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## ABOUT

### Singapore Management University (SMU)

A premier university in Asia, the Singapore Management University (SMU) is internationally recognised for its world-class research and distinguished teaching. Established in 2000, SMU's mission is to generate leading-edge research with global impact and produce broad-based, creative and entrepreneurial leaders for the knowledge-based economy. It is known for its interactive and technologically enabled pedagogy of seminar-style teaching in small class sizes.

Home to over 8,300 undergraduate and postgraduate students, SMU comprises six schools: School of Accountancy, Lee Kong Chian School of Business, School of Economics, School of Information Systems, School of Law and School of Social Sciences, offering a wide range of bachelors', masters' and PhD degree programmes in various disciplines.

With an emphasis on generating rigorous, high-impact, multi-disciplinary research that addresses Asian issues of global relevance, SMU faculty members collaborate with leading international researchers and universities from USA, Europe, China and India as well as with partners in the business community and public sector through its research institutes and centres. SMU's city campus is a state-of-the art facility located in the heart of downtown Singapore, fostering strategic linkages with the business and wider community.

### **Copenhagen Business School (CBS)**

Copenhagen Business School was established in 1917 and became integrated as an institution of higher education in the Danish education system in 1965. Today CBS is one of the largest business schools in Europe with close to 20,000 students.

CBS offers world-class research-based degree programmes at undergraduate, graduate and PhD levels as well as executive and other post experience programmes. The business school creates and provides original and relevant knowledge through publishing, participation in the public debate, consultancy and our expert database Experts@CBS.

CBS develops and shares knowledge in partnership with other universities, enterprises and organisations and contributes to the development of business and society.

MPA is pleased to support SMU's MEC initiative as it further **contributes** to the **development of Singapore** as an **international maritime centre.** 

Mr Andrew Tan Chief Executive Maritime Port authority of Singapore (MPA)

### **Maritime Economics Concentration**

The Maritime Economics Concentration (MEC) is a maritime-focused cluster of courses within the Economics major, designed to give students a distinctive preparation for maritime-related roles in industry and government organisations such as the Maritime and Port Authority of Singapore (MPA). Building on the foundations established in the major, the MEC develops essential knowledge and contextualised skills relevant for analysis of economic issues in the maritime sector.

An important distinguishing feature of the MEC is that academic courses are complemented in a variety of ways that make the concentration a fully comprehensive preparation for careers in the maritime sector. MEC students will have access to industry scholarships and experiential learning opportunities including industry study missions, site visits, local and overseas internships and non-credit courses presented by industry professionals.



### FOREWORD

The Maritime and Port Authority of Singapore (MPA) is the agency championing Singapore's development as a global premier hub port and international maritime centre. Today, Maritime Singapore comprises more than 5,000 maritime establishments providing employment to over 170,000 people. The maritime ecosystem, which is made up of shipping, port, maritime services as well as offshore and marine engineering sectors, collectively contributes about 7 per cent to our Gross Domestic Product.

As MPA continues to grow Maritime Singapore, developing competent maritime manpower across wideranging backgrounds and skills-sets will be instrumental in addressing the industry's diverse manpower needs. Working closely with key institutes of higher learning to establish a wide suite of maritime programmes forms part of the foundation of MPA's manpower development strategy. The Maritime Economics Concentration (MEC) is one such example, that demonstrates the strong partnership between MPA and Singapore Management University (SMU) in enhancing our local maritime education and training landscape.

MPA recognises the value of experiential learning and supports the various MEC industry study missions that seek to inculcate a global mindset and introduce a practical perspective of shipping amongst students.

In the increasingly competitive global maritime landscape, knowledge and innovation will be key to shaping and preparing Maritime Singapore to be future-ready. I take this opportunity to congratulate SMU on grooming the next generation of maritime talent. I wish both incumbent and future MEC students every success in their journey as they embark on fulfilling maritime careers.

Mr Andrew Tan Chief Executive Maritime and Port Authority of Singapore





### WORDS FROM THE ACADEMIC DIRECTOR

With a rich and thriving maritime economy, Denmark is one of the world's leading shipping nations. The country offers a plethora of learning opportunities for students aspiring to succeed in the maritime industry. The Industry Study Mission to Copenhagen is therefore a crucial component for students in the Maritime Economics Concentration at SMU. As many multinational shipping corporations have established themselves in Denmark, students on the study mission had the opportunity to visit their operations and learn how they developed into world-class organisations.

Moreover, interaction with industry experts serves as a platform for students to develop and formulate new ideas and thereby contribute to the development of Singapore as an international maritime centre. Knowledge sharing and talent development was the primary objective of the Industry Study Mission to Copenhagen. Our students returned from the study mission enriched and better equipped to meet the needs of the maritime industry.

We would like to specially thank Ambassador Berit Basse of the Royal Danish Embassy in Singapore, Professor Per Holten-Anderson (President), Associate Professor Dorte Salskov-Iversen (Vice President of International Affairs), Associate Professor Henrik Sornn-Friese (Academic Director, MSc. Program in Economics and Business Administration), Associate Professor Martin Jes Iverson (Academic Director, BSc IB GLOBE& BSc IBEngAGE) and Ms Julia W. Jensen from the Copenhagen Business School for their gracious support in making this maiden trip a success. We would also like to thank our gracious hosts - A.P. Moller Maersk Group, Baltic and International Maritime Council (BIMCO), Blue Water Shipping, Danish Shipowners' Association, FORCE Technology, Oil Gas Denmark, Port of Esbjerg, Semco Maritime, Svendborg International Maritime Academy (SIMAC) and the Technical University of Denmark (DTU). The support provided by our industry partners was paramount in ensuring the success of our study mission. Their confidence and commitment to our mission will ensure that the next generation of maritime talent will continue to be equipped to meet the constantly evolving challenges of the sector.

**Dr. Annie Koh** Vice President, Office of Business Development Associate Professor of Finance

Lee Kong Chian School of Business



### WORDS FROM THE DEAN

In May of this year, a group of 15 SMU students were given the opportunity to spend two weeks studying the Danish maritime industry first-hand. The students were from the inaugural intake of students in the Maritime Economics Concentration (MEC), a programme launched in the 2013-14 academic year to prepare talented and well-trained professionals for careers in Singapore's own maritime industry. The MEC is designed to prepare graduates ready for the world of business: combining the analytical underpinnings of an Economics major, the Concentration offers a set of courses dealing specifically with maritime-related subjects, and a range of hands-on experiences that together give our students an invaluable immersion in industry operations.

As you will see in this report, the Industry Study Mission – Copenhagen is an excellent illustration of this realworld immersion, providing our students with an exceptional experience: a comprehensive, on-the-scene overview of the Danish shipping industry combined with first-hand observation and practical engagement.

The ISM – Copenhagen is one of the benefits to SMU students arising from the partnership between the Copenhagen Business School and SMU's School of Economics and International Trading Institute, and has been greatly assisted by the generous support of Singapore's Maritime and Port Authority. In fact, ISM – Copenhagen is a preview of bigger things to come. Starting in the 2015-16 academic year, a group of MEC students will spend an entire semester at Copenhagen Business School, while SMU will host a reciprocal semester-long visit by CBS students. This special experience will help to promote Singapore-Denmark cooperation, assist our students as they develop their international maritime networks and provide them with a world-ready start to their maritime careers.

Professor Bryce Hool Dean, School of Economics

## INTRODUCTION

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Denmark is a sovereign state in Northern Europe. It lies southwest of Sweden and south of Norway, with Germany to its south. The Danish merchant fleet, the world's 18th largest, constitutes 3% of global shipping, and moves 10% of global cargo, making Denmark one of the world's leading maritime nations.

On 3 May 2014, students from the new Maritime Economics Concentration embarked on a study mission to Copenhagen Business School in Denmark. The delegation consisted of students from both the School of Economics and the Lee Kong Chian School of Business, providing it with the dual perspective necessary to analyse the Danish maritime model for lessons which could be applied to Singapore's own maritime sector.

During the 14-day trip, the students were exposed to the different areas of the maritime sector and gained a practical education in various aspects of the maritime value chain. The programme included visits to a number of global companies such as A.P. Moller Maersk and BIMCO, the Baltic and the International Maritime Council.

reflection sections of the report.

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This report provides a summary of the insights gained by the students; it also marks the first step towards achieving the main aims of the Mission - to review the application of knowledge, as represented in the



Danish Shipowners' Association

## THE DANISH SHIPOWNERS' ASSOCIATION

### A TRADE AND EMPLOYER ORGANISATION



As its name suggests, the Danish Shipowners' Association is a Copenhagen-based trade and employer organisation, representing more than 40 shipowners, port facilities and other associated members. Approximately half of the Association's members own Danish-flagged vessels; the other half run their operations in Denmark, using vessels registered elsewhere.

### Overview of the Danish Shipowners' Positive Trends in the Danish Maritime Association (DSA) Industry Despite Disappointing Economic Growth

The student team was privileged to speak with the director of Danish Shipowners' Association, Mr. Jacob Clasen, who explained to us the pivotal role played by the DSA.

In essence, the DSA lobbies for shipowners' business interests and regulatory development in the international arena, to secure the best possible operating strategies for Denmark, as well as defend its position as one of the world's leading shipping nations.

Their role in the domestic Danish shipping scene is best illustrated by the establishment of the Danish International Shipping register. Created by Act of Parliament in July 1998, the register exempts crews on Danish-registered ships from tax. This is an important factor as it lowers the overall costs of crew salaries. This has led to an increase in Danishflagged vessels as companies are able to make use of the country's skilled labour pool while maintaining their cost competitiveness. Danish shipowners are also allowed to hire crews not subject to Danish national collective agreements but on international competitive terms.

### **Trends in Danish Shipping**

The Association has over the years seen its membership expand to include foreign firms, especially from Denmark's Nordic neighbours. There has also been an increase in the number of offshore wind energy, supply and stevedore, oil rig and transport companies in the Association. The broad range of activities represented by the DSA is a sign of its inclusive nature and its growth in the regional shipping economy. In an era of global competition, Denmark faces intense competition from Asia. This era also however presents new potential opportunities for business and cooperation arising from innovation, enabling the industry to take the next step forward. Despite sluggish global economic growth since 2007, the Danish shipping industry has, with the exception of 2009, led the way for the Danish business community. In 2010, Danish shipping recovered rapidly from its losses in 2009, to post record foreign exchange earnings of DKK 195Bn and 201Bn in 2012 and 2013 respectively.

These figures amount to slightly less than 20 per cent of total Danish exports for those years and more than 50 per cent of Danish services exports. Shipping thus continues to be Denmark's leading export industry by a large margin. The ability of Danish shipping companies to uphold that position can be attributed to their ability to rapidly reconfigure their business models for lower global growth, and increase cost effectiveness despite the failure of economic growth to pick up as forecasted in the second half of 2013 and rates at continuing historical lows across most segments.

Shipping is dependent on economic growth, so the fact that the Danish merchant fleet continues to evolve and expand is extremely positive. Supportive national policies facilitating favourable conditions for Danish shipping companies have also helped them to maintain their current position as some of the world's most competitive shipping companies.



## A. P. MOLLER MAERSK

A WORLDWIDE SHIPPING AND OIL & GAS COMPANY



A.P. Moller Maersk Group is a Danish multi-national corporation with four core businesses - APM Terminals, Maersk Line, Maersk Oil and Maersk Drilling. Together Maersk Group employs roughly 89,000 people worldwide and generated revenue in excess of USD 48 billion in 2013.

#### **Maersk Line**

Maersk Line is one of the world's largest container shipping companies and contributes approximately half of the Maersk Group's revenue. The company's core business provides transportation services for products ranging from commodities to finished, fast-moving consumer goods. Maersk Line is supported through liner and feeder route services provided by MCC, Safmarine and Seago Line.

A recent vessel sharing agreement (VSA) with MSC marked a major move for the segment. The VSA covers 185 vessels with an estimated capacity of 2.1 million TEU, deployed on 21 routes, and is intended to strengthen cooperation through the sharing of infrastructure networks. Maersk Line and MSC will be able to provide customers with more stable, frequent services, and extend direct services to a greater number of ports. The VSA will also improve overall efficiency in both Maersk Line and MSC networks through better utilisation of vessel capacity and economies of scale. Lower costs and the streamlining of regular services enable the industry to expect growth generation from this cooperative venture.

Handling 625,000 barrels daily from over 80 platforms worldwide, Maersk Oil is a major player in the bunker market. The majority of production originates from the North Sea. Qatar. Kazakhstan and Brazil. The company presently produces one-third of Qatar's oil. In recent developments. Maersk Oil sold its ownership share in the Brazilian Polvo field to the operator. After buving stakes in three fields for USD 2.4 billion in July 2011, the company decided to take impairment on them following appraisal drillings which registered lowerthan-expected yields, combined with factors including higher development costs and lower oil prices.





#### **APM** Terminals

APM Terminals operates a global terminal network comprising 65 ports and terminal facilities in over 40 countries. The company provides maritime services including port management facilities and operations, container terminal services, inland transportation, and container repair services.

In 2013, global container trade grew by 3.8%, with industry analysts projecting market growth of 4.2%

in 2014. Total global goods trading volumes are expected to increase in volume by 4.3% this year and 5.3% in 2015, with annual global exports surpassing USD 20 trillion in value. As global trade volume and networks continue to expand, port and terminal infrastructure and investment will become increasingly important, particularly in emerging economies where trade growth is projected to be most pronounced. Leveraging over a century of maritime industry experience and the strengths of the A.P. Moller Maersk Group, APM Terminals has grown considerably, and now holds significant shares in major ports in Asia and around the world, adding value through its services to customers and port authorities. The business segment has performed consistently well, with five of the world's ten most productive container terminals being APM Global Terminal Network facilities.

## **REVENUE IN 2013** JSD 48 billion

FOUNDED

1904

**EMPLOYEES** 

89,000

#### **Maersk Drilling**

Maersk Drilling supports oil and gas companies in exploration At A.P. Moller Maersk's office, we were greeted by Mr. and production well drilling. The company provides Henning Morgen, General Manager, Group Communications specialised services in deep-water and harsh environments and Branding, who shared with us his book, "Creating Global with 16 rigs and floaters.

to the APMM Group, the company strategy seeks to develop and grow its business as a niche service provider within the ultra- deepwater and ultra-harsh environment segments. The history of Maersk is closely tied to the history of Through its Accelerated Growth Strategy, the company aims Danish industry growth. The company's management to build scale and scalability in these segments by doubling their fleet capacity by 2018.

The company offers unique business solutions through an emphasis on service delivery and customised drilling services for its clients. As with all of Maersk's businesses, Maersk Drilling builds its services around a team of highly skilled and committed work force and state-of-the-art offshore drilling rigs.

#### **Creating Global Opportunities**

Opportunities". Mr Morgen's wealth of industry experience, knowledge of Maersk's history and generous willingness To fulfil Maersk Drilling's role as a significant, stable contributor to share gave us a broad-ranging educational insight into Maersk's success.

> had previously taken a diversified investment approach to numerous market segments, such as supermarkets and food. A business strategy review however led the company to focus on its maritime business, and divest from other noncore businesses.

This decision led to a major change in terms of charting the company's future direction and strategy. This foresight proved to be right and in our opinion, played an instrumental role in Maersk's present day success.

Another crucial Maersk success factor is the company's ability to stay relevant and navigate the shipping industry's ever-changing landscape. Maersk has been able to do so by taking timely advantage of opportunities as they arise. By making the right acquisitions at the right time, the company has been able to expand and establish itself as the dominant player in the global maritime industry. Moreover, an interesting characteristic, which AP Moller Maersk Group shares with other Danish companies, is the company's pride in its established history and strong corporate values. These provide a solid foundation for the company's long- term market perspective and its focus on cost leadership and sustainability.







## **PORT OF ESBJERG**

EUROPE'S LEADING PORT

### FOR OFFSHORE WIND TURBINE SHIPMENTS



Categories (1000 tonnes)	2013	2014
Trailer/ container goods	1.931	2.016
General cargo	433	391
Liquid fuels	512	610
Stone/sand/pebbles	793	760
Fossil bulk	878	714
Solid bulk	58	56

The port of Esbjerg is the largest port in Denmark, with 150 years of history. The town of Esbjerg grew from an initial population of 15 families to its current 100,000 people with the development of the port. The port started out providing dairy exports to the UK, before developing as a fishing port. With the growth of the oil and gas industry in Denmark, Esbjerg now serves as a hub for product trans- shipment.

In recent years, however, Esbjerg has taken on a new role and developed into Europe's leading port for offshore wind turbine shipments. The port now accounts for two-thirds of the three gigawatts of offshore wind power so far installed in Europe. 65 per cent of all Danish wind turbines were shipped from Esbjerg, and the port is also used to ship components to a number of offshore wind farms including the UK's Lincs, Gunfleet Sands and London Array.

The port of Esbjerg is well-positioned in relation to Denmark's wind energy industry companies, most of which are concentrated in the country's western and southwestern regions. In recent years, some of the numerous local offshore and energy companies have succeeded in applying their know-how in the offshore wind industry, while continuing their oil and gas activities.







That is the background against which Esbjerg aims to strengthen its position as a focal point for the establishment, operation and maintenance of the many wind farms that will be installed in the North Sea in the years ahead.

To further strengthen Denmark's competences and special position in green offshore energy, a number of industryleading offshore companies have formed a strategic alliance to establish the Green Offshore Centre in Esbjerg.

The aim is to create an international beacon of knowledge and innovation in the planning and design, installation, operation and maintenance of offshore energy facilities. Besides offshore wind power, the centre will also be involved in wave power and other forms of energy derived from the sea which could achieve commercial breakthroughs in the coming decades. This forms an integral part of the port's vision, and its aim to establish itself as a port vital to Denmark's shipping personality.



# **BLUE WATER SHIPPING**

## COMPLETE TRANSPORT SOLUTIONS AND PROJECT MANAGEMENT



Blue Water Shipping was established in 1972 in Esbjerg, Denmark. Company founder Kurt Skov still runs the company from its quayside head office, as chairman of the board. Blue Water offers complete transport solutions and project management worldwide for all types of cargo.

#### **General Cargo**

Blue Water Shipping focuses on transport and logistics solutions for general cargo. Transport, storage and handling are managed either by integrated Blue Water systems or through individual, bespoke freight forwarding services. Regular services are offered to and from all major worldwide hubs in close cooperation with other Blue Water offices and a global network of partners and agents.

#### **Reefer Logistics**

Blue Water Shipping has many years of experience in temperature controlled transport - particularly by sea and road, but also by rail and air. Several of Blue Water's European and overseas offices were established with a view to offering reefer transport to clients in the food industry.

### **Oil, Gas & Industrial Projects**

Blue Water's historic successes include the transportation of entire oil rigs through the Russian river system, and the company possesses the expertise to handle complex global logistics for comprehensive FPSO projects in South America and Asia. We believe that this ability to cover all bases in the logistic chain provides Blue Water with a differentiating advantage over its competitors. The company understands its customers' needs and provides services at all points of the value chain.

#### **Port Services & Agency**

In addition to projects for the oil industry, Blue Water's head office in Esbjerg has developed expertise in handling and transporting wind turbines.

An established project department collaborates with the shipbroking department and stevedore foremen to handle increasing numbers of wind turbine shipments as well as the transportation of other large structures.

#### The North Atlantic and Smyril Blue Water

Since the 1980s, Blue Water has built close ties to Greenland, the Faroe Islands and Iceland, freighting fish and shellfish south and ordinary consumer goods north. Smyril Blue Water is the only freight forwarding company offering ro/ro service on the North Atlantic on its ultra- modern ro/pax ferry, the "NORRÖNA". The ship, which has a capacity of 130 trailer units, operates between the ports of Seydisfjordur, Torshavn and Hirtshals at a service speed of 21 knots, making it also the fastest freight service in the North Atlantic. Today, Blue Water and Smyril Blue Water offer transport solutions to and from the North Atlantic market by air and sea. As the only shipping company in the North Atlantic market, they offer their clients a unique ro/ro service and thus the possibility of loading both containers and trailers.

### Wind Logistics

With an experienced team of in-house specialists in turbines and foundation transportation and logistics, the company provides customised solutions working closely their clients.

### **Marine Logistics**

Blue Water offers a comprehensive range of services to the rapidly growing cruise industry, handling storage as well as the supply and distribution of all necessities for large cruise vessels calling at various ports worldwide.

### **66** Blue Water is among the top players in wind logistics for one-stop- shop solutions including port set-up, handling and transport. **J**

Inventory control and order tracking systems assist in tracing the goods - even during transport. Long-standing, close co-operation with major cruise lines provides the company with unmatched insight into the growing leisure industry. Operating from their offices in Denmark, Holland and the USA, Blue Water Shipping's cruise ship supply services provide high-grade logistics. Moreover, in ports where Blue Water is represented by appointed shipbrokers, these partners act as agents for the cruise ships - enabling the company to offer round-the-clock services to its clients.

## **SEMCO MARITIME**

SEMCO Maritime is a project engineering company dedicated With the growth of the wind power industry, SEMCO is now to providing the global energy sector with projects, solutions and manpower. Over the last decade, SEMCO Maritime has built up expertise as a multi-discipline Engineering, wind power industry. Procurement and Construction (EPC) contractor. Today, they apply their EPC expertise in the renewable energy industry, The company provides electrical infrastructure design, and particularly the offshore wind sector.

Wind is the fastest growing energy source worldwide. One including Burbo Banks, Walney I and II, and Gunfleet Sands. of the most accessible sources of non-fossil energy, wind power satisfies more and more of the world's energy needs. wind farms and has been involved in several transformer

applying their 30 years of knowledge and expertise, gained working on rigs, platforms and power plant projects, to the

project management and engineering services, and has laid cables for major offshore wind farm projects in the UK, It has also provided accommodation platforms for offshore platforms for Danish and international projects.



# **OIL GAS DENMARK**

Oil Gas Denmark is a trade organisation operating in Oil Gas Denmark's goal is to increase the value of North the upstream oil production sector. This body includes Sea oil and gas production. With potential billions of DKK numerous oil producing companies and their partners, in untapped resources in the North Sea, a combination of suppliers and service companies operating in the exploration careful strategy and investment is needed to unlock and and extraction of oil and gas in Denmark. Danish oil and gas realise the potential revenue and employment opportunities. production creates major value for Danish society.

Oil Gas Denmark offers joint access to the sector. The goal In 2012, the Danish state received more than DKK 25 billion is to create more transparency within the sector and increase in revenue from oil and gas activities in the North Sea. This understanding of the opportunities and challenges which economic spinoff, revenues from taxes, creates further Denmark faces. employment, export and technological innovation.







## **SVENDBORG INTERNATIONAL MARITIME ACADEMY**

## DENMARK'S LEADING MARITIME **EDUCATION CENTRE**



Svendborg International Maritime Academy (SIMAC) has a history of 150 years in maritime training in the town of Svendborg. An independent institution with over 600 students, SIMAC offers three main programmes - Ship Officer, Marine Engineer and Master Mariner. The 4-year courses and industrial attachment prepare students for a career on vessels.

Beside the hope of captaining a ship, a majority of the students want to add new skills to their ship-board occupational resumé and view their time on board as a stepping stone to a shore-based job. Although most seafarers start their careers with foreign shipping companies, they often eventually return to Denmark for a shore-based career and contribute to the country equipped with their wider global perspectives.

SIMAC plays a significant role in providing a talent pipeline of highly qualified officers for the shipping industry. However, attracting talent to the industry is seen as an increasing challenge. At present, female students make up a mere 10 per cent of the total, and efforts are underway to attract more women to the industry.

A similar trend in Singapore highlights the need for a change in the perception that the maritime sector is a menonly career. This was a salient point which everyone in the discussion agreed upon.













### **Unique Training Methods and Commercial** Applications

SIMAC's Western site is equipped with a simulator which offers students an unparalleled experience in terms of learning navigation first-hand, short of actually boarding a ship. The same site also houses a lab equipped with a functioning diesel engine for learning purposes.

The lab came about as an initiative by students who wanted hands-on training. The students were only able to source the engine after obtaining funding from the municipal government. The acquisition of the diesel engine has benefitted not only the students, but also companies who are now able to run tests on the unit. with similar results to those of real vessels.

Students are also required to gain technical skills including welding and basic maintenance. Onsite facilities cater to training of this kind. We also discovered that local industry encourages students to gain such competencies, which in turn makes them more effective supervisors. Employers value the integration of practical knowledge associated with engine repairs, and this lent added support towards the acquisition of motors for education purposes.







## BALTIC AND INTERNATIONAL MARITIME COUNCIL

## SHIPPING ASSOCIATION SERVICING THE WORLD

\* SMU

The Baltic and International Maritime Council, or BIMCO for short, is a shipping association providing a wide range of services to its global membership of shipping industry stakeholders, which include shipowners, operators, managers, brokers and agents.

Our team had the opportunity to learn about the association through an introductory lecture on the history of BIMCO. The council's main objective is to facilitate the commercial operations of its membership by developing standard contracts and clauses, and providing quality information, advice, and education. BIMCO in its operations promotes fair business practices, free trade and open access to markets and is a strong advocate for the harmonisation and standardisation of all maritime-related activities.

Accredited as a Non- Governmental Organisation (NGO) with relevant United Nations agencies and other regulatory entities, BIMCO actively promotes the application of internationally agreed regulatory instruments.

Accredited as a Non- Governmental Organisation (NGO) with relevant United Nations agencies and other regulatory entities, BIMCO actively promotes the application of international agreed regulatory instruments.

SINGAPORE MANAGEMENT UNIVERSITY - COPENHAGEN BUSINESS SCHOOL MARITIME ECONOMICS CONCENTRATION INDUSTRY STUDY MISSION TRIP - COPENHAGEN

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### BIMCO - Ballast Water Management System (BWMS)

Following the introduction to BIMCO, a further lecture touched on a relatively controversial issue, the use of the Ballast Water Management System (BWMS), in order to illustrate the role of BIMCO in the real world. The student team was able to gain a first-hand understanding of the complexity of the issue and the various layers of arguments for and against the BWMS.

In operation, ballast water is crucial to a ship's safety and propulsion efficiency. Ballast water is loaded whenever the cargo holds are empty to provide a weight offset for the cargo, enabling the ship to retain optimal balance.

The loading and discharging of ballast water at different ports has environmental implications, leading to the advent of a range of conventions aiming to prevent the spread of non-native aquatic life forms in lakes, rivers and seas. DTU **Technical University** of Denmark

## **TECHNICAL UNIVERSITY OF DENMARK**

NURTURING TALENT FOR THE SHIPPING INDUSTRY



The Technical University of Denmark (DTU) has for almost two centuries been dedicated to fulfilling the vision of H.C. Ørsted - the father of electromagnetism - who founded the University in 1829 to use the natural and technical sciences to develop and create value to the benefit of society

DTU today ranks as one of Europe's leading technical universities, and continues to set new records in terms of the number of academic publications. DTU's public sector consultancy enables the development of partnerships with industry.

### Maritime DTU

The Maritime DTU was launched in May 2014 and has virtual centres across all DTU departments. The centre provides a platform on which students and staff can interact and engage with the maritime sector. It also serves to strengthen research cooperation between DTU departments with national and international universities. Examples of crossinstitutional collaboration include the offering of joint courses and candidate and teacher exchanges. DTU understands the importance of a proper positioning of Denmark as a shipping nation and the need for education, research and innovation in collaboration with the maritime sector.

#### **Maritime logistics**

This research initiative conceptualises network design and transition in container liner shipping. An emphasis on the optimisation of speed of such vessels has been examined in the literature, and a thorough analysis of how to improve the cost- efficiency and productivity of terminal operations, such as yard logistics and vessel stowage, is on- going. Last but not least, we learnt about a new shift in maritime logistics, which provides firms with motivation to provide 'green' logistics solutions.





### DTU Maritime Logistics (MARLOG) research themes that have been laid out:

- 1. Methods and models for network design and transition
- 2. Fleet management and routing for container shipping
- 3. Fleet management and routing for tram shipping
- 4. Ship pooling and collaborative logistics
- 5. Optimising and simulating terminal operations
- 6. Green transport logistics and green corridors
- 7. Decision support based on stowage planning
- 8. Synchrony-modality combining land and sea operations

### **DTU Maritime Projects**

Stowage planning in Greenship Project is a project in collaboration with DTU MAN, ITU and Maersk Line to improve stowage planning (daily plans, service management and network design). Green Corridors projects (from SuperGreen to GreCor) focus on green sustainable multi-modal transport in the North Sea region. The projects also have a collaborative transnational approach with close collaboration with public and private stakeholders. In addition, there is also a focus on secondary networks and hubs, and the regional hinterland.

### PROTEUS

Product/service system (PSS) development towards innovative and sustainable engineering solutions PROTEUS (PROduct / service-system Tools for Ensuring User-oriented Service) is a newly developed innovation with a strong focus on developing new knowledge about how aftersales service can be effectively integrated into product and business development. This project ran from January 2010 to December 2013 and was co-funded by the Danish Agency for Science, Technology and Innovation (DASTI), the Danish Maritime Foundation and DTU. The purpose of the project was to simultaneously create research insights and innovation results over a prolonged (4-year) collaborative project, consisting of representatives from Danish institutions, a service (consultancy), international university partners and a total of ten maritime companies.

## **FORCE Technology**

FORCE technology is one of the leading players in technology development for offshore wind systems. It targets its efforts at transforming highly specialised technological knowledge into practical and cost-effective solutions for a broad number of industries worldwide. Their services are characterised by their ability to provide consultancy to customers at all levels of their organisation - from management systems right through to corrosion protection.



### **Role of Research and Development in the Maritime Sector**

As part of our visit, we were shown a number of the company's new developments and testing applications. This included an introduction to simulator systems within the office.

This was an eye opener for the students - seeing how far technology could take the shipping industry in terms of mechanics and preparing seafarers and shipbuilders for the unknown on the high seas. FORCE Technology's primary aim is not to turn a profit, but rather to create advances in the technological field and provide consultancy services as appropriate. The visit definitely gave the students a solid understanding of the effort that goes into technology testing and the complexity involved. Following its project with Singapore's Police Coast Guard, FORCE Technology has become a well-known name among reputable international suppliers of maritime simulators. The company's involvement in the Singapore maritime scene has been growing and could potentially lead to collaboration with Singapore Management University in the form of an industry partnership.





## **LECTURE SERIES**



### From Shipyards to Maritime Technology

Over the past three decades, Europe has seen a dislocation of shipbuilding activities from the continent to three main Asian nations, namely Japan, Korea, and China. CBS research fellow Thomas Roslyng Olesen presented his paper on the ways in which Danish shipbuilders and affiliates were impacted by the shift, in the hope that the study might offer insights to these Asian nations should the industry once again decide to shift operations to another part of the world.

This period of transition took place from 1977 to 1985, where the European share of the global shipbuilding market fell from 41% to 18%, while Asia increased its market share from 46% to 70%. This shift was part of a larger movement, which saw decline of the European manufacturing sector. Owned by the J Lauritzen Group, Danyard Frederikshavn was at the time one of the major Danish ship yards to undergo this tough period of change. Initially, Danish yards tried to adopt a 'blue ocean' strategy in an attempt to differentiate themselves from highly cost- competitive Asian yards. By going after niche projects such as advanced chemical tankers, they managed to win large-ticket projects from the growing U.S. shipping industry. While well- intended, their lack of experience in sophisticated tankers and inability to bring on board experienced sub-contractors resulted in heavy losses. Danyard suffered a DKK 490 million penalty for failing to deliver contracted tonnages, a major contributing factor to the firm's shutdown in the late 1990s.

With major vards such as Danvard, Elsinore, Nakskov and B&W winding down their operations, thousands of skilled employees at these yards became jobless. In response, a Foundation for Maritime Development and Cooperation (Fonden Maritim Udvikling og Samarbejde) was created

jointly by county, municipality and local business councils to create jobs for this skilled labour force. Eventually, this pool of skilled labour was absorbed into over 26 large corporate spin-offs, of which a number (approximately 10) survive today in one form or another - some were less successful.

Thomas concluded that the success of these spin- offs stemmed from various factors including the availability of investors, availability of entrepreneurs, transferability of skill sets etc. This economic transition, forced upon Danish ship vards, compelled business leaders to rethink their business strategies and models, and to leverage existing competencies to stay relevant with the changing needs of the global economy. The emergence of low-cost Asian yards prompted dislocated Danish yards to shift towards more knowledge-intensive activities offering higher added value and justifying their higher labour costs. This conjecture is perhaps best supported by the fact that vard closures did not impact R&D jobs as much as labour-intensive jobs.





## Shipping and the Environment

Most of the lectures and visits towards the latter half of the trip dealt with the relationship between the environment, shipping services and the industry.

The discussion progressed to a discussion of the Prof. René Taudal Poulsen was our first lecturer, and he relationship between cost efficiency and energy efficiency. kicked off the discussion with a talk on the environment Energy efficiency can be attained as shown in the marginal and shipping. He structured his lecture by looking at two abatement cost curve above. The real question however perspectives, that of the shipowner and that of the policy is whether energy efficiency is incompatible with cost efficiency. The relationship between energy efficiency maker, and made effective use of questions that addressed the general theme of each concept and got us thinking early and cost efficiency is direct. As illustrated from the above on about the discussions that were to take place. One of graph, being energy efficient (through speed reductions and the major concepts he spoke about was the relationship auxiliary power) can increase the amount of carbon dioxide between oil prices and shipping. Bunker costs contribute averted. Declining carbon dioxide emissions reflect the lower to almost 70 per cent of the total costs involved in running usage of bunker fuel for vessels. This enables ship operators a ship and present strategic cost management implications to use bunker fuel more efficiently, resulting in lower cost for for shipowners. A correlation could be observed between ship operators. The energy efficiency gap defined above is oil prices and green technologies adopted by shipowners. however still prevalent in the shipping industry, for several Essentially, if oil prices are very high, shipowners are more reasons. One of the reasons could be that ship operators do likely to use green technologies as alternatives to bunker not see a need to be energy efficient, as bunker fuel prices fuel - alternatives which might include wind energy and other are not a concern. It could also be that have been poor concepts. Operational changes are however also possible, performance monitoring to enforce on being energy efficient for example changes in speed and bunker consumption, wages and retrofit changes.



Marginal CO, abatement costs of analysed technologies

The choice of whether to adopt fuel substitutes or operational changes is highly dependent on the market environment.

### **Shipping and the Environment** (cont'd)

The choice of whether to adopt fuel substitutes or operational changes is highly dependent on the market environment.

Following the discussion on shipowners' considerations of the above issues, we moved on to the policy maker's perspective and the objective of reducing the negative impact of shipping on the environment. The discussion that took place in this section was insightful in terms of learning about policy and its application. We compared three policies and evaluated their pros and cons in terms of accomplishing the above mentioned objective.

#### Energy Efficiency Design Index (EEDI)

EEDI is an energy efficiency design index defined by the ratio of the social cost of shipping to social benefit. Social benefit is measured by deadweight multiplied by speed, and social cost by carbon dioxide emissions.

The advantage of such a measurement is that it is extremely flexible and can be applied to any ship in any country. The objective of achieving lesser emission reducing the requirement for every ship however may not be viewed to be as useful in a similiar manner.

The goal does not see itself being achieved, one of the major reasons being that it presently only applies to new ships, and not to the present global fleet. In addition, the 2008 crisis created a huge oversupply of ships, meaning that the age of the world fleet is relatively young given that the average lifespan of a ship is close to 30 years.



### **Danish Capitalism and the Global Challenges**

The Breweries



Sweden Germany

FDI Stock, Outwards as % of GDP					
1982	1986	1992	1999	2009	
2.35	2.84	10.86	29.51	56.12	
1.28	3.23	7.77	25.88	42.21	
1.00	2.08	9.20	18.75	3800	
5.41	11.45	18.25	41.33	66.41	
6.12	7.71	8.65	1929	39.73	

# STUDENT REFLECTIONS



The visit to AP Moller Maersk Group was enriching and certainly a trip to remember. We were privileged to be received by Mr Morgen, who told us about the rich heritage and evolution of the world's largest shipping firm, Maersk Line, and several critical points in history where Mærsk Mc-Kinney Møller took calculated risks, venturing into new industries leading to where it is today. One common characteristic which AP Moller Maersk Group shares with other successful Danish companies, such as Grundfos, Lego, Novo Nordisk etc., is the fact that they have an established history and strong corporate values which provides a strong foundation on which the company can grow organically and weather tough business cycles.

The establishment of family-owned trusts and foundations further ensured the success of these companies. These trusts and foundations shielded the firm from malicious takeovers and enabled it to remain in the hands of the founding family. With that, senior management is able to look across wide business horizons and take on long-term strategies that might not seem favourable in the near term. This has proven to be important for firms within the maritime industry, as it is known for its cyclical and volatile nature.

Ng Guang Jie Year 3, Bachelor of Business Management, Maritime Economics Concentration President, Merchants' Club



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We visited Svendborg, a town on the island of Fyn in southcentral Denmark. As soon as we arrived, we visited the Svendborg International Maritime Academy, where we attended a lecture about Denmark's maritime education system. I thought the system adopted by the institution was quite practical and useful - a system where students are challenged and taught in terms of a specific field of maritime studies, with a focus on the engineering and operational sides. The institution offered PhD and Masters programmes as well indicating a future fuelled by research by the students which could be used in the industry. Another important point was that the educational systems within the country are subsidised by the government, enabling a lot of interaction to take place with the leading companies like Maersk. The latter provide internships and draft contracts with the students. SIMAC are definitely ambitious, which is always good for an educational system, to stay up-to-date and be on top of the needs of the real world. The simulator system they employed was really impressive, and I can see why Danish seafarers are paid high salaries given their solid education.

Rohan Mathew

Year 3, Bachelor of Science (Economics), Maritime Economics Concentration



A morning visit to the port of Esbjerg allowed me to understand the importance of the port to the offshore wind energy industry in Denmark. The port of Esbjerg is the only port with sufficient depth to accommodate the ships necessary for offshore wind operations. Traffic levels are high, with 65% of Danish wind turbines passing through the port. Due to the port's location relative to the locations of universities in Denmark, it is a challenge for the port to recruit undergraduates due to their reluctance to leave their homes in the city. However the port views this as another challenge and people remain positive.

The later bus trip around the port was eye-opening and memorable, and allowed me to better relate to port activities and the actual sizes of the ships and offshore vessels.

#### Sean Seah

Year 3, Bachelor of Science (Economics), Maritime Economics Concentration Vice President, Merchants' Club



At BIMCO, the introductory lecture allowed us to gain a better understanding of how differing opinions can come together within this one large organisation. The Q&A session was insightful, as we learned more about the inner workings of the organisation. For instance, we learned how an organisation like BIMCO lobbies for the interest of its members, and how large companies can sometimes dominate proceedings.

> Hailey Kim Year 3, Bachelor of Science (Economics), Maritime Economics Concentration



At DTU (Technological University of Denmark), we learned more about the institution and how it caters to the maritime industry. One interesting insight was the presentation on the service and product approach business model. While servitization is not such a fresh perspective, the tools and framework created by the DTU team were definitely a great way to think about the kind of work that a company should be involved in, and how it should plan and implement its strategy accordingly.

Our visit to FORCE Technology, a close industry partner to DTU, exposed us to a variety of simulators and technology utilised to test the feasibility of structural designs. We also learned about their unique corporate structure and that the R&D process is one that happens over a long period of time.

Kenny Kee Year 3, Bachelor of Science



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The second part of our journey began; our first stop was at the port of Esbjerg, which was very interesting. A city defined by its port and its activities, employing a large majority of the people there and therefore embodying the features of a traditional maritime cluster. We visited two companies that day, and I must say that Blue Water shipping was the most impressive. Mr. Tolstrup was fantastic in his presentation concise and cogent. More than just textbook knowledge, I felt I had received an insight into the mind of a shipping company. He shared the unique strategy that Blue Water Shipping employed, which was to diversify their business into a variety of shipping and logistics streams. He explained that the reality of the industry was that it is volatile and will react to markets sharply. He introduced the new things the company was trying to initiate, one operation being to hire cruise ships for use as housing for maintenance personnel as they visit individual offshore wind turbines for structural repairs and maintenance. This is a much more cost efficient procedure and, it turns out, has been saving the company some money. The owner even came in and shared some of his views on the company, its humble beginnings but their strong drive to succeed. Definitely a company I would keep a look-out for.

Muhammad Muzhaffar Year 3, Bachelor of Science (Economics), Maritime Economics Concentration

