

# Blue (Carbon) Accounting in Activity Patorani : Is That Important for Sustainability?

Sultan Syah

Doctoral Program of Economic and Business  
Faculty  
Brawijaya University  
Malang, Indonesia  
sultanakuntan@gmail.com

Erwin Saraswati

Economic and Business Faculty  
Brawijaya University  
Malang, Indonesia  
erwin.saraswati@yahoo.com

Eko Ganis Sukoharsono

Economic and Business Faculty  
Brawijaya University  
Malang, Indonesia  
ekoganis@yahoo.com

Roekhudin

Economic and Business Faculty  
Brawijaya University  
Malang, Indonesia  
roynajam@yahoo.com

**Abstract**—This article aims to provide an understanding of the practice of carbon accounting at sea originating from the activity of flying fish fishermen (patorani). Sustainability theory provides a theoretical framework for the analysis of this interdisciplinary research. Literature review and data collection (dialogue, observation, and documentation) support the development of environmental accounting that contributes to the practice of sustainability. Researchers used qualitative methods with interpretive paradigms and ethnomethodology approaches. Patorani use ships with having 3 (three) machines. Calculation of time, distance, and fuel oil can minimize carbon pollution generated by ship engines. The use of ship engines produces carbon emissions of 1.567,128 TonCO<sub>2</sub>e / season. Blue accounting (carbon) as an accountability process plays an important role in maintaining the sustainability of the sea and air in Indonesia, as well as contributing to the reduction/increase in global warming. Researchers have limited time and money due to the breadth of Indonesian waters. Finally, this article recommends to the relevant parties, especially the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia to exercise strict control over carbon. The article offers an item in reporting the use of carbon in the ocean which can be initiated through ministerial or regional regulations

**Keywords**—Blue Carbon, Sustainability Accounting, Patorani

## I. INTRODUCTION

Since a few years ago<sup>1</sup>, the term "blue carbon" was coined to describe the magnitude of the potential storage of organic carbon from coastal vegetation ecosystems [1]. In this article the use of the term carbon describes the amount of carbon emissions generated by fishing activities in the ocean whereas, the term "blue" refers to the marine ecosystem used in the current discussion of "blue economy" in the future [2]. The term blue (carbon) accounting is understood as support for the blue economy and ocean strategy. This implies that science is interdependent [3] and the scarcity of marine resources requires science to give birth to new insights which can then reduce uncertainty and risk [4]. Therefore, blue (carbon) accounting exists to meet the needs of the world

community, especially regarding social and environmental accounting which does not only prioritize costs in making business decisions.

Blue (carbon) accounting refocused attention on social and environmental accounting. where the importance involves communicating information about the impact of exploiting maritime assets and their activities on society [5]. Indonesia's marine wealth invites foreign vessels to do illegal fishing, which amounts to 10,000 units. This marked a serious problem of sustainability and contributed as one of the factors causing the Indonesian sea in a state of crisis [6]. Various cases of sustainability in marine ecosystems occur because of irresponsible human factors [7][8][9][10][11]. This becomes one of the direct challenges for the world economic model that runs through conventional accounting and finance is sustainability [12]. Thus, the role of accounting science not only provides information related to company activities and focuses on stockholders and bondholders [13] but becomes more important, when incapacity in natural resources and social problems increase for present and future generations [14].

Flying fish is the main focus related to the issue of sustainability. Flying fish include small pelagic fish and live in deep waters. Flying fish have high economic value, especially flying fish eggs as export commodities to various countries such as the United States, the Netherlands, China, Japan, Hong Kong, Taiwan, Korea, Ukraine, Canada, Thailand, Russia, and Vietnam [15][16]. Not all fishermen in the world are able to catch flying fish let alone catch their eggs without catching or killing their mother. One fisherman who has that expertise is *patorani*. In carrying out its activities during the east season (April-September), *patorani* use tons of diesel-fueled engines or gasoline. The use of fuel by *patorani* needs to be known accurately, because the results can be used to support the paris agreement and government

<sup>1</sup> The use of the term blue carbon began in 2010 [1] [4]

policies regarding energy<sup>2</sup>. The Government of Indonesia applies the concept of circular economy [17] in realizing sustainable development goals (SDGs) consisting of seventeen goals [18]. To obtain data, researchers used qualitative methods to obtain data on diesel fuel consumption.

The qualitative method was chosen because it has the advantage in digging deeply into a phenomenon. Qualitative research methods arise because of a paradigm shift in seeing a reality. One of the paradigms used in qualitative research is the interpretive paradigm. Subjective perspectives in qualitative research continue to emerge. However researchers try to approach detailed technical research standards, the results remain reports that are not objective on the truth of a matter [19]. In the interpretive paradigm there are many approaches and ethnomethodology is part of the mazhab interpretation [20]. Empirical research topics derived from ethnomethodology studies are activities, environment, and sociological reasoning that lead to practice [21]. The use of ethnomethodology is considered appropriate to achieve the research objectives of this article which is to provide an understanding of the practice of carbon accounting at sea originating from the activity of fly fish fishermen (*patorani*).

## II. MATERIALS AND METHOD

### A. Materials

This initial concept stems from an initiative to preserve the forest that is not to harvest more than what is produced by the forest which is known as the concept of sustainability [22]. In 1987 the Brundtland report was made by the United Nations (UN) as a guide to making environmental and development reports because it provided a way out of future disasters and adopted the concept of sustainability that gives wide recognition today [23]. The concept of sustainability is better known as sustainability seen from three aspects namely economic, social, and environmental [24]. The concept of sustainability was adopted by the World Summit on Sustainable Development in Johannesburg, South Africa in 2002, initiating the birth of the concept of sustainable development. To achieve the goal of sustainable development, a series of sustainable development agendas for 2030 was developed by the member states of the United Nations known as the Sustainable Development Goals (SDGs). The implementation of SDGs can be applied in all company activities based on the triple bottom line concept that was initiated by Elkington.

### B. Method

It should be remembered that the paradigm is a "choice" for each researcher, although it requires the support of knowledge about when to use quantitative or qualitative methods. Accounting is included in the social scope related to human behavior, more interesting when examined with qualitative methods. Every researcher needs interpretation to understand the fundamental form of the social world at the

level of one's subjective experience [25] because all researchers bring interpretations into their research [26]. Ethnomethodology is a method that focuses on the daily activities of individuals who are in a conversation rather than interactions between individuals which is the realm of symbolic interaction. There are three stages of analysis that must be passed if you want to conduct ethnomethodology research namely; the first stage is indexicality search, the second stage is reflexivity which underlies practical action, and the third stage is the achievement of contextual action that can be analyzed [27].

To obtain preliminary data, the researchers met with a *patorani* community that was concentrated in Pa'lalakkang Village, Galesong District, Takalar Regency, South Sulawesi Province. The reason for choosing this research site is because the village of Pa'lalakkang is a place to live in the *patorani* community, the center of activities begins and ends all activities related to *patorani* to and from the sea. the time of the study was conducted from February 2018 to April 2019. The unit of analysis in this study were individuals who were related to the *patorani* community. The type of data is qualitative data. The source of the data comes from fundamental (primary) data that is facts obtained directly from the main source, and direct observations, as well as conversations rather than interviews with the parties studied. Data collection techniques are observation, daily conversation, and documentation.

## III. RESULT AND DISCUSSION

### A. Indexicality

Time still shows at 4:20 pm, but researchers are ready to leave. After performing the dawn prayer, leave for the research site. The automatic motorbike was driven up, hurried away from Makassar to the pala'lakkang sub-village, past Daeng Emba's residence in Beru village. Today is an important day for research. After a number of failures, today we can participate in *patorani* activities at sea. This is important to be able to participate by seeing, hearing, and experiencing firsthand how the reality of *patorani* in the sea. On the way, the researchers activated their cellphones, which were not active yesterday. Just see news from friends in the WhatsApp group. There was sad news coming from Palu, an earthquake measuring 7.7 on the Richter Scale (SR) and a tsunami wave. Moreover, the Meteorology, Climatology and Geophysics Agency (BMKG) issued a warning wave height of 1.25 to 2.5 meters.<sup>3</sup>

Researchers say the prayer "I hope this trip smoothly and return safely". In order to eliminate this concern, researchers turned their attention to taking pictures using cameras and cellphones. the ship being boarded began to become unstable. Researchers tumbled forward then slammed back and forward again. Researchers rushed out while holding the B Pro camera (which had been held) to find out what really

<sup>2</sup> The Paris Agreement's target is to keep the increase in global temperature from exceeding 2°C and work towards 1.5°C [31]. The government's commitment is to reduce greenhouse gases according to the Nationally Determined Contribution (NDC) in 2030 [27] and the commitment of

the energy sector to reduce greenhouse gas emissions by 314-398 million Tons of CO<sub>2</sub> in 2030 [28], [29]

<sup>3</sup> See the High Wave Early Warning Letter No : ME.301/PD/29/APM/IX/BMKG-201

happened. Researchers swallowed, seeing the height of ocean waves that exceeded the height of the ship. *Pinggawa* (Daeng Timung) immediately took over the helm of the ship which had been sleeping on the deck on the ship. Thankfully the ship can be mastered, the *Pinggawa* is indeed good at capturing its ships. With a relaxed *pinggawa* said "calm down sir, this is nothing" while smiling to look forward. Seen Daeng Narang and the mustard also laughed, as if supporting the words of the *Pinggawa*.

Arriving at the specified location, one by one the *balla - balla* were unloaded from the ship. Daeng Narang helped the Sawi to prepare the *balla - balla*, starting from one *balla - balla* and then throwing out the float then followed by the other *balla - balla*. When it arrives at the *balla - balla* withdrawal process, it must be done quickly because if the egg is too late it can turn red, Sul said<sup>4</sup>. This affects the quality of the egg. To avoid damage, after the balloon withdrawal is carried out, the *patorani* immediately conduct a brushing (separating the eggs from the coconut leaves) on the boat. *Torani* egg combing from the *balla - balla* is not easy, if one is pulled, the fingers can be sliced by palm leaves. Therefore, after the process of combing (separating) the flying eggs are done some time after the process of removing the *balla - balla* from the sea.

To carry out these activities, *patorani* buy diesel fuel using a letter of recommendation to purchase certain types of fuel from the Department of Fisheries and marine affairs. This was complained by one of the skipper, who had the researcher invited a discussion via the whatsapp application while waiting at one of the gas stations, in Takalar.

- Researcher : "Assalamualaikum warahmatullahi wabarahkatuhu Daeng Sese. What are you waiting for?"
- Daeng Sese : "Waalaiikum Salam Daeng. As usual for floating, it means Fishermen)
- Researcher : " Did you not get help from the Fisheries Service?"
- Daeng Sese : "What kind of help is that?"
- Researcher : "I have been to the Office of Fisheries and Maritime Affairs in Takalar, where I met with *patorani*. I asked "what are you doing" he said "take help for diesel fuel". I have not confirmed the truth
- Daeng Sese : "Oh it's not solar assistance but is taking care of Daeng's solar recommendation letter (See Fig. 1)"<sup>5</sup>



Source: Research Documentation (2018)

Fig. 1. Conditions While Waiting at Gas Stations and Recommendation Letters Purchase Certain Types of BBM

- Researcher : "if you buy directly at the gas station, do you have to bring a letter too?"
- Daeng Sese : "Yes, the letter was valid for 1 week but now it is only for 1 day. So for example it can not be today, means having to take another letter. The situation is getting harder now"
- Researcher : "How come?"
- Daeng Sese : "I do not understand the wishes of the Daeng government. Not make it easier for fishermen but instead complicate"
- Researcher : "Yes, Daeng Sese, I hope that today we can get diesel fuel"
- Daeng Sese : "sure"

Several conversations that have been presented previously show that the use of fuel oil (diesel fuel) is very important activity to capture *bayao torani* (flying fish eggs) when viewed through the ethnometodology approach is an expression of indexicality delivered by the actors (*patorani*).

**B. The reflexivity of the indexity of the use of fuel oil (diesel fuel)**

In every indexicality there is always a contextual action, which is followed by reflectivity. The use of fuel oil (diesel fuel) in the activity of catching *bayao torani* (flying fish eggs) is uncertain. As exemplified by Supardi Daeng Timung<sup>6</sup>, the distance from Galesong to Tanama - Fak Fak Regency is 830 miles, the ship used has a speed of 7 knots. to find out the time taken using the formula:

$$Time = \frac{Distance}{Speed} = \frac{830 \text{ mil}}{7 \text{ knot}} = 118,57 \text{ Hours}$$

$$= \frac{118,57 \text{ Hours}}{24 \text{ Hours}} = 5 \text{ day} \tag{1}$$

<sup>4</sup> See transcript of conversation number 5a on September 6 2018 minutes 00:21:19 to 00:21:35

<sup>5</sup> See Peraturan Menteri Kelautan Dan Perikanan Republik Indonesia Nomor 13/PERMEN-KP/2015 Tentang Petunjuk Pelaksanaan Penerbitan Surat Rekomendasi

Pembelian Jenis Bahan Bakar Minyak Tertentu Untuk Usaha Perikanan Tangkap

<sup>6</sup> See field notes number 48 on 2 February 2018 and transcript of conversation number 38 on 2 February 2018 number 00:06:26 to 00:07:57

So the time needed is 5 days. Daeng Timung<sup>7</sup> adding to the amount of diesel fuel and oil used one-way from Galesong - Tanama, Fak - Fak Regency during one catch season is as follows:

TABLE I. USE OF FUEL AND OIL FROM GALESONG - TANAMA FAK FAK FOR ONE SEASON

Information	Total Usage	Unit price	Total
Diesel fuel	8,5 Ton	IDR 5.100 / liter*	IDR 51.000.000
Brand Oil "Nitra"	1.250 liter	IDR 175.000 per 5 liter	IDR 43.750.000 **

Source: Processed Data (2019)

Information :

- \* 1 Ton = 1,000 kg: 0.85 kg / liter = 1,176,471 liters (diesel density around 0.85 kg / liter). The price of 1 ton of diesel fuel is IDR 6,000,000, then IDR 6,000,000: 1,000 kg = IDR 6,000 / kg. How to get the price of diesel per liter is IDR 6,000 / kg x 0.85 kg / liter = IDR 5,100 / liter
- \*\* The price of Nitra brand oil is 5 liters at IDR 175,000: 5 = IDR 35,000 / liter. For 100 liters of oil x IDR 35,000 / liter = IDR. 3,500,000

**C. Discussion**

The total leasing used per capture season for the Fak Fak waters is IDR 160,000,000 to 170,000,000. Supardi Daeng Timung<sup>8</sup> said to researchers. In the activity of catching *torani* eggs carried out by *patorani* for one *torani* season, all movements using a machine. The engine used to produce gas emissions. The gas emission contributed by *torani* egg capture activities during one season is 1,567,128 TonCO<sub>2</sub>e / season (see table 2). If referring to the government's commitment to reduce greenhouse gases according to Nationally Determined Contribution (NDC) in 2030 [28] and the commitment of the energy sector that is reducing greenhouse gas emissions by 314-398 million Tons of CO<sub>2</sub> in 2030 [29], [30] so serious steps are needed to tackle carbon emissions at sea. An approach is needed that is able to accommodate and record carbon emissions up to the reporting, namely by using blue (carbon) accounting. Blue (carbon) accounting not only reviews from the economic aspect alone, but also takes into account, records, reports on non-financial activities related to the environment and social, it is important for marine sustainability.

TABLE II. GAS EMISSION FIGURES FROM PATORANI CATCHING ACTIVITIES

Consumption	
Rate of consumption of 8.5 tons of Solar Ship capacity	6.75 Liters / Hour
Solar Consumption	690.000 liter / season
Assumptions: a. Average Distance = 1,533 Km b. Speed = 7 Knots (12,964 Km / Hour) c. Average travel time = (a / b) = 219 hours d. Number of transportation per season = 863 times	

e. Ship operating hours per season = 102,000 hours	
<b>Emisi</b>	
Emission Rate (Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting Introduction, 2010) <sup>9</sup>	1.843.680 KgCO <sub>2</sub> e / Liters
<b>Total Emisi</b>	15.671.28 KgCO <sub>2</sub> e / season
	1.567,128 TonCO <sub>2</sub> e / season

Source: Processed Data (2019)

**IV. CONCLUSION**

The use of fuel oil (diesel fuel) is very important activity to catch *bayao torani* (flying fish eggs) when viewed through an ethnomethodical approach is an expression of indexicality conveyed by the actors (*patorani*). Gas emissions contributed by *torani* egg capture activities during one season are 1,567,128 Tons of CO<sub>2</sub> / season. An approach is needed that is able to accommodate and record carbon emissions up to the reporting, namely by using blue (carbon) accounting. Blue (carbon) accounting not only reviews from the economic aspect alone, but also takes into account, records, reports on non-financial activities related to the environment and social.

**ACKNOWLEDGMENT**

Thanks to the *patorani* community, the Faculty of Economics and Business, Brawijaya University, Malang, and The Education Fund Management Agency (LPDP).

**REFERENCES**

- [1] C. Nellemann, E. Corcoran, C. M. Duarte, and C. De Young. 2010. *Blue Carbon : The role of healthy oceans in binding carbon.*
- [2] P. . Seelbach, J. G. Read, K. A. Buckner, T. Eder, and C. Manninen. 2014. *Great Lakes Blue Accounting: Empowering Decisions To Realize Regional Water Value, Michigan.*
- [3] R. Sargiacomo, Massimo; Coronella Stefano; Mio, Chiara; Sostero, Ugo; Dipetra. 2018. *The Origins of Accounting Culture: The Venetian Connection.* Routledge, New York, pp. 1–343.
- [4] P. I. Macreadie, O. Serrano, D. T. Maher, C. M. Duarte, and J. Beardall. 2017. *Addressing calcium carbonate cycling in blue carbon accounting, Limnol. Oceanogr. Lett.*
- [5] R. Gray, D. Owen, and C. Adams. 1996. *Accounting and Accountability: Changes and Challenges In Corporate Social and Environmental Reporting.* London: Prentice-Hall, Inc.
- [6] A. Solihin and A. M. Batungbacal, Ephraim Nasution. 1998. *Laut Indonesia dalam Krisis, Jakarta.*
- [7] Ruzardi;, S. Tamun, and B. Rochman. 2004. *Persepsi Pemukim di Kawasan Pantai terhadap Kerusakan Pantai ( Studi Kasus Pulau Batam ), Logika, vol. Vol. 1, no. No. 2, pp. 74-81.*
- [8] A. S. Keraf. 2014. *Filsafat Lingkungan Hidup alam sebagai sebuah sistem kehidupan bersama Fritjof Capra. Yogyakarta: PT. Kanisius.*
- [9] H. Eni. 2007. *Polusi Air Tanah Akibat Limbah Industri Dan Rumah Tangga Serta Pemecahannya,* Universitas Padjadjaran.
- [10] I. Gumilar. 2012. *Partisipasi Masyarakat Pesisir Dalam Pengelolaan*

<sup>7</sup> See transcript of conversation number 38 dated 2 February 2018 minutes 00:09:28 to 00:10:35

<sup>8</sup> See field notes number 48 on February 2, 2018 and transcript of conversation number 38 on February 2, 2018 minutes 00:09:41 to 00:09:55

<sup>9</sup> See Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting, 2010

- Ekosistem Hutan Mangrove Berkelanjutan di Kabupaten Indramayu, *J. Akuatika*, vol. Vol. III, pp. 198-211.
- [11] Mussadun and P. Nurpratiwi. 2016. Kajian Penyebab Kemiskinan Masyarakat Nelayan di Kampung Tambak Lorok,” *J. Reg. City Plan.*, vol. Vol. 27, no. No. 1, p. 49-67.
- [12] R. Gray. 1992. Accounting And Environmentalism: An Exploration Of The Challenge Of Gently Accounting For Accountability, Transparency And Sustainability, *Account. Organ. Soc.*, vol. Vol. 17, no. No. 5, p. 399-425.
- [13] N. Astuti. 2012. Mengenal Green Accounting, *Permana*, vol. IV, pp. 69–75.
- [14] A. Ö. Çalışkan. 2014. How accounting and accountants may contribute in sustainability?, *Soc. Responsib. J.*, vol. 10, no. 2, pp. 246–267.
- [15] R. S. Fitrianti, M. M. Kamal, and R. Kurnia. 2014. Analisis Keberlanjutan Perikanan Ikan Terbang di Kabupaten Takalar , Sulawesi Selatan, *Depik*, vol. Vol. 3, No. 2, pp. 118-127.
- [16] S. Amiruddin. 2017. The Changing of Tradisional Fishing Community to *Patorani* Fisherman in Takalar South Sulawesi,” *Saudi J. Humanit. Soc. Sci.*, vol. Vol. 2, no. No. 9, pp. 771-781.
- [17] Menteri Perencanaan Pembangunan Nasional / Kepala Badan Perencanaan Pembangunan Nasional, Kontribusi Sektor Swasta Untuk Pencapaian TPB / SDGs, no. Disampaikan pada Seminar Persiapan Penyusunan Laporan Keberlanjutan Perusahaan-GRI Jakarta, 25 April 2019, 2019.
- [18] UNEP (United Nations Environment Programme), “Transforming our world: the 2030 agenda for sustainable development.”
- [19] J. W. Willis. 2007. *Foundation Of Qualitative Research*. California: Sage Publication.
- [20] M. . Polomo. 2000. *Sosiologi Kontemporer*. Jakarta: PT. Raja Grafindo Persada.
- [21] H. Garfinkel. 1967. *Studies in Ethnomethodology*. Prentice-Hall, Inc, New Jersey, pp. 1–152.
- [22] K. F. Wiersum,. 1995. 200 Years of Sustainability in Forestry: Lessons from History, *Springer-Verlag*, vol. 19, no. 3, pp. 321–329.
- [23] T. Kuhlman and J. Farrington. 2010. What is Sustainability?, *Sustainability*, vol. Vol. 2, pp. 3436–3448.
- [24] J. Elkington. 1997. *Cannibals with Forks: the Triple Bottom Line of 21st Century Business*.
- [25] G. Burell and G. Morgan. 1979. *Sociological Paradigms and Organizational Analysis*, Firts Edit. London: British Library Cataloging In Publication Data
- [26] B. J. Malina. 1991. *Reading Theory Perspective: Reading Luke-Acts. In The Social World of Luke-Acts: Models for Interpretation*. Massachusetts: Hendrickson Publishers.
- [27] J. Heritage, 1984. *Garfinkel and Ethnomethodology*.
- [28] Undang Undang Republik Indonesia Nomor 16 Tahun 2016 Tentang Pengesahan Paris Agreement To The United Nations Framework Convention On Climate Change
- [29] Peraturan Pemerintah Republik Indonesia Nomor 79 Tahun 2014 tentang Kebijakan Energi Nasional
- [30] Peraturan Presiden Republik Indonesia Nomor 22 Tahun 2017 Tentang Rencana Umum Energi Nasional,
- [31] Guidelines to Defra / DECC’s. 2010. GHG Conversion Factors for Company Reporting Introduction,” pp. 1–49,
- [32] United Nations. 2015. Paris Agreement.
- [33] Peraturan Menteri Kelautan Dan Perikanan Republik Indonesia Nomor 13/PERMEN-KP/2015 Tentang Petunjuk Pelaksanaan Penerbitan Surat Rekomendasi Pembelian Jenis Bahan Bakar Minyak Tertentu Untuk Usaha Perikanan Tangkap