

Assessment of Entrepreneurial Inclination among the Seaweed Operator at Semporna, Sabah Using EAO Model

¹Nurul Hisifbli Ibrahim, ²Abdul Rahman Salli

¹Faculty of Plantation and Agrotechnology/Universiti Teknologi MARA Shah Alam Campus, Malaysia

² Faculty of Plantation and Agrotechnology/Universiti Teknologi MARA Sarawak Campus, Malaysia

Abstract - Seaweed cultivation is an export-oriented aquaculture subsector that is rapidly spreading specifically in South East Asia. Recently, almost all segments of seaweed industry are still facing many obstacles, especially at the level of small-scale farmers' management in the production and processing industry. The most obvious issue is linked to the development of seaweed operators. The main objective of this study is to assess the seaweed operators' attitude towards the entrepreneurial inclination. The survey was conducted among the seaweed operators in Semporna based on entrepreneurial attitude orientation (EAO) questionnaire. The result shows that the adjusted R square (Adj. R²) value is equivalent to 0.301. This indicates that 30.1 per cent of the entrepreneurial intention were explained by the four entrepreneurial attitude subscales; achievement, innovation, personal control and self-esteem. The result exhibits that the achievement, innovation and personal control were statistically significant at 95 per cent confidence interval. Self-esteem shows no significant relationship and thus signifies subscale as did not contribute much to the regression. The EAO factors contributes little to the regression of the entrepreneurial inclination, which indicates that the other factor such as socioeconomic inputs such as skills, knowledge, extension agent, gender and financial roles might include in the future study.

Keywords - Aquaculture, EAO, Entrepreneurial inclination, Governance, Seaweed

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I. Introduction

Seaweed is a lucrative aquaculture industry and recently being recognised by the government under the project of National Key Economic Area (NKEA) as a new agriculture subsector which has high global market potential. Seaweed farming is an export-oriented aquaculture subsector that is rapidly spreading specifically throughout the region of South East Asia. As fisheries are a seasonal occupation, seaweed farming is expected to be one of the major contributors of the fisherman community household income. The worldwide seaweed industry is expected to contribute more than RM 20 billion annually as it is useful in food, health and pharmaceutical industries. Food and Agriculture Organization (FAO) has recognised successful seaweed production in Sabah (Dalli, 1998) as mainly because of its sheltered coastal area in this state is suitable for seaweed farming and production. In particular, it is expected to be able to produce around 150,000 MT of dried seaweed which valued at RM 1.4 billion in year 2020 (PEMANDU, 2010).

However, in recent years, almost all segments of seaweed industry are still facing many obstacles, especially at the level of small-scale farmers' management in production and in the processing industry (Lukanpis & Danny, 2016). For instance, Indonesia and Philippines can produce dried seaweed yield up to 3.2 metric tonnes and 9.5 metric tonnes per hectare per year respectively. Meanwhile, Malaysia can only produce 2.5 metric tonnes per hectare per year. At the same time, the government also invests funds to attract small-scale farmers' and younger generation to engage in farming activities as to shift the currently low yield, low earnings and unproductive farms into high yield and better earnings. Government believes that this goal can only be achieved if the yield and revenue keeps increasing and the market condition is improved. This simply refers to the shift from traditional practice into a commercial-based practice.

Commercialisation is a relatively new effort by the government to transform this industry into a lucrative business entity that benefited the seaweed industry through all channels. For this reason, the government has invested funds for numerous technical research to improve crops and develop new standard operating, new high yield hybrid, new dosage of fertiliser and management to fit the Malaysian condition (Yasir & Ali, 2012). Nevertheless, all of these are a failure in terms of implementing the procedure to maximise the crop productivity (DOS, 2014). According to Rosli, Hussin, & Hossin (2014), this is quite significant within the small-scale farmers' community because of their negative attitude and behaviour towards the introduction of new technology.

In order to fulfil the NKEA objectives, seaweed farmers are encouraged to act as an industry player by venturing into business as an entrepreneur. This recommendation is intended to maximise their earnings, develop experience, expertise and skill in the targeted market. So, the government introduces the seaweed mini-estate project under Economic Transformation Programme (ETP) in order to provide an opportunity for seaweed farmers to improve their yield, income and participation in entrepreneurship. However, for most seaweed farmers, they do not understand the benefit from the government entrepreneurship efforts due to their mentality state of having no confidence in business and attitude towards farming. They possess low entrepreneurial attitude which might be influenced by their poor knowledge and cultures.

The objective of this study is to assess the attitude orientation of seaweed operators towards the entrepreneurial inclination in Semporna, Sabah. Moreover, it is important to include the target group opinion in developing this industry while the government tries to enhance it. Therefore, the prediction study of entrepreneurial attitude can provide further information with respect to catering future development of seaweed industry.

II. Literature Review

Entrepreneurial Attitude Orientation

Since entrepreneur is a human, the studies have made use of psychological determinants to explain the entrepreneur behaviour or attitude. It is known that the measurement involving entrepreneurs is frequently adopted the measurement of characteristics and personality traits as the main study determinant. Purzer, Fila, & Nataraja (1996), has made a review on the literature and he found that almost 51 tools are used in examining the entrepreneurial characteristics and more than half of it focused on skill assessment, and only one-third focused on the entrepreneurial attitude.

Theory of Planned Behaviour (TPB) is an important theory in studying human behaviour. Indeed, this theory is very flexible and/or able to be adapted to all kinds of fields which make it very popular in those research involving human. Although TPB theory is very significant in the study of decision making and intention, Robinson, Stimpson, Huefner, & Hunt (1991) believed that there is a need for a special mechanism or tool to study entrepreneurship. He proposed that the study of entrepreneurship should be based on characteristics represented by the entrepreneurship component. This is supported by Ajzen & Madden (1986), who expresses that the tools that developed by applying the attitude orientation will lead more variance in an individual's behaviour.

Therefore, Robinson *et al.* (1991) has emphasised that the study on entrepreneurs should be using attitude measurement because he found that the measurement that uses characteristic and personality traits was less stable and susceptible to change. Traindis (1971) explained that the cons of using characteristics instrument are probably because of its changing across time and situation through an interactive process within the environment. Subsequently, Robinson *et al.* (1991) developed Entrepreneurial Attitude Orientation (EAO) scale specifically to be used to measure the feature of an entrepreneur in response to those critiques mentioned above. Initially, the main objective of this EAO development is to test and determine and testify the hypothesis of 'the

attitude measurement has higher validity than personality traits or characteristic instrument among the entrepreneurs and non-entrepreneurs'. He identified four personality constructs that have been commonly used in research in entrepreneurs; which are achievement, innovation, personal control and self-esteem. Then, he combined these four sub-scales with the attitude components as proposed by Allport (1935). In fact, the construction of EAO scale was based on the tripartite model of attitude (Beckler, 1984), which has incorporated cognitive, affective and behaviour dimensions.

The EAO has several advances in terms of its item measurement which consists of theoretical and tripartite model that based on entrepreneurial domain. EAO is also appeared to be the most reliable and the only theory-based entrepreneurial orientation scale that used to study various types of subjects such as education (Ismail, Jaafar, & Tan, 2013), agriculture (Mohd Shariff & Samsudin 2008), and firm performance (Choe & Loo, 2013).

Entrepreneurial in Seaweed study

Entrepreneurial attitude studies are a popular research field in Malaysia to predict Malaysian attitude in venturing the business field and helping to develop new mechanism, specifically in the educational sector. The entrepreneurship development is undeniable for empowering the community by providing them with education, training and skills, and also strengthening the value of entrepreneurship-oriented personality which later will help to build a dynamic entrepreneurial personal character (Shabuddin, 2012). However, most entrepreneurial attitude studies in Malaysia are focusing on semi-medium enterprises. This present study is well aware that the studies which associated with seaweed entrepreneurial are very few and not a popular topic. Thus, this literature review will also include studies that are not in common with the seaweed studies, but had used similar entrepreneurial attitude or behaviour as its research topic in order to gain a better understanding about the entrepreneurial studies.

In South Sulawesi, Indonesia, the entrepreneurial studies among seaweed farmers have been conducted specifically on the entrepreneurial characteristics by Shabuddin (2012). The hypothesis was tested using the 'structural equation modelling' to model the framework of causal relationships between the identified variables. The study found that commitment is more to be seen as the dominant factor than achievement-motivation in the entrepreneurial assessment. While, the entrepreneurs' self-efficacy either directly or indirectly affects the entrepreneurial commitment. He further added that the enrichment of self-efficacy and achievement motivation factors among the farmers is very essential in order to flourish the seaweed industry in the region.

Another study done by Syafiyuddin & Jahi (2007) has analysed the relationship between personal characteristics and entrepreneurship competencies among the seaweed operators in South Sulawesi. Its objective is to determine the individual characteristics and seaweed operators' entrepreneurial competency level. The result indicates that the farmers' age have high impact on the competency classification such as harvesting activities, communication and motivation, and cultivation activities. Besides, the characteristics such as planning the farm activities, post-harvest activities, monitoring, evaluation, and management activities were also having a low relationship. The study discovered that the entrepreneurial competencies have significant relationship with the individual characteristics such as formal education, training, social capital, financial capital, land, and motivation. In addition, it also affects the increment of seaweed production and farmers' income.

As mentioned earlier, the literature related to seaweed entrepreneurial topic is rarely discussed, thus this review also includes the study from other industries as well. Since seaweed farmers are believed to be very similar with fishermen occupation, it is deemed appropriate to include this study in the literature of the present study. Mohd Shariff, Ali, & Rahman (2006) has conducted a study related to the entrepreneurial attitude. Its objective is to examine the entrepreneurial attitude orientation (EAO) between managers and non-managerial in fisherman's associations at three places in Setiu, Kuala Kedah, and Tumpat. The finding shows that the subscales such as achievement, personal control and self-esteem to be attributive to significant differences towards venturing business. The innovation subscale did not show any significant differences between these two study groups. This study concluded that the managerial group as more motivated to be an entrepreneur and venture in the business.

III. Methodology

This study was conducted in Semporna, Sabah- the most eastern part of Malaysia. The entrepreneurial study is seen as an interaction of individuals with their socioeconomic and environment. Therefore, for this study, face-to-face interview method was recognised as the best method to capture the meaning and understanding of seaweed operators. The population sample size was calculated using the Yamane formula (1969) which involved 81 respondents. The questionnaire design was mainly adapted and modified from various studies done by Robinson *et al.* (1991); Mohd Shariff *et al.* (2006); Lope Pihie & Bagheri (2011). The questionnaire only adopted 31-items when considering the constraints in terms of level of understanding among the seaweed operators. The items were carefully chosen so that it included all of the four subscale statements. The original ten-point Likert scale was also modified into five-point Likert scale.

IV. Result and Discussion

In Malaysia, fishermen and farmers are consistently experienced the highest poverty incidences among other sectors. Seaweed industry is categorised as one of the aquaculture enterprise. Therefore, it is common for an individual working in the aquaculture is referred as fisherman. In Table 1, it shows that seaweed industry is dominated by male (76.5%) due to the nature of seaweed farming which is laborious and most farms are still engaged with the traditional cultivation method. This finding is supported by Sunanji (2013) where he found that seaweed farming involves significant amount of work that need extra labour-hours. However, women involvement is still present which indicates that this occupation can be comprehended by both gender if they choose to do so.

It is unsurprisingly when the data shows that the majority of seaweed operators' age is actually between 30-39 years old (34.6%). The result is similar with a study conducted by M. Nor *et al.* (2016) where they found that this age category is the most common in seaweed farming in Semporna. Ali *et al.* (2015) has explained that the younger individuals like to seek off-farm occupation because it offers higher income and has better working conditions when compared to seaweed farming.

The result shows that the inexperience group (less than 10 years) has dominated the seaweed farming (Table 6.2). The finding is similar with the result shown by a previous study of Irmayani *et al.* (2015), where they found that less experienced (3 to 10 years) group is also dominant in seaweed farming at Mallasoro Jeneponto, Indonesia. The present findings might be explained by some of the respondents who are fishermen, and they recently involve in seaweed farming as their secondary income generation. This has been acknowledged by Sade, Ali, & Mohd Ariff (2006) who claimed that the seaweed farming is regarded as an effective way to improve fishermen's income, elevate their social mobility or at least eradicate poverty.

Table 1 Descriptive results of socio-demographic for the seaweed operators

Variables	<i>n</i>	Percentage (%)
Gender		
Male	62	76.5
Female	19	23.5
Age group		
Below 29 years old	5	6.2
30 to 39 years old	28	34.6
40 to 49 years old	21	25.9
50 years old and above	27	33.3
Education level		
No formal education	20	24.7
Primary school	42	51.9
Secondary school	19	23.5
Marital status		
Married	78	96.3

Divorcee/Widowed	3	3.7
Other occupation		
Fishermen	40	49.6
Seaweed Operators	22	27.2
Farmer	8	9.9
Business owner	7	7.4
Others	5	6.2
Household income		
RM 300 to 500	26	32.1
RM 501 to RM 701	36	44.4
RM 702 to RM 902	19	23.5
Experience in seaweed cultivation		
Less than 10 years	42	51.9
10 to 15 years	27	33.3
16 years and above	12	14.8

Note: N = 81 respondents

According to the result, more than half (51.9%) of the seaweed operators had barely high education. Their level of education is merely at primary level which indicates their low ability to find employment within other off-farm jobs. In this present study, the low level of education is consistent with the previous findings by Zamroni & Yamao (2012), who reported that the primary schooling is higher among the seaweed operators in Laikang Bay, Indonesia. The low-level education in seaweed setting might be reflecting the perception of some seaweed families where they regarded education as expensive and unimportant. This is further explained by Kronen (2013) findings when they suggested that the seaweed family sometimes made their children to assist in their farming works rather than going to school.

It is predictable when the results show that the majority of respondents are married. There are about 96 per cent of respondents who are married, and the rest either divorced or widowed. Kronen et al. (2010) agreed that the seaweed farming is a family-based employment, where the involvement of family members to assist in the farming process is considered as very crucial. According to a previous study conducted by Romero (2002), the involvement of all family members is suggested to be a requirement as it reduces the paid labour dependency, farming cost, and increases the farm productivity. Consequently, the involvement of members in seaweed farming can secure a better earning for the whole family.

Besides, the main occupation for most seaweed operators in the study area is fishermen (49.6%). This finding is similar to the study conducted by Zamroni & Yamao (2012) which has reported that seaweed farming as complement to fishermen occupation. Sade et al. (2006) further added that the seaweed farming currently serves as the second occupation, which is usually done during the fishing off-season because of fishing seasonal dependency. Fishermen are also found to be interested to venture in the seaweed farming because of its similarity with their current occupation. Additionally, they also do not have to spend much time to learn new skills and can easily adapt to seaweed farming because of their familiarity with the sea-setting and their affiliation to the fishing task.

Lastly, the result shows that the income from seaweed farming is quite low. The seaweed operators only managed to earn between RM 300 to RM 902 per month. Based on the result, it can be concluded that the seaweed farming still belongs to the poorest income group. According to EPU (2015), household that earn less than RM 630 monthly in Sabah are categorised as the extreme poor income group. In addition, these findings found that the low level of education also associated directly with the low-income generation because most off-farm jobs require proficiency and know-how. Those with higher education can manage the farm efficiently; therefore the production of high seaweed yield is seen as possible. They are more likely to adopt recent technology and able to negotiate better selling price as suggested by Kronen et al. (2013). Lower earnings are among the reasons why they are reluctant to expand their seaweed farm size.

EAO Factorial Analysis

The accuracy of the data was tested by using Kaiser-Meyer-Olkin (KMO) analysis. The KMO is an important analysis to go through before performing factor analysis because it tests the adequacy of the sample collected for this study. The KMO in Table 2 shows that a score of 0.763, which according to Kaiser (1974) is

acceptable for conducting the factor analysis. The reliability test of Cronbach's alpha was also conducted for all items. Overall, the sample shows that the average coefficient value of EAO statements is 0.835. For each of entrepreneurship factor, the reliability analysis ranged from 0.689 to 0.845 which indicates that the data as being reliable and consistent.

Table 2 Results of sampling adequacy and reliability for the EAO scales and Entrepreneurial Inclination

Construct	No. of items	KMO	Cronbach's Alpha
EAO	18	0.763*	0.835
Achievement	7	0.831*	0.845
Innovation	5	0.768*	0.815
Personal Control	3	0.701*	0.698
Self-Esteem	3	0.681*	0.689
Entrepreneurial Inclination	4	0.795*	0.857

*significant at 5% level

Note: N = 81 respondents

Table 3 shows the construct for four EAO and entrepreneurial inclination statements. The dimensions of the scale were examined by factor analysing the items using the principal components analysis with Varimax rotation method. By considering the original factor EAO (Robinson *et al.*, 1991), the extract factor was set on four factors. Interestingly, when the factor is fixed to four factors, all statements were placed within their group as suggested by Robinson *et al.* (1991). Initially, the questionnaire has adopted 31-components, but after checking for anti-image correlation, those with value less than 0.5, was deleted from subsequent analysis. In the end, there were only 18 components considered for factor analysis, and these components were reduced into four factors. The entrepreneurial inclination components show higher factor loading and the Varimax rotation was not carried out because only one component was extracted.

Table 3 Construct for the EAO¹ scales and Entrepreneurial Inclination²

	Item	Factor loading	Mean
Achievement			
C22.	Believe that one key to success is to not procrastinate	0.832	3.44
C3.	Feel good when I have worked hard to improve my business	0.814	3.64
C2.	Feel proud when I look at the results I have achieved	0.752	3.62
C13.	Do every job as thoroughly as possible	0.725	3.43
C1.	Get my biggest thrills when my work is the best there is	0.689	3.79
C11.	Never put important matters off until a more convenient time	0.679	2.77
C23.	Think that to succeed, you must eliminate ineffectiveness	0.613	3.32
Innovation			
C15.	Usually take control in unstructured situations	0.879	2.72
C4.	Get excited when I am able to approach tasks in unusual ways	0.853	3.19
C5.	Get real excited when I think of new ideas to stimulate my business	0.822	3.00
C25.	Believe it is important to continually look for new ways to do things in business	0.720	2.88
C16.	Often approach business task in unique ways	0.669	2.85
Personal Control			
C7.	Feel very good because I am ultimately responsible for my own business success	0.845	3.54
C8.	Get excited creating my own business opportunities	0.799	3.33
C17.	Always worked hard in order to be among the best in my field	0.752	3.11
Self-Esteem			
C31.	Believe it is important to make a good first impression	0.820	3.44
C30.	Believe successful people handle themselves well at business gatherings	0.816	2.86
C19.	Usually perform very well on my part of any business project I am involved with	0.701	3.12

Entrepreneurial Inclination			
E3.	Would like someday to start my own business	0.867	2.93
E1.	Seriously considered entrepreneurship as a highly desirable career option	0.840	2.81
E2.	Have the planning for opening a new venture	0.826	2.73
E4.	Could easily pursue a career involving self-employment	0.821	2.89

Note: N = 81 respondents

¹Rotation fixed into four factors

²No rotation were carried out due to only one component extracted

Multiple regression analysis

The multiple regression analysis was applied in order to assess the relationship between the independent variables (EAO) and dependent variable (EI). In Table 4, the Durbin-Watson test of 1.518 indicates that the regression model does not have multicollinearity problem. The adjusted R square (Adj. R²) value is equivalent to 0.301. This indicates that only 30.1 per cent of the entrepreneurial intention can be explained by the four entrepreneurial attitude subscales which are achievement, innovation, personal control and self-esteem. Adjusted R² is low describing the factors that might influence the entrepreneurial intention that had been excluded in this study combination. Although low in relationship, the value of F (4.76) = 9.615 p=0.000 shows a significant influence for both variables. The result exhibits that the achievement, innovation and personal control were statistically significant at 95 per cent confidence interval. Self-esteem shows no significant relationship and thus signifies subscale as did not contribute much to the regression.

Self-esteem among individual is important because it affects one's determination to achieve goals in their life. In this study, the self-esteem factor among the seaweed operators has a positive sign, but insignificant towards the entrepreneur inclination. The findings presented here is in contrast with those found by Ismail et al. (2013), in which they have reported that the high self-esteem individuals were likely to be entrepreneur or self-employed. The present findings also contradict with the study done by Mohd Shariff & Saud (2009), which showed that the self-esteem factor manages to influence the entrepreneurial attitude significantly. Another explanation might have to do with the respondents' lacking of self-belief and confidence in businesses or farm management is due to their low education level. In most cases, education or informal training have strong influence over the self-esteem among the rural community. This statement has been demonstrated in the study by Ndirangu (2016) who asserted that education does help to increase the farmers' ability to recognise opportunity and improve skill. They are triggered to develop their self-confidence and therefore steer to enhance their competency levels.

Table 4 The multiple regression for EAO and EI

Variables	Coefficients
Constant	-0.306
Achievement	0.312 **
Innovation	0.254 **
Personal Control	0.299 **
Self-Esteem	0.165
R ²	0.336
Adjusted R ²	0.301
ANOVAs F Value	9.615 *
Durbin-Watson	1.518

*Significant at 1%

** Significant at 5% level

The achievement factor has showed a significant influence over the entrepreneurial inclination which indicates that there are high achievement levels among the seaweed operators. Similarly, Collins, Hanges, & Locke (2004) found that the achievement as a very important attitude because it is able to predict the individual's entrepreneurial activities accurately. The interpretation might be justified through their perceived view of seeing seaweed farming as laborious. Regarding to this, they must possess high motivation and achievement commitment if they persist to work in the farm. According to Shabuddin (2012), the motivation-achievement is a major factor in seaweed farming because it can influence entrepreneurial commitment.

Additionally, most respondents are less educated and have limited skills to work on other occupations, so they will strive to motivate themselves because they are eager to increase seaweed yield as to get more money (achievement). In contradiction with the study done by Ismail et al. (2013), they found that the respondents who made high achievement were uninterested to be self-employed and tended to choose to be employed at a larger organisation. Indeed, high achiever individuals are more opportunists and have a passion to build on their career in an established company, which also offers them higher starting salary compared to entrepreneurship. As in the earlier discussion, the situation of young and well-educated individuals accepting the job offers is very common as it will serve them better opportunity to improve their social mobility.

Even though the innovation definition can be various, but for this study, it is referring to the ability to innovate or to adopt the technology and practices towards seaweed farming. Table 4 shows that the innovation factor is also contributing to the entrepreneurial inclination among the seaweed operators in the study area. In the study by Ismail et al. (2013), they found that the innovation as one of the significant factors in the entrepreneurial attitude. In this study area, the respondents have been observed and they seemed to be willing to adopt the technology introduced by the related agencies. For example, they planted their farm with the new seaweed varieties, practised new cultivation methods, and experimented with the tools and mechanisation. This attitude proves that they are willing to change their common practices, even though they are well aware that it will increase farming cost in future. A study conducted by Ali et al. (2015) has showed that they are eager to adopt new technology in their seaweed farms as this will increase their seaweed production. This is strengthened by Lunkapis & Danny (2016) findings which proved that the local seaweed operators in Tun Sakaran Marine Park were willing to try new technology but displayed slower adaption of the new changes. Therefore, the present findings are appropriate and relevant to explain the willingness to adopt technology advancement in seaweed farming (innovation). On the other hand, Rosli et al. (2014) has claimed that seaweed operators are not interested to adopt the technology that has been introduced to them. It is undeniable that the decision to adopt technology will increase profit in long run, but at the initial stage it will increase the farm operational cost. That is why they are not attracted to apply new technology in their farming skills.

The personal control or known as locus of control reflects one's beliefs on how far they are able to influence the outcomes or their success. The result has showed that personal control is significant among seaweed operators. Therefore, as suggested, when their personal control increase, the inclination towards entrepreneurship will also increase proportionally. This is similar with the study conducted by Bulut & Sayin (2010) where they found that those individuals with high personal control are likely to become an entrepreneur. Significantly, those who want to be a decision maker must possess higher confidence, stronger mental focus and well aware of what and where the decisions will turn them to. In the study area, the increasing of inner-thought level might elevate their ability or motivate them to produce better yield for selling purposes. In particular, personal control is influential over human attitude and it is reflected when the individual becomes motivated to take an action towards success. On the other hand, Mekonnen & Gerber (2015) has linked the personal control association with aspiration and innovativeness. This might be the reason for both personal control and innovation factors to be significant in the regression, which then indicating a successful entrepreneur possess higher confidence, ability, and adaptability of new technology.

V. Conclusion

The EAO scale is the measurement tool that is widely used in the entrepreneurial attitude studies. This present study validates that the EAO can be used in the aquaculture setting especially in seaweed farming. The factorial analysis indicates that EAO subscale such as achievement, innovation, personal control and self-esteem are reliable in the seaweed farming context. On the other hand, the EAO scale is used to analyse the effect of attitude towards the entrepreneurial inclination. The result shows that the entrepreneurial factor is inadequate to influence the entrepreneurial intention among the seaweed operators in Semporna. However, it does proved that the other three factors namely, achievement, innovation and personal control are influential over the entrepreneurial inclination among the seaweed operators. According to the result, the EAO factors do not contribute much to the regression of the entrepreneurial inclination which indicates that other factors, for instance, socioeconomic inputs should be added to the study investigation. In future, the other factor such as socioeconomic inputs such as skills, knowledge, extension agent, gender and financial roles should be included in the study. The related agencies must get involved and concerned with the seaweed operators' opinions and problems. This will help the agency to develop the programme that can be beneficial for Malaysian seaweed industry.

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