The influence of entrepreneurship orientation and IOT capabilities to sustainable competitive advantage of artisanal fisheries in Indonesia: A case study of Artisanal Fishery in Banten Province

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Abstract. Sustainable competitive advantage as the way of winning the dynamic competition consists of many factors that influence the success of its implementation. A quantitative research method was applied to fill the gap of the technology capabilities and entrepreneurship orientation as important factors that influence the sustainable competitive advantage. The research surveyed 106 small scale fishermen to find out how artisanal fishermen as entrepreneur in catch fisheries perceived digital transformation and sustainable competitive advantage. The unique proposition of the research was to find how the artisanal fishermen at the province of Banten, Indonesia perceived the Internet of Things Capability (IOT-Capability) or also known as digital transformation supports the sustainable competitive advantage practices in catch fisheries. The results of this research indicate that IOT technology highly influences the sustainable and competitive advantage of the fishery industry. The research finds out that small scale fisher as an entrepreneur believes that entrepreneurship orientation of artisanal fisher positively influences IOT-capabilities and makes it as mediation variable between the fisherman entrepreneurship orientation and sustainable competitive advantage.

Keywords: entrepreneurship orientation, IOT capabilities, sustainable competitive advantage, artisanal fisheries

1. Introduction
Indonesia with more than 7 Million Square Kilometer of the ocean is one of few maritime countries ever existed in the world. Indonesian’s ocean covers 70% of its overall territory, which means that only 30% of Indonesia’s territory can be occupied by human beings. Therefore, the Indonesian ocean can be regarded as strategic natural resources for the 250 million Indonesian people. Despite having 57,000 Km long of shoreline and number 2 longest shoreline in the world after Canada [1], the export value of catch and aquaculture Indonesian fish product is far below other countries with smaller coastline and ocean territory like China, Vietnam, etc. [2] The reports place Indonesia in Rank 10 with 3.11 Billion USD export value. This value is far below compared to Vietnam whose fish export values are more than 5.8 Billion USD. These phenomena raise a big question why such county like Indonesia with the
abundance of natural and human resources can be outnumbered by other smaller countries where in fishery product. Therefore this study discussing Indonesia fishery sustainable competitive advantage of artisanal fishery and the role of internet of things (IOT) technology as important factor as antecedent.

Small scale fisheries (SSF) or called as artisanal fishery, captures more fish around the world more than those in the commercial fishery industry [3]. It is count that 50 out of 51 million fishermen around the world are the artisanal fishers. Therefore, these small scale fisher can be considered as the people who are responsible for most of the fish exploitation around the world. Indonesia fishery situation is no different from those around the world. 99% of Indonesia fishing vessels or more than 500,000 out of 600,000 fishing vessels are below 30 Gross ton and most of them are below 5 gross ton with single outboard motor engine or no engine at all [4]. According to The Ministry of Marine Affairs and Fisheries (MMAF) in 2018 Indonesia catch fish industry catch more than 5 million fish vary from Skip Jack Tuna to Blue Swimming crab. MMAF in 2018 also indicates that there was a decline in the number of fishermen from around 2 million in year 2000 fishermen to only 800,000 fishermen in 2018. We also notes the catch fish quantity grow slowly from 6.52 million tons in 2015 to 6.83 million tons in 2016 [4]. This slow down of catch fish industry combined with the decline of the willingness to become a fisherman in such maritime country like Indonesia is known as declining catch fish phenomena [5]. Recent entrepreneurship studies on entrepreneurship of SSF indicates that countries with slack of marine resources live in a such poor situation which they should have not [6].

The sustainability practice covers three general dimensions of economics, social, and environment. Sustainability practice is believed can be achieved when all fishery actors practicing sustainability. It is known that sustainability practice can also become a source of competitive advantage to win the competition [7]. Sustainable competitive advantage can also be achieved through product innovation and process innovation[8]. Product Innovation tightly relates to the use of technology to creates a unique proposition and having a better performance.[9]. Therefore, this research is aims to study the influence of entrepreneurship orientation of artisanal fisherman with the use of the internet of things capability (iot-capabilities) to artisanal fisherman sustainable competitive advantage performance.

2. Literature review
2.1. Sustainable competitive advantage
Resource-based view (RBV) of a firm was initially introduced by J.B Barney back in 1991 as unique resources where the company must be competitive in the world of competition. These strategic resources must consist of characteristics of being Valuable, Rare, Imperfectly imitable, strategically irreplaceable [10]. Environmental sustainability mostly seen as an effort of keeping a sustainable environment where nowadays environmental sustainability is placed into a more strategic position as a company’s strategic advantages [11]. Further studies, transformed the traditional RBV theory into a wider scope of research that includes environmental and social factors known as the natural resource base view (NRBV) [12]. Social factors in sustainability also play an important role as capabilities of firms towards shared triple bottom line[13]. For then social base resource base view (SRBV) in conjunction with NRBV and RBV will together form a new shared triple bottom line value creation.

These strategic competitive advantages came from environmental strategic advantage ranging from minimizing the number of waste products and dippings the number of production inputs which lead to efficiency and firm's productivity and competitiveness [14]. Whereas SRBV will focus more on the mission base approach as creating more jobs, improve health, protect or improve the environment as well as creating more value creations to stakeholders [13]. Other than of being valuable, rare, imperfectly imitable, and strategically irreplaceable. Environmental and social sustainability can be added and fits into a strategic competitive advantage as an extension for being highly competitive as well as sustainable in their business performance [7][13]. The use of technology will play an important role for the company in achieving sustainable competitive advantage in the shifting paradigm era of the world where the role of digital technology becoming a compulsory [15]. The convergence of technology with the business worlds not only creates new opportunities but will also lead companies to be more sustainable [16].
2.2. IOT-capabilities

In the digital transformation era, IOT capabilities not only relates to how the technology can or cannot do and how sophisticated the technology is. But it relates more influence on other dimensions as the social, psychological, economic, environmental. Therefore, IOT capabilities is tightly related to social welfare and cultural behavior, as a new mean of creating new value creation. Therefore digital capability also simply called as digital transformation not only converging the technology but also social and cultural [15][17]. These broad dimension of this digital transformation is becoming more and more important due to the availability of the Internet technology that becomes more affordable, wider reach and more applicable to the whole business process [18]. IOT capable satellite tracking technology could potentially increase the catch per unit effort (CPUE) of artisanal fishermen, as all the data of fishing activity collected from the IOT device onboard conceptualize a more predictable pattern to control the catch [19]. The use of satellite geospatial technology could support the sustainability effort where the area that is indicated as overfishing can be avoided and gives the nature break to recovers. The use of IOT technology in an artisanal fishery not only saves the environment but could also potentially bring high efficiencies to the fisher.

Efficiencies by avoiding to waste a fast fuel and creates more efficiencies, more effective work time, and optimal catch since all the information is now timely available. The IOT also could lead into the most optimum fishing ground where the IOT could also predict a more accurate weather condition provided in the pre-departure preparation as well as preserving the maximum sustainable yield of the fishing ground can support [19][20][21]. Therefore, this IOT capabilities can surely support the sustainability practice as well as giving a competitive advantage to the artisanal fisher. Based on this discussion we than formulate our hypothesis as follow:

H1 : IOT Capabilities positively influence sustainable competitive advantage

2.3. Entrepreneurship orientation

In search of seeking new opportunities and leverage opportunities from the existing routine operation, one must have a strong entrepreneurship orientation to starts with. Therefore entrepreneurship orientation relates to how entrepreneur use their capabilities to innovates and bring new values to their existing business [22]. Entrepreneurship orientation constitutes of indicators where one must dare to take risk beyond their existing business as well as having a positive attitude towards innovations, proactive in an ever-changing dynamic situation and know how to drive their business when facing the competition [23][24].

Consideration of the Sustainable competitive advantage would benefit stakeholders in terms of companies' dynamic capabilities in making profits as well as to navigate the companies in difficult times [13][25]. As for the relation of entrepreneurship orientation and technology innovation, entrepreneur must endeavor the risk as well dare to innovate and use technology capabilities to achieve the sustainable capabilities [26][17]. Therefore, we hypothesize the relation of entrepreneurship orientation and IOT capabilities to sustainable competitive advantage in the artisanal fishery as follow.

H2 : Entrepreneurship Orientation positively influence IOT Capabilities
H3: Entrepreneurship Orientation positively influence sustainable competitive advantage

Therefore, our proposed model on our research can be seen in Figure 1
3. Methodology
The Indonesia fisheries territory, is clustered into 11 Fisheries management area or called as “wilayah pengelolaan perikanan” (WPP). And according to the Indonesia Ministry of maritime and fisheries (2018) there are 800,000 fishermen throughout Indonesia and 372,101 fishing boats under 10 gross tons or consist of more than 70% of Indonesia’s fishing boats. The Indonesia legislation act on fishery number 7 year 2016 about fishermen wellbeing and legislation act number 45 year 2009 on fisheries regulates that boat under the 10 gross tons considers as small scale fishing boat. There are 39,971 small scale boats operates throughout 6 provinces of Java island or 10.74% of small scale fisherman spreads throughout these 5 provinces. These 6 provinces capable of doing harvest to the Java seas on its northern part and the Indian Ocean at the southern parts see figure 2. The total catch fish production for these 6 provinces are more than 1.2 million tons of fish commodities per year [27].

Figure 2. Indonesia Fishery Management Cluster
Whilst Indonesia’s ocean is geographically stretch from the eastern part that meet the pacific ocean to the far west that meet the Indian Ocean. Therefore due to the homogeneity characteristics of small scale fishermen according to the Indonesia legislation act, as well as it was noted by MMF [28]. All of the six province’s clusters are capable of doing sea harvesting at WPP 573 and WPP 712. At this research we decided to take our samples with purposive samples of artisanal fishermen at Banten province. The research was conducted at the Lebak and Pandegelang Residence at Binuangun village. Binuangun is known as the largest fish landing ports in the province of Banten where most of the artisanal fisherman lands and sells their fish in the auction market. We are using Partial Least Square - Sequential Equation Model (PLS-SEM) as the use of PLS-SEM does not require a large sample [29]. The questionnaire distributed to 200 small scale fishermen and return with 106 questionnaires.

4. Results and discussion

Through our research we found that 99% of the fishermen in the Binuangun area already use mobile phones as the internet mobile network has reached the village and parts of the ocean. 51% percent of the respondent has used the Internet through its smartphone while the rest still uses feature phone for voice calls only. The average age of the respondent is 36 years old of age with the youngest fisherman 22 years old of age and the oldest is 60 years old of age.

In terms of job satisfaction, we found out that 51% of the fisherman would prefer to choose other jobs if there are any other jobs available than being a fisherman and 88% of the fisherman has no other jobs than becoming a fisherman. This job dissatisfaction reflected from the average fisherman income less than 2 USD per day. Recent study Indicates that people with an income of under 2 USD per day is considered very poor and categorized living in at the bottom of the pyramid people [30]. This result may also explain why the number of Indonesian fisherman are constantly declining every year.

By using SMART-PLS 3.0 we do the calculation of the data samples questionnaire. We do the confirmatory factor analysis by measuring model validity and reliability trough outer model test in figure 3 and we do the inner model test analysis at figure 4 to measure the structural model between latent variables [31]

![Figure 3. Measurement Model Method to Test the Indicator Validity and Reliability for Its Individual Latent Variable](image-url)
To validate each indicator of each latent variable, we then do the loading factor measurement of each indicator. A good validity of each indicator for the loading factor must be above 0.6 for each indicator, Average Variance Extracted (AVE) must be above 0.5 and Cross Loading factor must be above 0.7 [31]. While for the model to be considered as reliable must meet several criteria such as Cronbach’s alpha above 0.7 and composite reliability above 0.7. As for the structural model [31] suggests that R Square must be above 0.75 to indicates the strength of the model and t-value above 1.96 and significance level below 5%.

Through our research, there are 2 indicators that fall below 0.6 loading factors threshold; therefore, these two indicators are not valid and neither reflect or explain its latent variables. As for other indicators we find that the Average Variance Extracted (AVE) of each variable is above 0.5 Threshold. As for the validity indicators, we find that Cronbach’s alpha of each indicator is above 7.0 and composite reliability is above 0.7. Therefore through the adjustment in at the outer model earlier, we find that the model is valid and reliable. As for the structural model test, we found that hypothesis 1, hypothesis 2, and hypothesis 3, with the confidence level of 95% we find that t-value is above 1.96% and p-value bellow 0.05. Therefore, this study supports all the hypotheses. The operationalization of the variable can be seen at Table 1 as follow.

**Table 1. Operationalization of Variables.**

| No | Variable                          | Definition                                                                 | Dimension | Indicator |
|----|-----------------------------------|---------------------------------------------------------------------------|-----------|-----------|
| 1  | Entrepreneurial Orientation       | The way the Entrepreneur is looking for any new possibilities or innovation for their Company [23] | Risk-Taking | Perceived risk |

**Figure 4. Structural Model Analysis**
Innovativeness

### Pro Activeness

- Perceived Anticipating Competition

### Competitive Aggressiveness

- Level of offensive move against competition

### Autonomy

- Level of autonomy in jobs

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| 2. Sustainability Competitive Advantage [7] [8] | Valuable Resources | Rare Resources |
|------------------------------------------------|-------------------|---------------|
| Valuable Resources: key resources represent value for exploring market opportunities or assisting the organization in defending itself against environmental threats through an increase in revenue and/or a reduction in spending. | Perceived that technology gives them the advantage of saving fuel. | Perceived that fishermen have unique resources with the use of technology. |
| Rare Resources: key resources are unavailable for other organizations. These resources are very difficult for competitors to acquire. | Perceived that the use of IOT can expand market opportunity. | Perceived that better knowledge. |
3. IOT Capabilities

IOT capabilities imply that firms make strategic decisions more efficiently; namely, by using IOT, these firms can recognize new business opportunities, threat possibilities, and maintain competitiveness [26].

| Imperfectly Imitable Resources | Perceived that IOT can bring efficiency to their work. |
|--------------------------------|-----------------------------------------------------|
| Strategically Irreplaceable (Durable): key resources are difficult to replace with another strategic equivalent. | Perceived that use of technology will become something that is not easy for the competitor to duplicate |
| Environmental Sustainability: the company values environmental sustainability | Perceived that technology will well inform the level of fish stocks |
| Social Sustainability | Perceived that the use of IOT will bring positive impact to environment preservation |
| Perceived level of IOT Capabilities | Perceived that the use of IOT will bring benefit to the workers |
| | Perceived that the use of IOT would bring positive impact to nations |
5. Conclusion
The research concludes that IOT capabilities positively influence sustainable competitive advantage. These results verified the research conducted earlier which indicates similar results where IOT capabilities enable to supports sustainable competitive advantage [9]. The research indicates that the small-scale fishermen expecting the use of IOT will enable them to be sustained as well as gain competitive advantage to win the competition. The research also supports other research conducted in Japan that successfully implement IOT capable equipment in their sea cucumber fishing industry, and resulted in a significant increase of income as well as improving the ecological system [32].

As for hypothesis 2, The research finds out that entrepreneurship orientation positively and significantly influences IOT capabilities. It is found out that the stronger level of entrepreneurship orientation will result in the use of IOT technology for the artisanal fisher. This indicates that the strong entrepreneurship orientation of the artisanal fishers mediated by IOT capable technology would lead to sustainable competitive advantage achievement. The research also finds out that strong willingness from the small scale fishermen in the small village of Binuangeun have a strong willingness to preserve, protect and wisely exploit their sea into a more sustainable common pool resources as well as gaining a significance level of competitive advantage by the use of technology.

Further research must cover more into the social and psychological and social factors of the artisanal fisherman. As suggested by earlier journal who indicates that digital transformation includes a wide range of dimensions not only the technology itself but also the social and psychological factor as drivers to sustainable competitive advantage [33][34].

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