

STRUCTURAL ANALYSIS AND PROTOTYPE MODEL TESTING OF
OFFSHORE FLOATING STRUCTURE FOR AQUACULTURE
SEAWEED OCEAN FARMING

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**STRUCTURAL ANALYSIS AND PROTOTYPE MODEL TESTING OF
OFFSHORE FLOATING STRUCTURE FOR AQUACULTURE SEAWEED
OCEAN FARMING**

MUHAMMAD ILHAM BIN ABDUL RAZAK

**A thesis submitted in partial fulfillment of
the requirements for the award of the degree of
Bachelor of Applied Science (Maritime Technology)**

**DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND SCIENCE MARINE
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2012



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**DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT**

It is hereby declared and verify that this thesis entitled:

STRUCTURAL ANALYSIS AND PROTOTYPE MODEL TESTING OF OFFSHORE FLOATING STRUCTURE FOR AQUACULTURE SEAWEED OCEAN FARMING by **MUHAMMAD ILHAM BIN ABDUL RAZAK**, Metric No. **UK 17468** has been examined and all errors identified have been corrected. This thesis is submitted to the Department of Maritime Technology as partial fulfilment towards obtaining the Bachelor Degree of Applied Science (Maritime Technology), Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

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DECLARATION

I hereby declare that this thesis entitled **STRUCTURAL ANALYSIS AND PROTOTYPE MODEL TESTING OF OFFSHORE FLOATING STRUCTURE FOR AQUACULTURE SEAWEED FARMING** is the result of my own research except as cited in the references.

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STRUCTURAL ANALYSIS AND PROTOTYPE MODEL TESTING OF OFFSHORE FLOATING STRUCTURE FOR AQUACULTURE SEAWEED OCEAN FARMING

ABSTRACT

Seaweed farming has become one of the natural resources which are economically important for Malaysia. Since the government introduced the National Key Economic Area (NKEA) on September 2010 seaweed production is included with the mission to produce seaweed up to 1 million metric tons per year. Ever since 1978, Sabah is the main seaweed producer in Malaysia and most of the total production is farmed off the coast of Semporna, which is located in the east coast of Sabah. What makes it less suitable to be developed in peninsular is because of the existing cultivation systems for seaweed is not suitable with most of deep and open water area in peninsular. Moreover, the existing cultivation systems are less sustainable on environment and economics. The significance of seaweed apart from their vital role in providing high value food, they also can be used for resources of gels and chemicals used in everyday commodities. In order to maintain the competitiveness of Malaysia seaweed production in global market, certain strategic action in ensuring product need to be implemented. Therefore, other cultivation system which is suitable in peninsular has to be developed in order to support the production and meet the required target. The purpose of this research is to create a design of the offshore floating structures scientifically based on improvement of the existing Long Line System for commercializes scale seaweed farming in Peninsular Malaysia. Some key factors in the design, prototype and testing of floating offshore structures need to be considered for the development of ocean farming. This topic covered range from static and dynamic responses study, transient response, maximum loading and floating structure interaction force regarding spectral modelling approaches.

ANALISIS STRUKTUR DAN UJIAN MODEL PROTOTAIP STRUKTUR TERAPUNG UNTUK PERLADANGAN RUMPAI LAUT LUAR PESISIR

ABSTRAK

Perladangan rumpai laut telah menjadi satu sumber asli yang penting dari segi ekonomi untuk Malaysia. Sejak kerajaan memperkenalkan National Key Economic Area (NKEA) pada September 2010, rumpai laut adalah termasuk dengan misi pada hasil rumpai laut sehingga 1 juta tan metrik setiap tahun. Sejak 1978, Sabah ialah pengeluar rumpai laut utama di Malaysia dan kebanyakan daripada jumlah pengeluaran adalah dari daerah Semporna, yang terletak di Timur perairan Sabah. Sistem penanaman yang wujud di Sabah adalah tidak bersesuaian dengan kawasan perairan di semenanjung. Tambahan pula, sistem penanaman yang wujud masih kurang mampan untuk persekitaran dan ekonomi. Kepentingan rumpai laut selain peranan dalam menyediakan makanan yang berkualiti tinggi, mereka juga boleh digunakan untuk sumber-sumber gel dan bahan kimia yang di gunakan dalam komoditi-komoditi harian. Bagi mengekalkan daya saing pengeluaran rumpai laut Malaysia dalam pasaran global, tindakan strategik dalam memastikan keperluan produk perlu dilaksanakan. Lantarnya, penanaman lain yang sesuai di semenanjung perlu dibangunkan supaya menyokong pengeluaran dan memenuhi sasaran. Tujuan penyelidikan ini ialah untuk mewujudkan satu reka bentuk struktur terapung luar pesisir secara saintifik berdasarkan prinsip “Long Line System” yang telah wujud untuk mengkomersialkan perladangan rumpai laut berskala besar di Semenanjung Malaysia. Beberapa faktor utama dalam reka bentuk tersebut, prototaip dan ujian terapung bagi keperluan struktur luar pesisir dan pembangunan perladangan di laut. Topik ini meliputi kajian terhadap statik dan dinamik responses, fenomena semulajadi, pemuatan maksimum dan interaksi struktur terapung melalui pendekatan model spectrum.