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Sustainable fisherman settlement development

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Abstract

Sustainability theory is considered important in the world. The theory has evolved the paradigm of architecture design to the level where it has reconsidering the environment, social and economic. However, the sustainable architecture development plan often implemented from a partial sustainable development theories. This research will discuss the theories of sustainable development that take a place in fisherman settlement area. The fisherman settlement is chosen as the context due to the vulnerability of the area in Indonesia, which showed by the government policy regarding the fisherman settlement. The theoretical study will cover general sustainable development concept to sustainable housing and settlement theories especially in fisherman settlement. This research utilizes a logical and critical argumentation method with descriptive analysis.

Keywords: sustainable development; fisherman; settlement

1. Introduction

Sustainable development has been the most current issues that widely implemented in every development plan. The first and the most common concept of sustainable development rooted from the definition in the Brundtland report, “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). Which developed and debated by the theorist of the sustainable development that summarized, according to Masroor and Bose, as followed 1. The development while ensuring the fulfillment of basic needs of current and future generations (WCED, 1987); 2. The development while ensuring income and expenditures per capita does not decline over time (Perman, Ma, Common, Maddison, & Mcgilvray, 2003); 3. The development while ensuring supplies of natural capital is not decreasing over time; 4. Development while ensuring the protection of human beings as possible (Georgescu-Roegen, 1971); 5. The Development to protect the community and community relations; 6. Development by improving the institutions consensus and capacity building (Perman et al., 2003); 7. The development to maintain biodiversity and ecological processes and protecting the health of ecosystem resilience (IUCN, 1980).

Masroor and Bose emphasized that sustainable development. similar as common sustainable theorist, that sustainability consist of three development concern which are environment aspect, economic aspect and social aspect. (Al-Masroor & Bose, 2011) argue that the three aspect of development concern are linked to each others. However rather see the development aspect as three independent aspects that connected or intersected, Masror and Bose emphasize that environment is a broader aspect that covers two others aspect and introduce the ecological aspect. Then (Charles, 2001) introduces the practical application to complete the framework of sustainability. This is an ongoing assessment in that consists of four stages. Stages of economic sustainability, community sustainability, ecological sustainability and the highest stage that the sustainability of institutions that incorporate all three. The

important of institution in sustainable development also noticed by UN in UN-Habitat Summit 2012, Sustainable development is a multidimensional process connecting environmental protection with economic, social and cultural as an integrated development (Golubchikov & Badyina, n.d.), with emphasized on Human Settlement and add culture as the institution framework in society.

Indonesia is the largest archipelago in the world with 17,504 islands and sea that cover 5.8 million km² (consist of the territorial sea 0.3 million km², archipelago territory 2.95 million km (UNCLOS, 1982). With wide coastlines, many Indonesian live in coastal areas and make use of marine and coastal resources as their main income. These communities consist of: boat owner, laborers fishermen, fish and other marine organism farmers, fish traders, fish processors, suppliers of factors of fisheries production facilities. Most of the coastal inhabitants live under the poverty line (Lasabuda, 2013). Several studies on fisherman economic conditions show high uncertainty income economy from this sector. This followed by low index of human development of coastal population this led to low capacity of fishing communities to take opportunities outside their local community (Boedhisantoso, 1999). This slum fishermen settlement area is often referred as “*Kampung Nelayan*”.

Fisherman settlement development are legally regulated under Republic Indonesia Ministry of Housing Regulation Number 14/PERMEN/M/2006 about special housing provision which further explained in Republic Indonesia Ministry of Housing Regulation Number 15/PERMEN/M/2006 about Fisherman Settlement. The regulation stated the adequate housing provision and fisherman settlement especially the one on disaster prone area is prioritized. Furthermore, Indonesian Law or “*Undang Undang Republik Indonesia*” number 1 year 2011 about Housing and Human settlement emphasizes the government responsibility for adequate fisherman settlement provision. Those regulations showed the government concern in housing provision and settlement improvement to support the sustainability of coastal settlements area. They also encouraging the research in fisherman settlement in order to improve the quality of live of the resident in the area.

There are some research has been done regarding Fisherman Settlement for instance; the spatial plan to eradicate the slump settlement in fisherman settlement (Hasanuddin, Noor, Santosa, 2013; Pramesti, 2015; Dewi, 2015; Yodsurang dan Yasufumi, 2015; Trang, 2016). The material and building shape that used in fisherman settlement (Aristianto, Santosa, & Prijotomo, 2010; Septanti, Irvansyah, & Setyawan, 2009). Climate change in coastal settlement (Soemarno, Faqih, & Setiawan, 2013). The economic improvement of fisherman settlement through spatial and physical intervention (Pramono, 2010; Ristianti, 2015) and the influence of tidal flood in forming fisherman settlement morphology. Sustainable urban growth in fisherman settlement (Setioko, Pandelaki, & Murtini, 2013). Base on the theoretical review, the theory or concept of sustainable cultural development of fisherman settlement has never been developed (see table 1).

Table 1. The previous study of fisherman settlement

NUMBER	AUTHOR AND YEAR OF RESEARCH	TOPIC OF FISHERMAN SETTLEMENT	ASPECT OF SUSTAINABLE DEVELOPMENT			
			ENVIRON MENT	ECONOMY	SOCIAL	CULTURE
1	Septanti (2009)	Material and building shape		☐	☐	
2	Aristianto, Santosa, Prijotomo (2010)	A solution for fisherman houses that based on cosmology				☐
3	Pramono (2010)	The development of a fishing village into a tourism coastal area		☐	☐	
4	Setioko, Bambang & Murtini, EE Pandelaki. (2012)	The unaffected fisherman settlement setting			☐	☐
5	Hasanuddin, Noor, Santosa (2013)	Shows the implementation of the policies and programs in the fisherman settlement		☐	☐	
6	Ristianti (2015)	The development fisherman village into floating village tourism	☐	☐	☐	☐

NUMBER	AUTHOR AND YEAR OF RESEARCH	TOPIC OF FISHERMAN SETTLEMENT	ASPECT OF SUSTAINABLE DEVELOPMENT			
			ENVIRONMENT	ECONOMY	SOCIAL	CULTURE
7	Pramesti (2015)	Ecotourism and fisherman settlement	☐			
8	Dewi (2015)	Slump settlement	☐	☐	☐	☐
9	Yodurang dan Yasufumi (2015)	Water circulation pattern influence on traditional daily life and the settlement				☐
10	Trang (2016)	Floating house to adapt climate change	☐			

Source: Author analysis, 2016

The recent problems faced by the fisherman settlement are bad environment. There are garbage at the beach and fisherman area settlement (see figure 1a). there is no place for drying fish and washing fish (see figure 1b).

a)



b)



Fig. 1 (a). The garbage at the beach in Madura Island, Indonesia , (b) a place for drying fish
Source: Author documentation, 2016

2. Research theory

The main theory used in this paper are sustainable development and human settlement.

2.1. Sustainable development

There are three aspects in sustainable development (Holmberg, 1992). These three aspects are consist of; 1. Economic: sustainable economic development capable of providing supply goods and services utilizing renewable natural resources, is able to keep the balance of the shopping and public debt, and sectoral development unbalanced and extreme resulting negative impact on agriculture and industry. 2. Environmental/Ecological: An environmentally sustainable system can maintain natural resources, avoiding the exploitation of natural resources and the utilization of natural resources that can not be renewed at the stage where similar benefits gained. Preservation of the environmental system includes maintaining natural diversity (biodiversity), the stability of the atmosphere and a variety of other ecosystems. 3. Social: Sustainable development in the social sector can ensure social justice, the provision of social facilities and adequate access to health, education, gender equality and political system that is clean and participatory.

The concept of sustainable development, that covers a wide range of knowledge, has developed and adapted to a variety of fields. Figure 1, 2, 3, and 4 is a schematic development of the concept of sustainable development are developed in accordance with their respective fields.

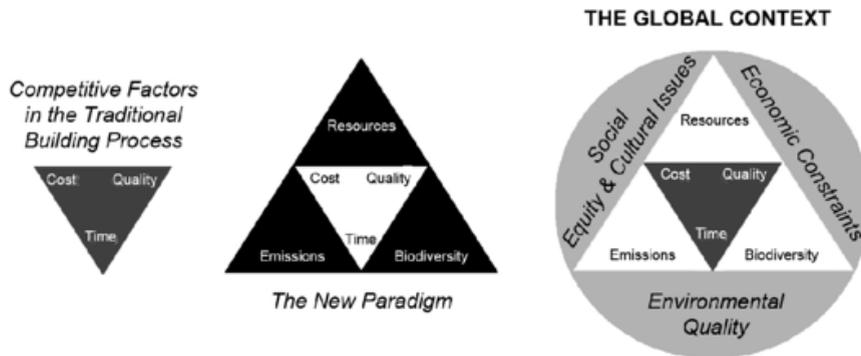


Fig. 2. Contextual Sustainable Construction
Source: (Bordeau, 1998)

From figure 2 the history elements of development starting from the triangle bases that consist of Cost, Quality and Time. These frameworks mainly use in traditional development plan that tried to quantify the economic perspective that represent by cost, the quality of the object and the time constraint. Then there are three emerging issues, consist of Resources, Biodiversity and Emission, introduced as a broader element of development. The theory introduced a new paradigm for a broader and longer impact of a development that also represents the environmental aspects of development. The third diagram integrates the element of development in the global contexts; consist of Social Equity and Cultural Issues, Economic Constraint and Environmental Quality. The last diagram of Development Element showed the basis of sustainable development theory.

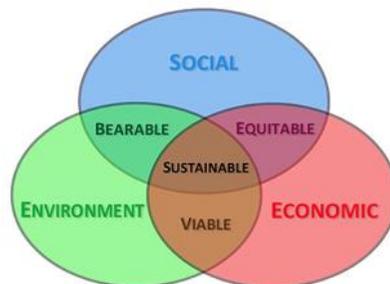


Fig. 3. Sustainable Development
Source: (IUCN, 2006)

Figure 3 shows the sustainable development concept that encourage by United Nation. The concept developed from the last stages of development elements at figure 2. The diagram consists of three main pillars of sustainable development, which are environment, economic and social. The three pillars cover the environment aspect such as viable and bearable, the economic aspect covers equitable and viable and the social aspect covers bearable and equitable.

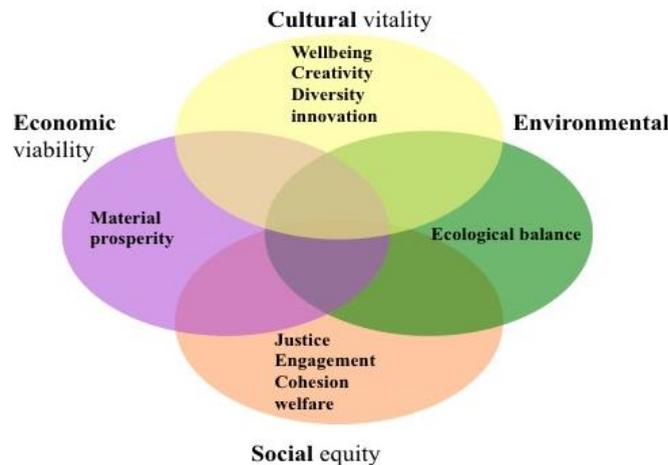


Fig. 4. Four Pillar Sustainable Development
Source: (Interpretation from Hawkes, 2001)

(Hawkes, 2001) add the cultural as an aspect of vitality in sustainable development, as showed in Figure 4, in his interpretation of sustainable development. The diagram consists of four pillars of sustainable development, which are economy, environment, society and culture. -In addition, the development element covers a broader issues in every aspect, namely material and prosperity in Economic viability aspect; ecological balance in Environmental Aspect; -The Social equity aspect that consist of justice, engagement, cohesion, welfare and wellbeing, creativity, diversity and innovation in cultural vitality aspect.

(Djajadiningrat & Famiola, 2004) argue that there are principles of sustainable development, which must be fulfilled to meet the sustainable development, which are; a. Ensuring Sustainable Development Equity and Social Justice. Development strategy should be based on the premise on things such as: a more equal distribution of land resources and factors of production, more equitable roles and opportunities, and economic equality achieved there must be a balance welfare. Distribution, development of the present generation should always need to achieve a future generation needs, b. Sustainable Development Appreciating biodiversity is a prerequisite for ensuring that natural resources always available on an ongoing basis for the present and the future. c. Sustainable Development using an integrative approach is a sustainable development that prioritizes the relationship between man and nature. Human kind intervention could affect the nature in beneficial or destructive manner.

Basically there are no significant differences between the IUCN's and Hawkes's sustainable development concepts. The only difference is in cultural aspect, which promoted as a pillar that should be separated from social pillar, this because cultural is a distinct reference point in improving vitality. To sum up, the sustainable development concept has to consider the needs of the future generation.

2.2. Sustainable development and architecture

Based on the World Commission on Environment and Development, which defines sustainability is not confined to human's proper role in maintaining its existence on earth. But also includes other values that play a role in the global ecosystem. The needs to find long-term solutions that will ensure the sustainability of human existence and well being more prominent than seeking appropriate terminology to describe the human kind need. Architecture is one striking form of economic activity. It is predicted that the pattern of resource intensity of architecture in general will follow the same pattern with improved economic status and income per capita.

Professionals architect must accept the fact that the improvement of the economic status of the community will increase the demand for architecture components such as land, buildings, energy etc. The objective of sustainable

design is to find a design solution that can ensure the balance and the existence of the three principles of sustainability in the architecture, (Jong-Jin & Brenda, 1998) namely:

1. The economic resources, which focused on reduce, reuse, and recycle of natural resources
2. Life Cycle Design that provides a methodology for analyzing a process and its impact on the environment.
3. Design humanistic, focused on the interaction between humans and nature.

Developed base on sustainable development concept, the sustainable architecture theory considers about aspect economy, environment and society. However, the theory does not specified in every single architecture development scopes. The broad scopes of Architecture, namely building, settlement and urban, should be treated differently according to the scopes and the future generation needs that diverse in every scopes. Especially, on settlement it must consider about the housing design for sustainability.

2.3. *Housing and settlement*

Settlement is a space or container in which humans perform daily activities as (Jayadinata, 1999) argue that a space can be defined as an area with a geographic limitation. The limitation of a space affected not only by the surrounding physical condition but also social and governmental system, which occurred everywhere. (Zahnd, 1999) added that the development of a space is a requirement to support various human activities. To encourage benefits, environmental conservation, awareness of environmental values, and its implications for the efforts of social, economic, and investment in the development of residential space environment as a container of human activity.

(Doxiadēs, 1977) argues that settlements will always be associated with the houses and human settlement, human settlement is a place (space) to live and socialize for human in societies and houses is a place (space) with the function of the dominant place to stay. In line with it, (Turner & Fichter, 1972) argues that the home or place of residence has broader meaning than a physical space with boundaries. Turner added that the home of some approach, namely physically, economically and socially. The most important thing in each house is not what the house but its influence in the lives of the occupants. To fully understand, the housing can be interpreted from some elements of housing, namely: shelter: protection against external interference (nature, animals), and so forth. House: the building structure to reside. Housing: things that are associated with the activity residing (build, inhabit). Human settlement: collection (aggregate) home and residential activities (settlements). Habitat: the environment of life (not limited to humans). According to (Doxiadēs, 1977), the settlement would go well if associated with several elements, namely: natural, human, social life, shell (space), and network (relationship):

1. Housing is where the individuals that exist interact and influence one another, and have a sense of belonging on the neighborhood. (Abrams, 1969)
2. Housing can be interpreted as a reflection and manifestation of the human self, either individually or in a unity and togetherness with the natural environment and can also reflect the standard of living, welfare, personalities, and human civilization inhabitants, community and nationalities (Yudohusodo, 1991)
3. Neighborhood area is a group of houses, which is also a part of the settlement, both urban and rural neighborhoods areas are equipped with basic infrastructure, public facilities and utilities as a result of the efforts to provide an adequate and liveable neighborhoods area. On the other hands, settlement area is defined as a part of the environment outside protected areas (namely national park and military zone), either urban or a rural area that serves as a residential environment and activities that support life and livelihood (laws of the republic of Indonesia No. 1, 2011).

Settlement is where people live and socialize. Therefore, a settlement consists of the content (People who lived inside) that is human and the container (a physical place of human to live that includes elements of natural and man-made). In this sense, (Doxiadēs, 1977) noted that the settlement is not only depicted in three dimensions, but should be four dimensions, the arena is no element of human life and always be a character and culture in time flow framework even further, the content can be divided into five major elements known as ekistics elements:

1. Nature (nature), provides the foundation for settlement areas are formed or molded and the framework in which a settlement can function.
2. Man (anthropos)
3. Society (society)
4. Protective Structure (shells), a structure in which people can live and function in societies.

5. Network services (network), whether natural or artificial that facilitate the functioning of a settlement such as roads, electricity, water.

Discuss about settlement especially about fisherman settlement has written in “Fishermen Bend Urban Renewal Area” 2013. That there are 10 (ten) renewal strategies for the fishermen settlement: The creation of 21st century jobs, The timely provision of infrastructure, a place that is easy to get around, a vibrant, mix of uses and activities, Distinctive and diverse neighborhoods, a great place for families, a high quality built environment, smart environmental solutions, environmental constraints addressed, strong partnerships and effective governance.

Based on settlement theory must be considered about: network or infrastructure, facilities, and public facilities that mix of uses and activities, distinctive and diverse neighborhoods, a great place for families, a high quality built environment, smart environmental solutions, environmental constraints addressed, strong partnerships and effective governance. These theories can be used in guiding the sustainable fisherman development.

2.4. The Law of settlement

There are three important pillars in the implementation of sustainable development, as declared in the meeting of the Rio + 10, namely the need for coordination and integration of natural resources, human resources, and the resources used in each building with the approach of population, development and environment through interaction aspects social, economic and environmental (Karim, 2010). Sustainable settlement is the main issue in the Habitat Agenda II in 1996, which urges the sustainable settlement development that considering: a. Community development efforts that can conserve resources and environmental responsibility with an emphasis on the precautionary principle; b. Efforts equalization against the chance of getting a healthy life, safe, and productive, and in harmony with nature and the local environment, as well as cultural and spiritual values applied. The Rio Summit or Rio+20 enhance the sustainable development focus in Habitat II, the conference concludes three objectives in sustainable development, namely (1) renew the political commitment on sustainable development, (2) identify the gaps between the progress in achieving the progress and implementation of the commitments that have been approved a long time, and (3) address the new challenges are constantly evolving.

The Minister of Housing of the Republic of Indonesia regulation Number 15/PERMEN/ 2006 on Implementation Guidelines for the Implementation Regional Development Settlement Fishermen that should provide the infrastructure and facilities at the fisherman settlement area. Regional infrastructure is a basic physical needs should be provided in fishermen settlement area that allows the region to function and develop various activities related to marine and fisheries activities as it should be. For example, docks, boat moorings, boat docks. And also the public facilities in fishermen settlement district that serves to organize and develop the economic, social and cultural life and livelihood of fishermen. For example a place for drying fish, fishing nets, and fish markets provisions. The primary network infrastructure in fishermen settlement district is connecting units of housing in residential areas to the others district. The network is used for public purposes, either in the form of road infrastructure, floating bridge and the ship network. Secondary network connects the fishing area to housing. Utilities use as supporting facilities in settlement area to provide clean water, electricity, telephone and gas.

Based on the laws of the republic of Indonesia number 1 of 2011 about neighborhoods and settlement explained that neighborhoods and settlement areas is an integrated system consisting of coaching, organizing housing, the implementation of residential areas, maintenance and repair, prevention and improvement of the quality of the slums, providing land, funding and financing system and the role of the community. To sum up, the main aspect of the law number 1 of 2011 about neighborhoods and settlement that should be adapted in fisherman settlement are: 1. The network that connect fisherman house to public area, sea, syringe fish, place for making fishing net and fish markets; 2. Utilities clean water, electricity, telephone and gas. 3. Improvement the quality of slum and financing system and the role of the community.

3. Research Conclusion

In order to develop sustainable fisherman settlement, there are four main aspects of sustainable development that should be considered, namely environment, social, economy and culture coupled with government regulations

on fisherman settlement and theories about the settlement. Where in fact the fisherman settlement condition is degraded in term of environmental condition, unsolved poverty residents and rather slums condition. From the aspect of environment there needs more attention to preserve the environment by the provision of drainage and disposal system in the fish-processing and fish auctions, provision of clean water in every home of fishermen and public facilities, the provision of telephone, gas and electricity. These basic infrastructures badly needed to support the village of fishermen settlement access and road network. Reduce the odors of fish waste and the fish drying process. Then, form social aspect the settlement and housing development should pay attention to the activities and habits of fishermen. The habit of fishing is different in every places, it is influenced by the endogenous culture, namely a community spaces for fishermen to stitch nets, fish auctions, spot cleaning and drying fish. While on economy aspect there is a need to provide a place that can increase the income of fishermen as fish processing production house, fish market, etc. This explanation is illustrated in figure 6 diagram which further detailed in Figure 7.

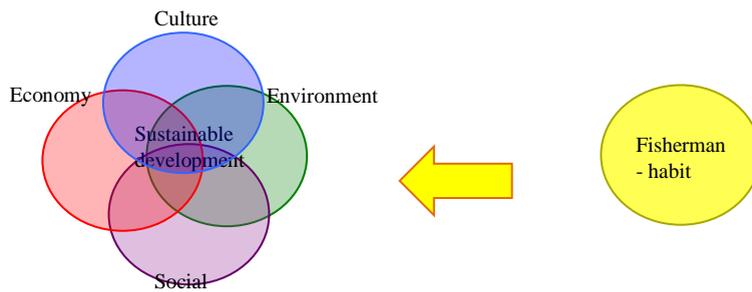


Fig. 6. Sustainable Development and Fisherman Settlement
 Source: (Personal Analysis Result, 2016)

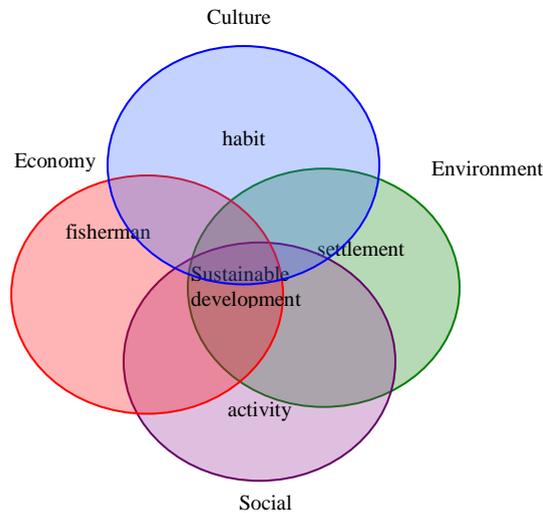


Fig. 7. Sustainable Development for Fisherman Settlement
 Source: (Personal Analysis Result, 2016)

This concept of sustainable development in fisherman settlement could use as an architecture guideline in developing fisherman settlement design. The basic design of fisherman settlement should consider the house, place,

building, path and drainage design, which include adequate houses for fisherman, smart building facilities, Reduce, Reuse and Recycle waste management in fish industry, the place to support fisherman activity, easily accessible fishing boat harbor and free of flood and litter settlement.

The study analyzes fisherman settlement sustainable concept and a guideline to apply this concept in a case study. This case study also showed the current fisherman settlement problems in following sustainable development criteria. In environmental aspect, the problem is unhealthy garbage polluted beach condition. In economic aspect, there is no available market to sale the fishes. There is no place to support social activities like communal washing and drying fish spot.

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