Towards a future of mobile, competitive “port-in-ocean” system for evolving seamless supply chains

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Most likely the first time that China exchanged substantial quantities of material goods with the outside world via deep ocean routes was when Admiral Zheng He embarked upon a series of seven long round-trip voyages. According to recorded history, he had 300 mega-ships of 400 ft each (as compared to Columbus’s 85 ships, see Figure 1) and a 28,000-man crew. It remains perhaps, the most impressive ocean armada that any country had ever assembled. What is most intriguing for the purpose of our paper is that Menzies Gavin, highly controversial yet not improbably, argued with evidence that in 1421 Zheng He had by then discovered Australia.

One ponders what the ancient Chinese may have done if they had realized that there were (and still are), rich iron ores located just a little distance up the river. Perhaps they may have utilised their massive ships to form a seamless supply chain. For iron and steel making is one of the great contributions by the ancient Chinese to the world. Now some five centuries later (or late), the Chinese have again come back to Australia to collect iron ore. For without iron, there is no steel, and steel is essential for infrastructure construction in China.

The seamless supply chain

In this paper, which is part of a four part series, we intend to propose our overall conceptual solution to the problem of forming a seamless supply chain as illustrated in Figure 2 (the process of turning iron-ores into steel products). There is no need for a costly Zheng He style floating armada. It is it not even necessary, indeed in our shared opinion even wasteful of resources, to be building billion dollar ports on land. We envision our port-in-technology as evolving to future needs. We envision a seamless supply chain: one that brings the iron ores (processed as may be required in situ) from the mines to the jetty for loading, then through a patented
technology of tipper barges to be trans-shipped via conveyors up to the awaiting ocean going bulk carrier.

As shown in Figure 3, some of the iron ore refining processes may be undertaken at the mine. Then from the mines, these materials are taken by short overland routes to the jetty. At the jetty, the lorry (vehicular “barge”) then tips over the iron ore fines onto the tipper barges. A tugboat then takes these tipper barges down the river to the sea where an ocean going bulk carrier awaits and the iron ores are transferred aboard. From there it is a long journey across the ocean waters to a Chinese port. At the port, the usual port-on-land procedures apply and the materials are transported over to the factory. The demand-supply loop is closed again when there are re-orders for iron-ores. In the future, these processes are likely to be more tightly coordinated and even synchronised.

The “port-in-ocean” system

To better illustrate and explain the components of the “port-in-ocean” system technology, we have constructed a model (see Figure 4). As may be seen, large vehicles are deployed to fetch the processed iron ore fines from the mines towards the jetty where there is an awaiting tipper barge. In the traditional port-on-land system, the iron ore fines are loaded onto trains. Thus railway system becomes an integral part of the process of transportation of iron ore fines. The iron ore fines are then uploaded to ocean going, bulk carriers anchored along the wharf of the port-inland. In contrast, in the port-in-ocean system, the tipper barge, once filled with iron ore fines, is then pulled along the river by a tugboat towards the sea.

Another critical component of the make-up of the port-in-ocean system is the conveyor barge. It is through the conveyor system that the iron ore fines are uploaded onto the ocean-going vessel. Now the process of trans-shipment of iron ore fines under the port-in-ocean system is seen as a seamless flow. Once uploading is completed the ocean-going vessel can then cross the ocean towards the land port. It is possible in the loading phase to incorporate a patented, enclosed form of conveyor system (such as the models pioneered by Innovative Conveying Systems Pte Ltd of Australia).

Figure 2. Conceptualization goal: a port-in-ocean system for seamless supply chain.

Figure 3. The supply chain form mine to factory: towards seamlessness.

Figure 4. A simple model of the “port-in-ocean” system and technology.
From here, the process is exactly the same as the traditional mode of trans-shipment. However, the system of port-in-ocean is revolutionarily simple and dramatically cost effective. In comparison to using normal ports, the system can easily lead to a cost saving of as high as 99 per cent. Moreover the underlying patented technology is deceptively simple and yet it is mobile. Thus if the mining in one location is no longer economically feasible, the entire “port-in-ocean” is redeployed, something which would be impossible for a fixed port on land.

Follow-up papers
In follow-up papers we shall discuss the following:
1) In greater technical detail, the underlying patented technologies (tipper barge and conveyor system) for creating the port-in-ocean as well as citations of the key portions of the patents that had been filed across several countries
2) A case study based on a real example taken from the western coast of Australia: the recent case of the Oakajee port-on-land and its railway system.
3) A paper that explores how this novel idea of port-in-ocean may possibly be funded and implemented especially within the Australian or even Indonesian iron ore mining industry.

Finally we hope our paper may highlight to governmental authorities worldwide the possibility of exploring alternative infrastructural configurations that are efficient, effective and economical, a pertinent issue given the uncertain and constantly changing economic climate.

ABOUT THE AUTHORS

Prior to becoming an academic, Dr Foo Check Teck had held senior positions as Manager with ABN Bank, Project Manager (Contract and Finance) with a major German MNC, Klockner Industrie Analagen and Assistant Director, Strategic Planning of National Productivity Board, Singapore (now SPRING). Besides NTU where he is Associate Professor, Systems Engineering and Management, he is concurrently Honorary Chair of Competitive Strategy with University of St Andrews and Distinguished Professor of Finance, City University of New York. He is globally renowned for his research on art of war corporate strategy (appearing as an expert on the US History Channel) and was selected one of the Straits Times “Movers and Shakers in Asia”, who also named him as Singapore’s “Man of Renaissance”).

Loke Siew Fai is a Singapore building professional, having spent three decades in the management of building and civil construction projects and also as a consultant on design and build projects, specialising in industrial buildings, factories and facilities. The last ten years in the marine construction industry as a shipyard owner and operations manager have led to his invention of the Tipper Barge, an uninterrupted seamless marine transport system for minerals. His invention had been patented in several countries including the USA. Mr Loke is confident that his Tipper Barge shall revolutionise the concept of ports and how minerals are transported. He is now focused on developing his invention for commercialization. He was invited by Nanyang Technological University to present his innovation and parts of this paper were recently delivered jointly with Dr Foo Check Teck at a seminar for researchers organised by the Center for Maritime Studies, National University of Singapore.

Mr Stewart Graham has a background in mining and the raising of capital on the Australian Stock Exchange – arguably the world’s greatest venture capital market for mining and mining related enterprises. He has been both Managing Director and Chairman in two such listed companies he created. Currently, Mr Graham’s is developing of a 20 million tonne per annum iron ore port at Port Denison, Western Australia where the offshore yet reef protected port intends to utilise the conveyor barge system for loading Panamax bulk carriers. Mr Graham and his engineering consultants see this new technology as a viable alternative to paying the high price for conventional facilities such as the nearby US$2 billion Port Oakajee. Mr Graham’s new company Oceanport Shiploaders Ltd has negotiated a right to further develop and utilise the Tipper Barge system within Australian waters.

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