Gender roles in the Anchovies Food Supply Chain – *Bagang* System in Mempakad Laut, North Borneo, Malaysia

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Abstract

This article examines the roles of gender in the *Bagang* system, an organisation of the anchovy supply chain in Mempakad Laut, Sabah, Malaysia bordering the Marine Protected Area named Tun Mustapha Marine Park. Gender study on marine ecosystem management is important to understand the involvement of men and women specifically on how they are complementing each other in ensuring effective resource management. This exploratory study was obtained via qualitative approach as the data collections method including Focus Group Discussion (FGD), interviews as well as field observation. A total of 30 informants participated in this study which were selected through purposive sampling and snowball sampling method. Findings reveal that men and women are equally important in the *Bagang* system. Men work on marine affairs and material development, while women work on product processing and marketing. The contribution of women in the sustainability of the *Bagang* system was significantly visible and was treated equally in most aspects notably in financial management and in the decision-makings from the initial to the end of the anchovy supply chain. These findings are very important as guidelines to plan a better sustainable marine management for the future and a fine example of how sustainable fisheries can be achieved in supporting the United Nations Sustainable Development Goals No. 5 which is gender equality.

Keywords

Bagang system, Food supply chain, Gender equality, Gender roles, Marine resources, Sustainable fisheries

Introduction

The keywords for gender are ‘roles’ and ‘responsibilities’. Gender is related to the roles and responsibilities between men and women in a family, society and culture. The concept of culture includes multiple meanings that are to be defined differently based on historical period, ideology or social group (Hong, 2013, Salguero-Velazquez et al., 2022). Gender studies determining gender norms, resource utilisation patterns, and power dynamics indicated that men and women's roles are intertwined but unequal, particularly in terms of workload, leadership, and decision-making (Torrel et al., 2021). Gender also refers to the economic, political, and cultural characteristics and possibilities that relate to being male or female (Siles et al., 2019). The societal meanings of what it means to be male or female differ throughout cultures and evolve over time (Salguero-Velazquez et al., 2022). Gender refers to the variety of socially created roles and relationships, personality traits, attitudes, behaviours, values, and relative power and influence that society ascribes on a differentiated basis to man and women (Rohe et al., 2018). The concept of gender is referring to the expectations of characteristics, abilities and behaviours that may occur for women and men referred to as ‘femininity’ and ‘masculinity’ (Torre Castro et al., 2017). The role of gender is something that is learned there for it is dynamic and changes over time (Uc-Espadas et al., 2018). This means that gender roles are different depending on culture.

The Food and Agriculture Organization of The United Nation (FAO) conducted many studies related to gender issues and roles in fisheries. According to FAO (2016) the engagement of men and women in the fisheries sector are influenced by the social, cultural and economic contexts of where they live. The relation between male and female are based on economic status, power relations as well as the access to productive resources and services. FAO also found the value chains between men and women in fisheries which have distinct roles, and their socio-economic status influences their power relations. Gender studies related to fishing activities show that men and women play specific roles in the process of fishing activities (Harper et. al., 2017; Tamothran et al., 2019), hence gender study on fisheries is supposed to be focused on both men and women engagement in an institution or society (Uc-Espadas et al. 2018). But likely men's and women's contributions to fisheries often has resulted in women being excluded from fisheries decision-making processes (Harper et. al., 2017; Rohe et al., 2018). Gender issue is often associated with studies on inequality of rights, opportunities between men and women and by focusing on the role of women in certain fields, violence against women and the strengthening of women's roles in society (Rohe et al., 2018; Salguero-Velazquez et al., 2022).

Community-based resource management is vital for local communities that rely on small-scale fishing and marine conservation (Evans et al., 2011; Hoshino et al., 2017). In coastal fishing communities, there are clear roles for men and women (Torrell, 2021). Both men and women are involved in fisheries, but often in different roles and activities (Sarah et al., 2017; Tamothran et al., 2019). The recent seminal work by De la Torreo Castro (2019) placed an emphasis on inclusive management and argued that including all genders in the management process is crucial because gender consideration in environmental governance related to the particular situation of small-scale fisheries (SSF) can lead to the creation of new ways to solve problems.

In this article, a focus will be given on the gender roles in the *Bagang* system, a conventional method of fishing anchovies. The *Bagang* method to fish anchovies was introduced to fishermen in 1987 with the help and guidance of the Malaysian Fisheries Development Authority (LKIM). This anchovy fishing activities has contributed to the economic development and income of fishermen in North Borneo. In fact, according to Mohd Ariff and Mohammad Raduan (2008), *Bagang* was actively used during the administration of the British North Borneo Chartered Company. This pinpoint the establishment of Bagang fishing in certain coastal areas in North Borneo had been more than a century ago. The *Bagang*

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fishing was originally practiced by the Bugis community as a traditional fisheries activity in the waters between Malaysia and Indonesia which is found on the East Coast of Sabah, Malaysia. The current *Bagang* system practice in Sabah, Malaysia is not limited to the Bugis ethnic group in Tawau (East Coast of Sabah, Malaysia) but also involves the other communities in Sabah like the Bajau and Suluk ethnic groups (Foo et al., 2022). Locations of the *Bagang* operation have been expanded to Marudu Bay, Kimanis Bay, Kuala Penyu, Lahad Datu, Kunak and Tawau (Mohd Ariff and Mohammad Raduan, 2008). The *Bagang* system in Pitas (North Coast of Sabah, Malaysia) is traditionally based in nature with being as the major source of fish supply in Sabah especially for dried anchovies (Biusing, 2001).

Despite the wealth of literature available in the field of community-based resource management, gender roles in the *Bagang* system studies have yet to be well-captured. Subsequently, research on gender roles in fishing activities in North Borneo is also limited in current literature (Hamdan et al., 2019; Tamothran et al. 2019). The role of gender in the management of marine ecosystems has become one of the many issues discussed recently, especially on the link of gender and environment by the community (Torreo Castro et al., 2017). However, gender roles in the *Bagang* system have not been studied as rigorously and thoroughly in literature. There is still a lack of a comprehensive understanding of how different management objectives are held by local residents, and specifically by fishermen, and how these objectives affect management outcomes and fishing behaviour (Hoshino et al., 2017). Having greater insight into gender roles in the *Bagang* system would yield useful information because women have been largely excluded and underrepresented as users and stewards of natural resources. It is important to have information about the characteristics of the ecosystems in question, together with the resource users and their relation to management plans (de la Torreo Castro, 2019). Since the *Bagang* system studies is very limited in existing literature and no direct studies seems to have been conducted regarding the gender roles in the *Bagang* system, this study is crucial in both extending the body of knowledge and emphasising that women play important roles in the *Bagang* system in addition to men.

Research Methodology

Study Areas and *Bagang* System

The location of the studies is centered at *Bagang* system operation area in Kg. Mempakad Laut, Pitas, Sabah, Malaysia (6.6837° N, 116.9502° E). The operation of *Bagang* system is concentrated in the eastern part of the Marudu Bay in the west side of the Pitas Peninsula bordering the zone of Tun Mustapha Marine Park which is the largest Marine Protected Area in North Borneo region. Currently, only Tun Mustapha Marine Park has *Bagang* system fisheries among the well-known marine parks in Sabah. This is because when Tun Mustapha Marine Park was officially gazetted in the year 2016, the *Bagang* system fisheries in these areas had already been well-established by the fishing communities for decades. Two decades ago, there were about 100 of *Bagang* operating in Pitas reported (Biusing, 2001). Based on the field study in the year 2020, the head of *Bagang* operators mentioned that the number of *Bagang* has increased to more than 200 in that year. Subsequently, the Mempakad Laut fishing communities' *bagang pacak* locations had also expanded to nearby villagers' coastal waters as observed during a revisit to the study areas in the year 2021. This figure includes *Bagang* which has not yet obtained an official license from the local authority. Any construction on the seawater of Sabah is required to obtain an official license from the Sabah Ports and Harbours Department. Hence, the choice of this study is relevant, in fact it is the most active *Bagang* community in terms of managing the *Bagang* system itself from the process of developing and building the *Bagang*, the implementation of fishing, processing the catch and the stage of marketing.

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Data collection and analysis

This exploratory research refers to the key words in the concept of gender namely the roles and responsibilities of men and women as the main framework of the study. The epistemological and social constructivist approach has been used for this study. This approach holds the idea that people seek understanding of the world in which they live and work. People construct their own unique meanings for the events that occur in their lives, meanings that are oriented towards entities or entities. Due to the fact that these meanings are diverse and various, the researcher is required to explore for the complexity of viewpoints rather than reducing the meanings to a select few categories or concepts. (Creswell, 2009). Participation recruitment was selected based on using purposive and snowball sampling. Purposeful sampling approach involved identifying and selecting individuals or groups of individuals who were particularly knowledgeable or experienced with the phenomenon of interest (Cresswell and Plano, 2011). During the Snowball sampling process, presently engaged research participants helped recruit new subjects for an investigation. Snowball sampling is a term of purposeful sampling that often proceeds after a study begins and occurs when the researcher asks participant to recommend another person to be sampled (Creswell, 2012).

Focus Group Interview (FGI) and Field Work Observation (FWO) have been used to collect the data. Interviews were administered to a focus group including the head of *Bagang* operator, head of Village, selected women who are involved in marketing and women that are actively doing fish processing. The selection of informants (n=30) in this interview is believed to provide solid information input from various perspectives related to the background of the *Bagang* system, its implementation, and their respective roles in the continuation of the system. The Focus Group Interview (FGI) were conducted first and had relied on the acquisition of information from a group of informants that interact with each other based on the research topic (Afiyanti, 2008). An open-ended questions or non-structured interview was used during the FGI (Figure 1). The informants were divided into several groups according to their respective roles, namely the group of women who carried out sales activities, the group of women who were involved in cleaning and classifying dried anchovies and the group of men who worked in *Bagang*. After the FGI, field observations were carried out by visiting the Kg. Mempakad Laut, the *Bagang* platform and the anchovies processing site as well as the community stall. Observation through fieldwork is important to get a real picture related to the implementation of the *Bagang* system as well as to identify community activities in the implementation of the system. User research consists of two fundamental activities: observing and conducting interviews. Observing is the most significant of these activities since it offers the most accurate information about people, their work, and their needs, and since the study focuses on the gender roles observation will help in interpreting result from the FGI (Figure 1).

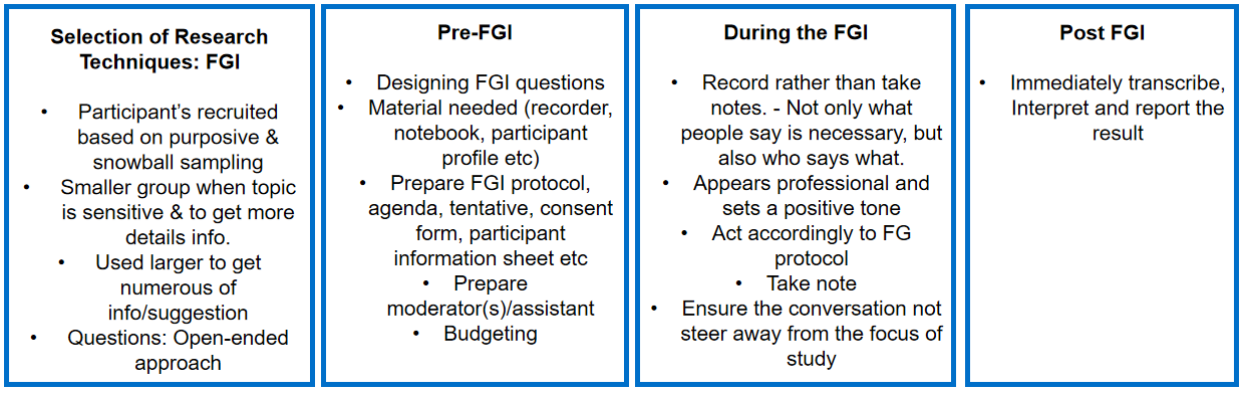

Fig 1. The developed procedures of Focus Group Interview (FGI) application for this study.

Findings and Discussion

Roles of Gender in Bagang System

The *Bagang* system is a systematic operation that refers to anchovy fishing activities. There are four main stages in the Pitas, Marudu Bay's anchovies' food supply chain for the Bagang systems (Figure 2) as follows:

1. the process of preparation and development,
2. preliminary processing,
3. final processing, and
4. product marketing

'*Bagang*' is the name for the huge cage built by the fishermen at the coastal area. The '*Bagang*' was constructed using the *Oncosperma tigillarium* tree log which is commonly known as '*Nibung*' by locals (Figure 3a). According to Mohd Ariff and Mohammad Raduan (2008) *Bagang* is a fishing gear by the Bugis which are made of bamboo and nets with lamps that used to attract fishes. There are two types of *Bagang* namely *Bagang Pacak* (Figure 3b) and *Bagang Timbul* (Figure 3c) that is used in Kg. Mempakad Laut, Pitas, Sabah, Malaysia for fishing anchovies in Marudu Bay. The *Bagang Pacak* is static which remains in a location while *Bagang Timbul* or *Apung* or *Bagang Timbul* is floating and can be moved to various locations (Foo et al. 2022). The process of preparation and development of *Bagang* is related to the tasks of preparing raw materials to build *Bagang* in a place that has been determined by the head of *Bagang* in a certain water area. This includes the provision of water transport, namely boats, cooking utensils, lamps, nets and even *Nibung (Oncosperma tigillarium*) as the main pillar of *Bagang* (Figure 3a). Apart from that, the first stage task is also to prepare a platform or a drying table.

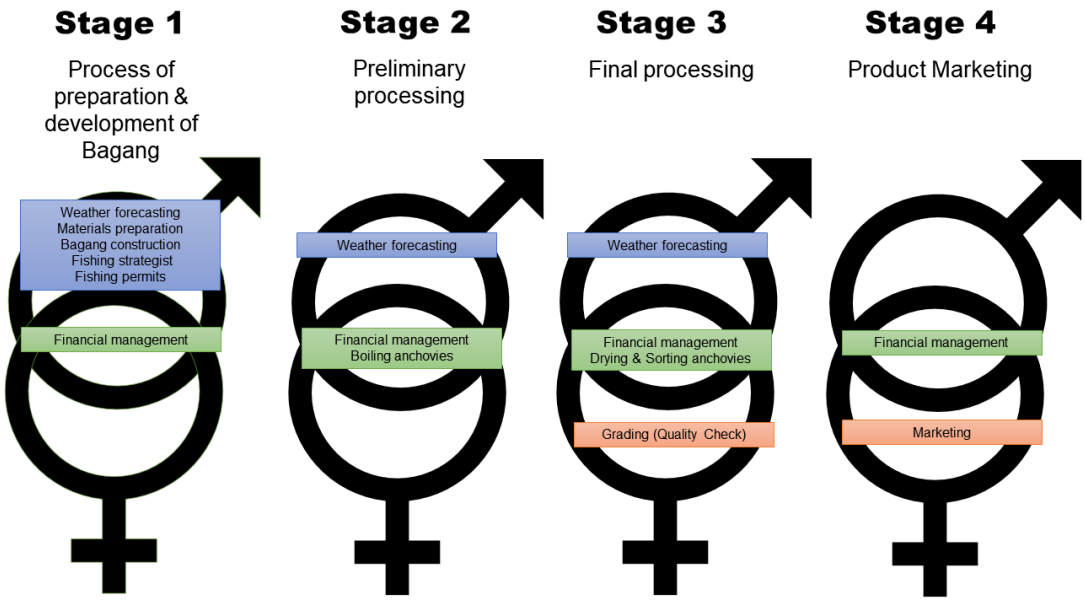

Fig 2. Exclusive men role (blue box), exclusive women role (red box) and both genders (green box) sharing roles in different stages of the Bagang system – anchovy supply chain in Kg. Mempakad Laut, Pitas, Sabah, Malaysia.

Preliminary processing refers to the task of processing freshly collected anchovies to ensure the quality of the fish is at the best level that is elastic and not crushed. In this stage, the freshly harvested anchovies need to be boiled immediately

at the *Bagang*. While the final processing is to dry the anchovies at the drying platform. This stage also includes the classification of anchovies according to grade quality which is controlled by women. Anchovy drying in the past was simply by drying in the sun, but now there are special dryers created as an option for that purpose. Lastly is the product marketing process. At this stage the marketing tasks include pricing, promotion and negotiation. All the processes are referred to as the *Bagang* system because marine ecosystem management is not limited to managing living resources but also the way to utilize it by humans as a component in the ecosystem.

Rochmayanto and Kurniasih (2013) adapted the gender theory by Fakih (1996) who studied the role of gender in managing climate change in the mountains of Solok, Sumatera Barat. According to the theory, there are three categories of gender roles, namely the productive role, the reproductive role and the role of community management and politics. Productive role is a role for women and men to obtain cash payments and market production. Reproductive role to ensure the maintenance and reproduction of the labor concerned and domestic matters such as giving birth, nurturing and caring for children, fetching water, cooking, washing, cleaning the house, repairing clothes and more. While the role of community management and politics are related to social activities and organizing community at a formal level. Based on the theories and concepts of gender discussed, the study of gender in this article will focus on the specific roles of men and women in implementing the *Bagang* system, specific to the study area in Kg. Mempakad Laut, Pitas Sabah and how sociocultural factors influence job specialization according to gender. Men and women's harvesting roles are rooted in their own social, cultural, and economic circumstances (Siles, 2019). Findings show that both genders are significantly important in the *Bagang* system (Table 1). Men work on marine affairs and materials development, while women take in charge in product processing and marketing. An independent study conducted in Marudu Bay on grouper fish farming also yielded similar gender role analysis like this study (Tamothran et al. 2019). Specialization of tasks according to gender in the management in *Bagang* system will make men or women perform their respective suitability (Table 1).

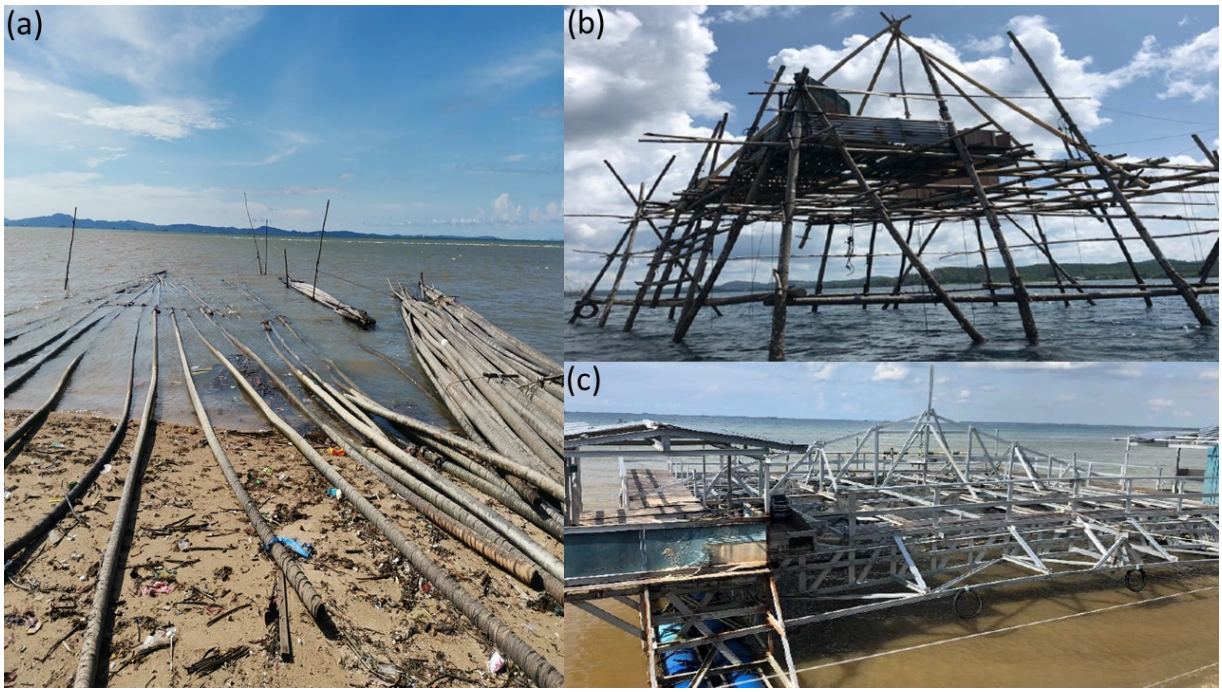

Fig 3. (a) Basic materials for the construction of *Bagang Pacak* which is *Oncosperma tigillarium* (*Nibung*) tree log, (b) *Bagang Pacak*, (c) *Bagang Timbul*.

Table 1. Role of Men and Women in Bagang system

Men	Women
Marine affairs	Product processing
Materials development	Marketing

The Bagang community is referred to as a group of informants involved in the *Bagang* system. Based on the data revealed from the Head of Village, most of the population in Kg. Mempakad Laut is the Bajau community, while the rest are of Suluk and Bugis. As a Bagang community in Kg. Mempakad Laut, men and women are both contributing to the operation of the Bagang system. It can be said that gender roles are equally important. For example, the male informant stated,

> *"The matter of anchovy grading is left only to the woman, the man does not know that".*

This is positive evidence, where the men in the study area recognize the abilities and expertise of women in determining the quality of anchovy products cultivated by them. Another women informant mentioned that

> *"Biar lelaki pigi laut. Itu kerja diorang. Kami jaga anak di rumah. Mau bermalam bah sana Bagang tu".*
> *['Let the man go to the sea. That's their job. We take care of the children at home. After all, we must spend the night there'.]*

This indicated the women's understanding in determining their share of duties and responsibilities in the *Bagang* system. This condition can be referred to as a normal lifestyle or stereotype related to the task of going out to work by managing household affairs. The high demand for anchovies and the increase in the number of *Bagang* operations carried out job opportunities for the community for both men and women. Not only Mempakad Laut community members, but neighbouring villagers also are recruited when human capital is not enough to handle certain processes during the anchovy peak season. Homemakers from another village like Kg. Pinggan Pinggan gain opportunities to earn side income as this task can be done at home while they manage women's reproductive roles. Typically, women are hired in the final processing stage of sorting and cleaning the dried anchovy's internal organs as women are more recognized in quality checking ability. Women empowerment is crucial in the sustainability of anchovy's economy in Pitas as women play a dominant role at the second half of the anchovy supply chain in assuring the quality of anchovies and marketing strategies meets consumer trends (Figure 2). In addition, women actively partake in the decision-making of managing the economy of anchovy supply in various aspects such as pricing, promoting and trading.

Nowadays, marketing strategies like promotions are important since there are an increasing number of Bagang communities in Sabah coastal areas and competitors (Mohd Ariff and Mohammad Raduan, 2008). In the rise of the digital economy, the usage of communication technology becomes increasingly beneficial to support the local economy especially during pandemic outbreak lockdown (Azra et al. 2021; Ferrer et al., 2021). One of the concerns of the fishing communities in Marudu Bay is the limited job opportunities causing young adults to migrate to the city in search of livelihood stability (Musa et al., 2020). Although it has been reported that younger generations are less likely interested to be involved with the initial stage of fishing activities like catching fish (Hamdan et al., 2020), younger generations are more adept in using communication technology and online shopping digital platform to assist in online marketing

strategies compared to older generations (Basyuni et al., 2018). Moreover, younger generations who are lacking profound knowledge and experience in the *Bagang* system than their elders can contribute to selling seafood products by the roadside stalls or/and digital platform. The Bagang system not only empowers women in fishing industries which are usually associated as men's world but can reduce rural-urban migration phenomena of the younger generations through youth empowerment in communication technology utilization. Government agencies such as the Fisheries Development Authority of Malaysia (LKIM) and the Department of Fisheries (DOF) needs to introduce various programs to develop fishermen communities' capability and knowledge in utilising communication technology to enhance marketing strategies since digital technologies advancement are progressively slow and limited to fishermen education background (Mazuki and Man 2014; Amir et al., 2021; Ferrer et al., 2021; Pahlevi et al., 2021). This activity can enhance the development of community-based resource management in fisheries and towards achieving Target 5.b of Gender Equality in United Nation Sustainable Development Goals promoting empowerment of women and among younger generations in the enhancement of digital technology literacy. Moreover, there are quite several women and youth own a mobile telephone in Mempakad Laut made Target 5.b.1 (proportion of individuals who own a mobile telephone, by sex) of Gender Equality in United Nation Sustainable Development Goals seemed achievable.

The Role of Men in Bagang System

Based on the gender stereotype theory, men are generally perceived as more masculine than women, whereas women are generally perceived as more feminine than men, where each of the genders mainly has a different scale of femininity and masculinity which will determine the role of each gender itself. Gender stereotype theory also mentions that gender factors will also affect differences in decision-making roles and outcomes or risk from the decision they made (Rochmayanti and Kurniasih, 2016). International Union for Conservation of Nature (IUCN) (2020) mentions that for sustainable ecosystem management, understanding gender gaps and addressing the specific barriers is the way to a good governance. The gender gaps listed by IUCN are barriers that are related to the rights of land ownership, voice in decision making and violence. These gaps between women and men, often rooted in social, cultural and legal norms as well as customs.

Marine matters are not only subject to fishing activities but also related to weather forecasting, planning to determine the appropriate time to go to sea as well as arranging fishing strategies. Traditionally, fisheries have been associated with men (Fröcklin et. al., 2013). Men manage maritime affairs (Table 1). This is a common culture among the Bugis community who owned, introduced, and practiced *Bagang* until today, and is now being practiced among *Bagang* communities around Marudu Bay, including Mempakad Laut. Men oversee fishing activities in *Bagang* as it is a high-risk task and considered heavy for women. In addition, women are considered to do housework, including babysitting and be responsible for other household affairs while men are going to the sea. This proves that gender inequality is linked to women's reproductive roles such as taking care of children and household responsibilities which is similar with the findings of previous studies related to gender roles in fishing activities (Fröcklin et. al., 2013).

Marine matters are not only subject to fishing activities but also related to weather forecasting, planning to determine the appropriate time to go to sea as well as arranging fishing strategies. Since males oversee fishing matters, men are responsible for weather forecasting. In Marudu Bay, other fisher's communities involve with different fishing activities apart from the Bagang community also acknowledge that men's traditional knowledge on locals' weather are richer than women (Tamothran et al. 2019). In the past, weather forecasting was traditionally conducted by observing tides, cloud conditions, and numerous other physical environmental factors. However, in the present day, *Bagang* communities rely

on weather forecasts from local authorities and consult forecasts displayed on weather forecasting websites that can be accessed at any time. Weather forecasting is essential for planning fishing activities at the *Bagang* platform and the entire *Bagang* process, from fishing to commercialization.

Carpentry and construction related tasks are indeed commonly associated with men's responsibilities. However, at present, the involvement of women has also been considered, especially in terms of budget related to the purchase of building materials because in the *Bagang* system in Mempakad Laut, women are involved in managing income from the *Bagang* system (Figure 2). The construction of a *Bagang* is done in two ways, either by hiring a contractor or by working together among the *Bagang* community. Usually, the construction of *Bagang Timbul* or the Floating *Bagang* involves the services of the contractor because this type of *Bagang* is based on iron materials and requires modern and sophisticated technology and equipment in its construction (Figure 3c). While *Bagang Pacak* (Figure 3b) is usually built manually through cooperation among men in the community. This means that the decision-making process related to the construction of a branch is done by men. This also includes determining the type of *Bagang* to be built and the materials to be used as well as the location of the *Bagang*. This is because men are believed by the community to be more expert in fisheries matters.

Men are responsible for preparing building materials and constructing *Bagang* in the waters that have been identified by the *Bagang* chief and obtained permission from the local authorities including The Fisheries Department of Sabah. Thus, most of these *Bagang* platform ownerships are recorded under men even though women also contribute financially to the development of *Bagang* cages in Marudu Bay (Figure 2). Other community-based aquafarming like grouper and marsh clam located in Marudu Bay under the guidance of fisheries department are also under men ownership although women also have important socioeconomics, cultural and ecological contributions in these seafood supply chains (Tamothran et al., 2019; Shah et al., 2021). Generally, fishing activity of collecting clams inshore mainly involve women as only simple tools are required prior to the introduction of clams' aquafarming in North Borneo (Hamdan et al. 2019). The establishment of aquafarming in Marudu Bay had increased men's role in marsh clam chain supply whereby traditionally marsh clam fishing is managed by females for food source and side income. Like gender roles in the early stage of the *Bagang* system, men play a more significant role to prepare the construction of marsh clam cages due to commercialization. In addition, men also become more involved in collecting marsh clam and marketing in the marsh clam chain supply compared to traditional clam fishing activity (Hamdan et al., 2019; Shah et al., 2021). Granting ownerships to men had altered gender roles in marsh clam supply chain in Marudu Bay. The target 5.a under gender equality in United Nations Sustainable Development Goal is promoting for women equal rights in access to ownership of property. Ownership has the potential to change the nature of gender relations within a community. This can only be achieved in Marudu Bay with support from local authorities to empower more women in the fisheries sectors of this study area which are rich with diverse marine products by increasing the chance for equal rights of women ownership in local community-based management fisheries development projects. Not only men but women also have an important role in different types of seafood supply chain in Marudu Bay (Hamdan et al., 2019; Tamothran et al. 2019).

The Role of Women in Bagang System

Women's role in fisheries is often constrained by many barriers including culture. The division of roles in the study area is influenced by inherited customs in society. In some cultures, it is considered a cultural taboo for women to go out onto boats (Siles et. al., 2019). For example, the restriction on going to the sea for women is often based on women's health conditions. Menstruating women and those with health problems are not allowed to go down to the sea and be in

Bagang. They believe that illness can cause bad things to happen to fishing activities in *Bagang*. Although there are no specific restrictions for women to join men in *Bagang*, they have been accustomed to the customary practice for a long time, therefore women very rarely participate in the fishing in the *Bagang* platform. There may be those who see this as a discrimination against women, but for them this is a common custom that should be complied with respect, and it does not offend them at all. Obedience to customs is a sign that they appreciate the *Bagang* system.

The Fisheries and Agriculture Organization FAO (2020) stated that in 2014, women accounted for about 50 percent of the workforce in fisheries and aquaculture, including their involvement in processing and trading. Enabling women's participation in agriculture and fisheries provides many benefits including yield expansion, poverty eradication and improving food security (WorldFish, 2016). Women in *Bagang* system perform fisheries activities on land which are related to product processing and marketing (Figure 2). As housewives this is a suitable task for women. Although women are seen to do only easy and lighter tasks, their work greatly affects the survival of the *Bagang* system and the anchovy market. The task of product processing belongs to women. The task of processing anchovies including drying, sorting (grading) and packing anchovies is the expertise of women. Although there is male involvement in this stage, women are remaining the dominant players because women are believed to be patient and thorough. The task of drying anchovies requires special attention. Anchovies should be dried at the right time, the right period and at a certain level of heat. Drying and removing the anchovies is done repeatedly depending on the situation, hence high patience is required. Men folks in Marudu Bay recognized that women are more knowledgeable and skillful in processing marine products than men (Tamothran et al. 2019).

Women are responsible for managing the marketing affairs of anchovies and other seafood products. In this stage women will determine the price of the product, market size, promotions, and dealings with customers. This makes women as important as men in socioeconomic affairs in the *Bagang* system. In the Bagang system operation, women's enjoyed privilege acting as sales manager and financial manager through all four stages of the Bagang system operation (Figure 2). In the maritime society of Marudu Bay, women's social and economic contribution in fisheries is highly regarded and recognized by their community in most stages of the seafood supply chain (Hamdan et al., 2019; Tamothran et al., 2019). Women are allowed to actively participate in fishing activity in Marudu Bay and have equal opportunities for decision making. Therefore, equal opportunities at all levels of decision making in economics and women in managerial positions can enhance sustainable fisheries development as highlighted under target 5.5 Gender Equality of Sustainable Development Goal. Lack of equal opportunity for financial management decision-making in the Southern Pacific region had caused negative impacts when local men as a leader misuse money (Rohe et al., 2018). The responsibility of finance management is not something that is easy to take on. Something to be learned from men of the *Bagang* system who recognize women in financial matters (Figure 2).

In summary, the above findings show that the roles of women and men are equally important in managing the marine ecosystem through the *Bagang* system. Gender collective involvement benefits the *Bagang* community. Apart from the specialization of duties and responsibilities between men and women, it simplifies the work process according to the gender distribution as mutually agreed. Role determination by recognizing gender expertise itself can also ensure the quality of work and products. Apart from that this can strengthen the sense of belonging of the *Bagang* system regardless of gender.

Gender studies carried out by Rochmayanto and Kurniasih (2013) shows that men and women are equally important in management that involves the environment and the community. Their study was conducted to look at the role of gender in managing climate change in Solok, West Sumatra. Changes in gender roles raises gender unitless. However, in the

whole discussion, the role of women is emphasized as a contributor to climate change in addition to men. In fact, some suggestions of strengthening the role of women were put forward in the results of the study including (1) to increase the political role of women, (2) to increase the capacity of women in formal and informal education, and (3) cultural reconstruction based on gender equality. Clearly this study still tends to be a study of the role of women. According to the Food and Agriculture Organization of The United Nation (FAO) (2016), women are part of the population in fisheries development activities. Women have been important as fish entrepreneurs, managing money, financing various fish-based companies, and generating huge returns for households and communities in several developing regions. This means that both genders, whether female and male are each possessing dominant strengths, where they can be in a position of high dependence.

Conclusion

The uniqueness of this *Bagang* system is the existence of division of tasks between men and women in the marine resource management process. This is influenced by many factors related to their sociocultural background, including lifestyle, values and customs. In this context the men work on processes at sea related to fishing, preparation of building materials, boats and fish processing at first stage, while the women are responsible for final tasks including the process of fish drying, classifying fish according to quality as well as marketing. Hence, this article aims to discuss the role of gender in the *Bagang* system and the sociocultural factors that influence the determination of the role of women and men in complementing the community-based marine ecosystem management.

Gender research focuses not only on the participation of women or men in the management of marine resources, but also on the complementary roles of both genders in the ecosystem. The Bagang system followed in Kg. Mempakad Luat, Pitas, the participation of men and women is deemed to be of equal value. In the Bagang system, men and women are perceived to have their different strengths in terms of knowledge and abilities for fisheries-related duties. In their own societies, gender roles and their dominance in tasks are recognised. This adds value to the Bagang system and fosters a sense of community belonging. In this instance, societal influences determine the gender-based specialisation of jobs.

Bagang's system proves that male and female cooperation in managing marine resources is the best approach. The method of gender involvement is a factor for the harmonious management of the fisheries activities. In addition, the sociocultural elements of lifestyle, values and beliefs that still exist in the community make the specification of roles and responsibilities agreed in accordance with community norms. These findings are very important as guidelines to plan a better sustainable marine management for the future. Moreover, a fine example of women empowerment ensuring sustainable fisheries in line with the United Nations Sustainable Development Goals 5 – gender equality. Gender equality, namely the collective involvement of men and women in the marine ecosystem management is important to realize the potential of fisheries and aquaculture not only to increase fish production, but also offers income opportunities and improve food security. As a study from a gender perspective, it is best that the roles of men and women as complementary in ecosystem management to provide equal opportunities and rights to both genders to carry out their responsibilities comfortably and in an orderly manner. Disputes over rights and equality as well as comparative studies of the advantages of men and women will only constrain the effectiveness of management.

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