT

This research aims to understand how the Taliabo Village community utilizes the potential of Sausu River rocks, identify the challenges faced by rock gatherers, and explore the socio-economic dynamics of the village in addressing these challenges. This research uses an inductive qualitative analysis. Inductive analysis is an approach that begins with field facts, analyzes them based on relevant theories and arguments, and ultimately yields a conclusion. The results show that gathering rocks in the Sausu River of Taliabo Village is a vital economic activity supporting the livelihood of part of the community. Adapting to natural conditions and using traditional tools like tire rafts and gate-gate demonstrate the community's resilience and creativity in utilizing local resources. Although flexible working hours offer adaptation to uncertainties, the pricing structure of rocks based on their size provides significant economic opportunities. However, challenges such as natural conditions in the dry season and health issues add difficulties to this work. Furthermore, socio-economic aspects such as the culture of mutual aid underscore the importance of communal cooperation in overcoming hardships. At the same time, limitations in meeting education and housing needs reflect broader challenges faced by the river rock gatherer community in Taliabo Village. Therefore, the Government of Parigi Moutong Regency is recommended to support the rock gathering activities in the Sausu River as an essential part of Taliabo Village's local economy. It could include providing training and access to more efficient technology to enhance productivity and work safety for river rock gatherers. Additionally, rock gatherers are advised to adopt safer and more sustainable work practices, including ergonomic tools and attention to occupational health and safety. For the Taliabo Village community, it is recommended that the existing mutual aid system be strengthened. These joint initiatives can help address some of the socio-economic challenges the river rock gatherer community faces while strengthening communal resilience against economic and natural uncertainties.

Keywords: *Livelihood; River Rock Gatherer; Village Community.*

INTRODUCTION

Technological advancements have significantly altered how societies fulfill their daily needs (Ramadhani et al., 2023), impacting the industrial and service sectors and how people interact with their natural environments. The potential of a region plays a critical role in determining the types and quality of economic activities that can develop (Mrabet et al., 2021). Natural resource variations across regions lead to specific diversifications in livelihoods, which in turn influence the welfare of local communities (Sayful, 2020).

The economic potential of a region largely depends on its ability to manage and develop existing natural resources (Anggariani et al., 2020). This concept is crucial in formulating strategies for sustainable economic growth. Wisely identifying and utilizing natural resources enhances living standards (Ebeke & Etoundi, 2017) and ensures environmental balance and sustainability (Schroering, 2019). In this context, a deep understanding of how to maximize a region's economic potential is crucial.

Taliabo Village is an intriguing case study examining the relationship between regional potential and community livelihoods. Located near the Sausu River, Taliabo Village harbors unexploited natural rock resources. The residents, especially in Hamlet 4, gather river rocks as their primary livelihood. This activity reflects the utilization

of available natural resources and portrays the socio-economic conditions of the community, which faces limited access to more formal and sustainable employment.

The residents of Taliabo Village, particularly in Hamlet 4, face significant socio-economic challenges. Most are migrants without land ownership, compelled to rent land for housing. This situation restricts their access to more stable and profitable economic resources. Their reliance on traditional livelihoods, such as gathering river rocks, highlights their limited options. Although natural resources like the Sausu River offer economic potential, their utilization could be more optimal.

Working as river rock gatherers poses unique risks and challenges. With no age restrictions, even children and the elderly participate in this physically demanding activity. This situation raises concerns about their welfare, health, and long-term livelihood sustainability. Moreover, the low social status associated with this job adds psychological burdens to those involved.

More research is needed to examine how regional potential influences livelihoods and the socio-economic conditions of the Taliabo Village community. Previous studies have tended to focus on the economic potential of a region without profoundly considering the socio-economic aspects of communities dependent on natural resources. This limitation indicates the need for a more holistic research approach that views natural resources not merely as economic commodities but also considers their direct social and economic impacts on the surrounding communities.

Based on the description above, this research aims to understand how the Taliabo Village community utilizes the potential of Sausu River rocks, identify the challenges faced by rock gatherers, and explore the socio-economic dynamics of the village in addressing these challenges. The anticipated benefits of this research include providing new insights into the adaptation and resilience strategies of local communities in optimizing available natural resources and offering recommendations for sustainable economic development that is inclusive and responsive to the needs and challenges faced by the Taliabo Village community.

METHOD

This research uses a qualitative approach to understand groups of people, objects, situations, conditions, ongoing events, and even thought systems (Whitney, 1960). This research was conducted in Taliabo Village, Parigi Moutong Regency. This research utilized both primary and secondary data sources. Data was collected through interviews with key informants, field observations, literature study techniques, and document analysis concerning the practice of river rock gathering and its impact on the socio-economic aspects of the village community. The acquired data was then analyzed using inductive qualitative analysis. Inductive analysis is an approach that begins with field facts, analyzes them based on relevant theories and arguments, and ultimately yields a conclusion (Neuman, 2003).

RESULTS AND DISCUSSION

A. Utilization of River Rock Potential

The river rock gathering enterprise in Hamlet 4 of Taliabo Village is the primary income source for many less affluent families. The lack of skills and other job opportunities compels them to engage in physically demanding labor. According to microeconomic theory, this job choice can be explained through opportunity cost (Rai et al., 2017), where the lack of available alternatives makes river rock gathering the best option. Under limited economic conditions, individuals tend to choose jobs that directly satisfy their basic needs, such as the need for food (Mitra, 2022).

The social and economic dynamics in Hamlet 4 illustrate how the scarcity of employment opportunities and private agricultural land contribute to the community's job choices. The structuration theory explains that such socio-economic conditions shape social practices, including job selection (Galvin, 2020). Even at an advanced age, the necessity for engaging in physically strenuous work like river rock gathering indicates a socio-economic disparity affecting individuals' quality of life. The concept of occupational risk in occupational health is also relevant here, given the physically demanding nature of this work and its potential to cause long-term health issues (Schram et al., 2019).

Using traditional tools in the river rock gathering business indicates limited capital and technology. Predetermined working hours and earnings that only suffice for daily needs point to suboptimal working conditions. In small business development, sustainable livelihood, which emphasizes enhancing capacity and resource access, is highly pertinent (Arafat et al., 2022). Developing the community's capacity to manage the river rock gathering business through skill training or technological improvements could contribute to increased income and well-being.

B. Methods for Gathering River Rocks

The process of river rock gathering illustrates the challenging interaction between humans and their natural environment. The collected river rocks result from a complex interplay between geology and hydrology, producing irregular, rounded shapes. River geomorphology theory explains that erosion, transportation, and sedimentation processes influence river rocks' shape and size over many years (Pérez, 2017). These factors contribute to the unique characteristics of river rocks, making them valuable materials in construction.

Choosing river rocks that are more significant than the standard diameter of 30 centimetres for use in building foundations acknowledges the value and strength of this material. In materials science, the size and strength of the rocks

are primary considerations when selecting construction materials (Sari & Sudarti, 2021). Larger and sturdier rocks are preferred for their ability to support building structures more effectively. Gathering river rocks of specific sizes requires gatherers to possess particular skills to identify and select rocks suitable for construction needs.

Traditional tools such as tire rafts and *gate-gate* in the river rock gathering process show the local community's adaptation to natural conditions and technological limitations. These simple tools enable gatherers to transport large rocks from the river to land with relatively high efficiency, albeit with considerable physical effort. Reliance on these traditional methods also reflects a symbiotic relationship between the community and its natural environment, where local knowledge and traditional skills are vital assets in utilizing natural resources. It aligns with the concept of cultural ecology, which emphasizes the dynamic interactions between humans and their environment in shaping cultural adaptation systems (Bennett, 2017).

1. Tire Rafts

Tire rafts, an innovative adaptation from used loader inner tires, play a vital role in the river rock gathering. This modification, including adding wooden supports and reinforcement with rattan and hoses, demonstrates an intuitive understanding of basic physics principles, particularly buoyancy and load distribution. The principles of physics, especially Archimedes' law of buoyancy, are highly relevant in explaining how tire rafts can lift and hold heavy rock loads without sinking (Consales et al., 2018). This modification also shows local wisdom in using available resources to create effective and economical solutions.

Gathering river rocks using tire rafts reflects efficiency in utilizing the natural environment for economic activities. Using tire rafts minimizes the risk of equipment damage from heavy loads and optimizes transporting rocks from the middle of the river to the shore. The ergonomic work concept is evident in how the tire rafts are designed to reduce the physical burden on river rock gatherers while enhancing work safety and productivity (Santoso & Prihono, 2022). Given the variability in individuals' abilities to gather river rocks, this efficiency is crucial, as indicated by the number of tire rafts needed to fill one truck.

The varying production capacity among individuals, ranging from 20 to 27 tire rafts per truck, indicates variability in skills, physical strength, and possibly access to resources or more productive river rock gathering locations. It reflects the socio-economic dynamics within the river rock gatherer community, where only some have the same opportunities or abilities

to generate income. Employment economic theory that examines factors influencing labor productivity and income distribution can offer further insights into how these factors affect the lives of river rock gatherers (D'Elia & Gabriele, 2022). Thus, using tire rafts is not only a technical solution to the problem of river rock gathering but also plays a role in a broader socio-economic context.

Furthermore, gathering river rocks to fill one truck is a process that requires significant time and effort. The time it takes to gather enough river rocks to fill a truck, ranging from four to five days under optimal conditions to two weeks when river rocks are hard to find, shows excellent variability in work productivity. This variability can be influenced by factors such as river flow conditions, rock availability, and the rock gatherer's physical condition and work efficiency.

In the context of time and project management, this significant time difference indicates uncertainty that must be managed. Using queuing theory in operational management could be relevant here to optimize workflow and reduce waiting time in the river rock gathering process (Liang, 2017). Strategic arrangements regarding the number of rock gatherers, placement of tire rafts, and efficiency in moving rocks from the river to the shore can minimize the time required to fill one truck, thereby increasing the income of river rock gatherers.

Additionally, the prolonged duration required for river rock gathering highlights the challenges faced in this work. Long working hours in potentially hazardous environments, such as rivers with strong currents, add to workplace safety and health risks. Applying ergonomic and workplace safety principles, such as task rotation and sufficient rest breaks, can help mitigate these risks (Park et al., 2021). Aligning the need for work efficiency with the well-being of rock gatherers is vital to ensuring the sustainability of the river rock-gathering enterprise.

2. *Gate-Gate*

Traditional tools like *gate-gate* in river rock gathering reflect the local community's adaptation and innovation in addressing encountered challenges. *Gate-gate*, designed from iron with a bent tip and a handle wrapped with inner tire rubber, demonstrates the application of ergonomic principles in tool design. Using inner tire rubber as a handle reduces the risk of the tool slipping, especially in wet conditions, ensuring the safety and effectiveness of the tool in extracting rocks from beneath the sand.

The choice of materials and design of the *gate-gate* reflects a deep understanding of the working conditions in the river and the specific needs of

the rock-gathering activity. The bent iron tip facilitates the gatherer's ability to pry rocks from the sand, showcasing an innovation that enhances work efficiency. This approach aligns with participatory design theory (Hayes et al., 2021), which emphasizes the importance of involving gatherers in the design process to ensure the tool meets their needs accurately.

Using *gate-gates* in river rock gatherings indicates how simple tools can enhance productivity and reduce physical effort in demanding work. Factors such as gatherer safety, tool effectiveness in addressing work conditions, and gatherer comfort are the primary considerations in designing this traditional tool. Adapting tools based on work conditions and specific gatherer needs is shared among communities relying on natural resources and local wisdom daily (Sasmita et al., 2022). In this context, *Gate-gate* is not just a tool but also a representation of cultural adaptation and local wisdom in managing natural resources.

C. The Economic Activities of River Rock Gatherers

1. Working Hours

A seven-hour workday represents flexible working hours for river rock gatherers, illustrating their adaptation to the inherent uncertainties in the informal sector. This flexibility allows them to adjust to the variability of rock availability and weather conditions, significantly impacting the feasibility of river rock gathering. Such adaptations are characteristic of informal work, where instability in work conditions necessitates a dynamic and responsive approach. Adaptation theory is relevant in this context (Muchiri & Opiyo, 2022), as it describes how individuals or groups adjust their strategies to cope with environmental or work conditions changes.

The uncertainty in working hours and earnings in the informal sector also highlights river rock gatherers' economic vulnerability. They are in a position that requires significant dependence on fluctuating natural conditions, placing them at higher economic risk than formal employment. The concept of uncertainty in economic theory (Ashraf, 2021), which explains how individuals make decisions in situations with incomplete or changing information, can provide insights into how river rock gatherers manage the risks associated with their work.

While flexible working hours offer the freedom to adapt to external conditions, they pose challenges regarding income security and access to social safety nets. The lack of social protection, a common feature of the informal sector, increases the vulnerability of river rock gatherers to potential events that could disrupt their ability to work, such as illness or injury. Labor economics, which considers factors such as income security, working conditions, and

access to social services, is relevant for understanding and addressing some of these challenges (Jansson, 2017). Integrating river rock gatherers into a more formal social protection system could reduce their vulnerability and enhance their economic resilience against uncertainty.

2. The Income

The pricing structure per truck for river rocks, differentiated by size, underscores the importance of physical attributes in determining the economic value of a commodity in the local market. The established prices of IDR 380,000 for medium-sized rocks and IDR 400,000 for larger rocks illustrate how the dimensions and physical quality of materials are critical factors in determining their market value. It aligns with basic economic principles, particularly the theory of supply and demand, which states that the price of a good is determined by the buyer's willingness to pay and the seller's willingness to sell, both influenced by the attributes and scarcity of the good (Garrone et al., 2019).

The price agreement between buyers and the community of river rock gatherers reflects a negotiation and consensus process typical of local market dynamics. This mechanism shows an organized trading system where buyers and sellers interact to determine a fair price based on a mutual perception of the river rock's value. In this context, the concept of market fairness from economic theory can be invoked (Zahid et al., 2019), where the agreed-upon price reflects a fair value for both parties, balancing the seller's need to earn an income and the buyer's need to obtain quality materials.

This pricing structure directly influences the income river rock gatherers earn from their economic activity. The income depends on the volume of river rocks gathered and the quality and size of rocks that meet market demands. Here, the marginal utility theory, which states that the value of a good or service is determined by its last utility to an individual (Obłój & Wiesel, 2021), can explain how the varying utility of river rocks, according to their size, contributes to their pricing. The varying income among river rock gatherers, determined by their ability to gather rocks that meet the size and quality criteria of the market, illustrates the complex relationship between labor effort, natural conditions, and market dynamics in determining the economic outcomes of river rock gathering activities.

D. The Challenges of Gathering River Rocks

1. The Natural Conditions in Taliabo Village

The challenges faced by the river rock gatherer community in Taliabo Village, especially those related to natural conditions, demonstrate the close

relationship between local economic activities and environmental rhythms and changes. Extended dry seasons reduce the availability of rocks in the river flow areas, directly affecting the volume of rocks that can be gathered and, consequently, the gatherers' income. Ecological science can understand this phenomenon through ecosystem resilience, a system's ability to withstand changes and maintain its functions and structure (Wang et al., 2020). In this case, the river rock gatherers depend on the resilience of the river ecosystem they exploit.

Seasonal changes in the availability of river rocks present adaptation challenges for the gatherers. They must adjust their gathering strategies to fluctuating natural conditions, demanding flexibility and innovation. Adaptation theory, stemming from evolutionary biology, can be applied in this socio-economic context to understand how communities cope with and respond to environmental changes (Singh et al., 2019). In this case, the river rock gatherers' ability to adapt to drought conditions and their strategies to overcome these limitations are manifestations of social adaptation processes.

The significant impact of natural conditions on economic activities in Taliabo Village underscores the importance of understanding and managing environmental risks in such work. A risk management approach involving identifying, analyzing, and mitigating risks (Ramesh, 2022), could be relevant in helping the river rock gatherer community plan and prepare strategies to deal with fluctuations in natural resources. Integrating local knowledge of natural rhythms with risk management practices can assist this community in enhancing its resilience against the uncertainties posed by natural conditions.

2. The Health Conditions of River Rock Gatherers

The health of rock gatherers in Taliabo Village poses a significant obstacle in the river rock gathering process, highlighting the importance of physical conditions in labor-intensive work. These health limitations hinder their ability to perform river rock gathering tasks effectively and efficiently, affecting not only individual productivity but also having a broad impact on the income and welfare of their families. In ergonomic studies, understanding the interaction between work and the health conditions of workers is crucial to designing jobs that support worker welfare and minimize health risks (Eldar & Fisher-Gewirtzman, 2020).

River rock gatherers' health risks may relate to various factors, including prolonged exposure to harsh physical conditions, the use of potentially non-ergonomic equipment, and the possibility of workplace accidents in natural environments like rivers. Occupational health and safety is relevant, emphasizing the need to apply ergonomic principles and safety measures to

protect workers (Sámano-Ríos et al., 2019). These efforts include providing personal protective equipment, training on safe work techniques, and offering information on managing health risks associated with their work.

The impact of health conditions on work capability underscores the importance of access to health services and social support for the river rock gatherer community. The theory of social determinants of health, which identifies economic, social, and environmental factors as significant influences on health status (Freudenberg, 2022), provides a framework to understand how work conditions and access to health services affect the health of river rock gatherers. Therefore, strategies to address health challenges in river rock gathering should involve improving work conditions, enhancing access to health services, and providing adequate social support for the river rock gatherer community.

E. The Socio-Economic Life of River Rock Gatherers

1. The Practice of Mutual Aid

The mutual aid culture thriving among the river rock gatherers in Taliabo Village reflects a fundamental aspect of their socio-economic life. The close interaction and cooperation among the gatherers benefit economically and strengthen social bonds within the community. Their practice of helping each other, especially in loading river rocks onto trucks, exemplifies the principle of communal cooperation, a core value in many agrarian and communal societies. This concept aligns with social solidarity theory, which emphasizes the importance of cohesion and cooperation in maintaining social stability and harmony within a community (Muis, 2022).

Cooperation among the river rock gatherers facilitates economic activities and creates a sense of unity and mutual support crucial for addressing daily life challenges. This social interaction produces an informal social safety net that provides protection and security for community members. Social exchange theory, which describes social interactions in terms of benefits and costs, can help understand how this cooperation benefits individuals and the community, not only in terms of physical assistance but also in strengthening social networks and emotional support (Akhirun & Septiady, 2022).

Moreover, cooperation among the river rock gatherers creates work efficiency, enhancing productivity and income. By sharing the workload, gatherers can complete tasks more quickly, which speeds up the selling process and allows them to return to gathering rocks. This approach, known in economics as comparative advantage, allows each community member to contribute according to their strengths, thus enhancing communal economic activities' overall effectiveness and efficiency (Gnangnon, 2020). Therefore,

the practice of cooperation and mutual aid among river rock gatherers is fundamental for the sustainability of their work and plays a crucial role in forming and maintaining the social and economic structure of the community.

2. Meeting the Living Needs of River Rock Gatherers

Gathering river rocks in Taliabo Village is the primary livelihood supporting basic family needs, including children's education and housing. Although the income from this activity contributes to family economies, it often falls short of covering the costs of higher education for children. This situation underscores the importance of education as a basic need that must be met to enhance quality of life and provide better opportunities for future generations. The theory of human capital, which emphasizes investment in education as a factor in enhancing individual productivity and income potential, is relevant in this context (Collin & Weil, 2020). Limited access to quality education can perpetuate the cycle of poverty and restrict future economic opportunities.

In housing needs, income from river rock gathering enables some gatherers to build or renovate their homes, though only with non-permanent materials such as wood. The lack of permanent building materials highlights the economic limitations the river rock gatherer community faces. It clarifies the need for more significant support from the government or other institutions to improve housing standards. Abraham Maslow's theory of basic needs, which identifies housing as a fundamental need for security, is highly relevant in emphasizing the importance of adequate housing conditions in achieving individual well-being (Limin & Teh, 2021).

The limited access to quality education and inadequate housing conditions underscore the socio-economic challenges faced by river rock gatherers in Taliabo Village. An asset-based community development approach, which recognizes and utilizes the community's strengths, resources, and existing capacities to enhance quality of life, can be an effective strategy to address these challenges (Maclure, 2022). By identifying and mobilizing local assets, including the skills and knowledge of the river rock gatherers, development efforts can be more sustainable and have a broader impact on improving the quality of life in Taliabo Village.

CONCLUSIONS AND SUGGESTIONS

Based on the results and discussion, it can be concluded that gathering rocks in the Sausu River of Taliabo Village is a vital economic activity supporting the livelihood of part of the community. Adapting to natural conditions and using traditional tools like tire rafts and *gate-gate* demonstrate the community's resilience and creativity in utilizing local resources. Although flexible working hours offer adaptation to

uncertainties, the pricing structure of rocks based on their size provides significant economic opportunities. However, challenges such as natural conditions in the dry season and health issues add difficulties to this work. Furthermore, socio-economic aspects such as the culture of mutual aid underscore the importance of communal cooperation in overcoming hardships. At the same time, limitations in meeting education and housing needs reflect broader challenges faced by the river rock gatherer community in Taliabo Village.

Based on the above conclusions, the Government of Parigi Moutong Regency is recommended to support the rock gathering activities in the Sausu River as an essential part of Taliabo Village's local economy. It could include providing training and access to more efficient technology to enhance productivity and work safety for river rock gatherers. Additionally, rock gatherers are advised to adopt safer and more sustainable work practices, including ergonomic tools and attention to occupational health and safety. For the Taliabo Village community, it is recommended that the existing mutual aid system be strengthened, especially in supporting children's educational needs and improving housing conditions, by forging closer cooperation with relevant stakeholders such as local government and non-governmental organizations. These joint initiatives can help address some of the socio-economic challenges the river rock gatherer community faces while strengthening communal resilience against economic and natural uncertainties.

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