



Model For Small Enterprises Innovation Strategies Adaptation On Climate Change: Learn From Traditional Textile Sumba

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ABSTRACT

All business organizations face various risks that might arise from changes in the external macro and micro environment. One of the significant changes in the external macro-environment is climate change. Climate change and its derivative impacts on business activities need to be managed properly by adapting innovations in the production process. Various studies on the impact of climate change on business activities are more focused on conventional measures to gauge business risks which are more responsive and focused on large companies. There are still few studies conducted on small and traditional businesses related to strategic actions in dealing with climate change, especially non-agricultural businesses. Therefore, this research aims to provide an overview of the adaptation strategy of production process innovation in the small-scale weaving industry in Sumba Island, Indonesia. The research conducted in-depth qualitative interviews with traditional textile producers in East Sumba. The main criterion in determining the respondents is the length of the business run by the traditional weaver. The study found that while most traditional weaver of Sumba textile relies on status quo technology, some strategies emerged to adapt to climate uncertainty in weaving production. The authors also identify three benchmarks of climate adaptation measures by the traditional weavers.

Keywords: Ikat industry, Production process innovation, Small enterprises, Climate, External Macro and Micro environment.

INTRODUCTION

Climate change has become a global issue that has been frequently discussed in recent decades, emphasizing the importance of reducing and managing the risk of extreme events and natural disasters in a changing climate (IPCC, 2014; Jiang & Li, 2021; Murray & Ebi, 2012; Paul, Lang, & Baumgartner, 2017; Pryor, 2013). From the perspective of developing countries, climate change is the most complex environmental and

social challenge, especially when linked to sustainable development (Kalele, Ogara, Oludhe, & Onono, 2021). As one of the biggest global challenges in today's world, climate change affects various sectors, such as agriculture, trade, and commerce. Companies face the risk of changes in the ecological environment that have an impact on their daily business operations (Beer-mann, 2011; Herrmann & Guenther, 2017).

Various studies have been carried out to give serious attention to the adaptation to environmental changes as an anticipatory action and planning process. The results of these studies can be seen in the modeling of new policies, technological innovations, and development interventions that are still based on a "business as usual" approach that ignores the environmental adaptation behavior of creative and socio-cultural technical actors (Crane, Roncoli, & Hoogenboom, 2011; Herrmann & Guenther, 2017). In addition, studies on climate change adaptation are more focused on the agricultural sector which is directly related to climate change, while relatively few discuss the strategic behavior of companies, especially small industries, in adapting to climate change (Gasbarro, Iraldo, & Daddi, 2017; Herrmann & Guenther, 2017; Kalele et al., 2021). Furthermore, Herrmann and Guenther (2017) explained that currently, there have been many studies and publications focused on organizational climate change adaptation, such as in the insurance, tourism, construction, and water supply sectors. The basic assumption of these studies and publications is that companies in various sectors are affected by the impacts of climate change and therefore companies need to adapt to these impacts. By recognizing climate change, companies can interpret the opportunities and threats posed to gain competitiveness by entering new markets and developing new products or services.

The weaving industry is one of the categories of industry in Indonesia (BPS, 2020) and is included as one of the sub-sectors in the Indonesian creative industry, which contributes significantly to Gross Domestic Product (BEKRAF, 2019). The business activity of the ikat industry in Kabupaten Sumba Timur is a home-based business, where most workers are family members, especially mothers and daughters. Although generally this ikat business activity is run on a part-time basis and is subsistence in nature, recently it has become a commercial handicraft business to fulfill consumer needs (Murniati & Takandjandji, 2016; Nugrohowardhani, 2016).

Sumba Island, one of the large islands in East Nusa Tenggara, is a semi-arid climate region consisting of rainy and dry seasons. The main

characteristic of this island is the lowest level of rainfall compared to other islands in Indonesia (Go, Kurniasa, Potapova-Crighton, Himayati, & Kumar, 2020). Furthermore, Lassa, Mau, Li, and Frans (2014) stated that Sumba is a semi-arid area where most of the land is savanna, which has erratic rainfall with low rainfall intensity, which results in a high level of vulnerability in the livestock and food crops sector. In addition to its effect in the primary sector, climate change in Sumba also has an impact on the secondary sector, especially the ikat industry sector which uses natural dyes as raw materials. Murniati and Takandjandji (2016) and Ndamunamu, Batubara, and Sundawati (2019) stated that natural dye-producing plants are increasingly difficult to find, thus requiring efforts to develop and identify dye plants in order to support the sustainability and development of the weaving craft business.

This study aims to describe the innovation strategy of the production process carried out by ikat craftsmen in Kabupaten Sumba Timur. The innovation strategy in the production process is one of the alternative actions in adapting to climate change (Herrmann & Guenther, 2017). The main research question, formulated to answer the problems described above, is what kind of innovation in the production process is carried out by ikat craftsmen in responding to the scarcity of raw materials as a result of climate change. This paper is divided into three major parts. First is the introduction that explains the reasons for the importance of this research and a review of the literature related to the research topic. Second is the explanation of the methods used to answer the research questions and objectives. The last part is a discussion of the results and conclusions to provide an in-depth understanding of the adaptation strategies carried out by ikat craftsmen in Sumba.

Climate change adaptation is the process of adjusting to the climate and its current or predicted effects. This adjustment process is carried out by modifying processes, practices, and organizational structures to decrease losses or to exploit and take advantage of profitable opportunities. Modification of processes, practices, and organizational structures occurs when companies adopt innovations (Aniah, Kaunza-Nu-Dem, & Ayembilla, 2019).

Beermann (2011) explains that in dealing with climate change, there are two ways that can be done, mitigation and adaptation, both at the governmental level and at the corporate/organizational level. Mitigation refers to actions to reduce exposure to change through regulation and implementation of technological change, while adaptation refers to adjustments made to respond to current or predicted changes. One of the strategic implementations of mitigating environmental changes from a business management perspective is the development of an energy-efficient production process which then gains market benefits. Meanwhile, the incentive obtained by the company when carrying out the adaptation strategy is the development of new products as part of technological innovation which then acquires new markets.

From the perspective of business organizations, climate change can be seen as both a risk and an opportunity. Identifying risks and opportunities is considered as the first step to designing and implementing strategies related to climate change. Companies can benefit by introducing new products or innovative production processes through identifying and exploiting new market opportunities for environmentally friendly products and services (Gasbarro et al., 2017).

Crick, Eskander, Fankhauser, and Diop (2018) explain that the ability to read and respond to signs of climate change is essential for most entrepreneurs to achieve business success. With a good understanding of environmental changes, companies can reduce costs, minimize disruption, or increase sales. Furthermore, Aniah et al. (2019) emphasized that adaptation actions toward climate change are urgent and necessary in the midst of a situation of complications and uncertainty to provide alternative paths to compete and succeed. Innovation is seen as the company's capacity to introduce new processes, new products, new ideas, use of new technologies, and even new ways of working to improve the effectiveness and performance of the company. Generally, there are two types of innovation carried out by small businesses, product innovation and process innovation. Product innovation is seen in changes in the final product or service provided to custom-

ers, while process innovation is a change made by companies in the way they produce a product or service (Gunday, Ulusoy, Kilic, & Alpkan, 2011; Hsin, Hong, & Sheng, 2019; Killa, 2017).

Method

This study uses an exploratory and qualitative research approach. There are two main reasons researchers use a qualitative approach to answer the questions and research objectives that have been formulated above. First, the context of this research can only be approached by qualitative method. Second, it is still uncommon to find quantitative indicators to measure climate change adaptation strategies in terms of production process innovation in the ikat industry, so a more in-depth and detailed exploration is needed. The qualitative data in this study was obtained by semi-structured in-depth interviews with 20 informants of ikat weaving craftsmen in Kecamatan Kambera in July 2021. The selection of respondents was based on a non-probability sampling technique by considering the length of business.

Respondent	Gender	Age	Location
Length of business between 10 to 25 years			
R1	Female	40	Mauliru
R2	Female	42	Mauliru
R3	Female	52	Mauliru
R4	Female	50	Mauliru
R5	Female	42	Mauliru
R6	Female	51	Mauliru
R7	Male	48	Lambanapu
R8	Female	54	Lambanapu
R9	Male	28	Lambanapu
R10	Female	35	Mauliru
R11	Female	49	Mauliru
R12	Female	35	Mauliru
R13	Female	61	Lambanapu
Length of business more than 25 years			
R14	Female	60	Lambanapu
R15	Female	27	Mauliru
R16	Female	46	Lambanapu
R17	Female	70	Lambanapu
R18	Male	63	Mauliru
R19	Female	59	Lambanapu
R20	Female	60	Lambanapu

Table 1.
Samples

The main interview questions were about the respondent's understanding of climate change and its impact on their business, as well as what strategic actions have been taken related to innovation in the production process. The following table summarizes the details of the samples. Qualitative data analysis was carried out through several stages. First, transcribing the interview data and making key notes for further observations. Second, organizing data and coding that allows researchers to develop key themes to answer the research questions. The last step is the verification step.

Results and Discussion

In general, the characteristics of the handicraft business in the ikat industry in Sumba Timur are home-based businesses using traditional and simple weaving tools that have been passed down from generation to generation. Ikat fabric production equipment is adjusted to the needs of use. To explore respondents' perceptions of climate change and its impact on the ikat business, respondents are aware of climate change and its impact on the availability of raw materials, as stated below:

"...in the past, looking for kombu was easy, available around the house. Today, it is difficult to get, we must go to the hill, walk far just to get it..."(R14)

"...today, for the source of blue color, the wood in the forest is not easy to find, need to go too far away to get....in the past, it was available behind the house..."(R17)

"...it is right that to find the leaves for the source of blue colors in the forest is difficult..."(R8)

Efforts taken by craftsmen to adapt to climate change consist of looking for alternative raw materials, modifying raw materials, and cultivating plants as sources of raw materials. Following are some statements regarding alternative efforts to be made when there is a shortage of raw materials.

"...in the past, we used cotton for weaving but it took a long time to make. Now yarn is available in the shop as ready material. We are only looking for natural dyes. During the dry season like this, the tilapia leaves start to stunt and are no longer

fertile due to the (lack of) rain, so we usually mix it with the coloring products from the shop so we can work on something that we can sell..."(R13)

"... we still use natural dyes. If it's hard to get around here, we can order from Nggongi. For the blue color which is difficult to get, we give the cloth to (the people in) Mondu, so they can do the dye process..."(R17)

"... we looked for wood for the blue color until we got it (even) if it is far and took a long time. Now we are trying to grow our own plants and we already can make use of it..."(R16)

"... we use Wantex (a well-known brand of clothing dyes), so we can produce cloth quickly..."(R10)

"... We used to get Kombu in Mburukulu and Mangili, but now it is rare, there's no rain, so to give black color we use Wantex..."(R2)

The innovation process in modern companies is generally performed by reconfiguration and realignment of the innovation process. Reconfiguration refers to a company's efforts to dynamically adapt and develop its innovations by proactively adapting the innovation process, and reactively transforming the innovation process to respond to environmental changes. Reconfiguration of the innovation process is required as a result of changes in the market and the company's technology. Meanwhile, the realignment of the innovation process refers to the combination and integration of various activities in order to achieve superior performance (Lichtenthaler, 2016). Referring to the general characteristics of the business in the ikat industry in Sumba, it can be understood that the innovation process done based on the theories and views explained above is not yet as perfect as it is done in modern business organizations. However, based on the results of the research analysis, it was found that the innovation of the production process in adapting to environmental changes carried out by ikat craftsmen in Kecamatan Kampera, formed at least three orientations of the adaptation strategy for the innovation of the production process as shown in Figure 1.

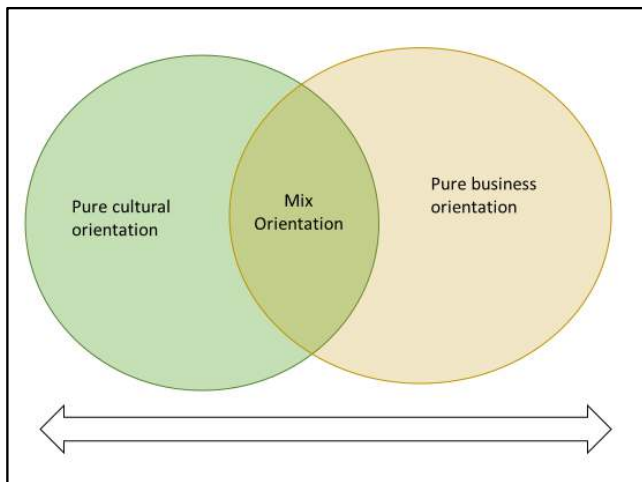


Figure 1.
Model of Production Process Innovation Adaptation

Adaptation of production process innovation by craftsmen shows three orientation patterns. First, there is a strong tendency to maintain the production process that has been performed for generations by ensuring that the production process is carried out using natural raw materials. The adaptation is achieved by cultivating plants that produce natural dyes in order to maintain the uniqueness of the product. We categorize these adaptive behaviors as culture-oriented adaptations. This first strategic behavior is mostly performed by businesses that are relatively well established with more than 25 years of business. Second, there is also a strong tendency to use alternative raw materials (chemical dyes) to shorten processing time to quickly earn income from the production process and maintain production continuity to meet market demand. We categorize this behavior as a business-oriented adaptation behavior, which is more likely to be performed by craftsmen with more than 10 years of business. Third, a combination of business-oriented and culture-oriented adaptation strategies. In this category, there are craftsmen who maintain the authenticity of the ikat cloth by giving some of the traditional coloring work to other parties in order to accelerate the processing time to meet supply needs.

Conclusion

Sumba Island, as stated by experts, is cate-

gorized as a semi-arid area or a savanna area which is characterized by low rainfall, resulting in a high level of vulnerability. This has an impact on the diversity of the livelihoods of the people to adapt and survive (Nugrohowardhani, 2016). The Ikat industry is one part of the survival process. However, with the increasing value of ikat products, the ikat business has begun to lead to a business orientation to meet market demand. The results of this study provide an illustration that the ikat craftsmen understand the existence of climate change which results in the scarcity of raw materials. To respond to this change, the craftsmen make adaptations in the production process while maintaining the originality of the product by providing raw materials independently and also by making adjustments to the use of alternative raw materials. The results of this study propose a production process innovation model related to climate change adaptation by ikat craftsmen. By all means, this model needs to be approached more deeply, either by conducting qualitative or quantitative exploratory studies. Further research is needed by first making indicators that definitely measure the orientation of both cultural orientation and business orientation in the ikat production process in Sumba.

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