

# PORT INTERMODAL IMPROVEMENT MODELS FOR NIGERIA'S LAGOS PORTS

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# INTRODUCTION

- The concept of intermodalism has constantly reoccurred in literature as the optimum solution to the ever rising problem of port congestion especially as it affects the ever increasing encroachment of the city to the port gates.
- Macharis and Bontekoning define intermodal transport as the combination of at least two modes of transport in a single transport chain, without a change of container for the goods, with most of the route travelled by rail, inland waterway or ocean-going vessel and with the shortest possible initial and final journeys by road.



# Intermodal transport as part of a supply chain

- According to Jesus et al, a supply chain focuses a product and extends back over the integrated chain of actors,
- activities and resources required for making it available at the place of consumption.
- Next, a logistics chain focuses an item and extends from when the article number is created
- until it is dissolved (article consumed or becoming a part of another article).
- Again, a transport chain focuses a consignment and extends over movement, physical
- handling and activities directly related to transport such as dispatch, reception,
- transport planning and control.
- Thus, the transport chain is seen as a relevant component of logistics chains, which in turn compose supply chains involving any different actors which can act as logistics service buyers or logistics service providers.



# A.THE CONCEPT OF INTERMODALISM AND INTEGRATION TO PORT DEVELOPMENT

- Notteboom has opined two ways through which ports relieve congestion and enhance competitiveness vide; port operations and inland extension. While the former
- emphasizes improving efficiency of port operations such as loading and unloading, ship
- bunkering, customs clearance, and security screening, the latter entails seaport's inland
- extension reflected in the growing number of inland ports of varying size and scope of functionalities across the world.



# Inland port

- The transport industry operates different kinds of inland terminals under different names, such as Inland Clearance Depot, Dry Port, Inland Container Depot, Logistics Centre, Freight Village, and Inland Port



# Seaport to Inland port integration

- Modern seaports, and shipping lines, integrate vertically with inland intermodal terminals to control hinterland transport (Nottebom 1997). This is yet to be imbibed in West Africa. With an increasing level of functional integration, many intermediate steps in the transport chain have been removed.
- Seaport to inland port integration is made possible through intermodal road-rail terminals. These are equipped for the transshipment and storage of intermodal loading units (ILUs) between road and rail. Nigeria can adopt this option.



# Barge transport to inland waterway model

- The inland waterway net-
- work is made up of terminals, waterway connections and container flows.
- Barges originate from the different inland terminals and carry containers in round trips to the various ports.



# B.THE PRESENT STATE OF NIGERIAN PORTS ANALYZED WITH EXISTING MODELS

- ENHANCED CONSERVANCY RESPOSSIBILITY
- An analysis of the data showed that most of the ports recorded increases in the gross registered tonnage, mainly due to the constant capital and maintenance dredging of the channels at the nation's ports by the Lagos Channel Management Limited (LCM) and Bonny Channel Management Company Limited (BCC).
- According to the data, which is for the third quarter of 2013, the volume dredged from 2006 to date by the LCM is 53,583,546 metre square, while a total of 24 numbers of critical wrecks have been removed. This provides shipping companies the economy of space, which enhances their turnover. The volume dredged by BCC from 2006 to date is 43,537,000 metre square, while 14 wrecks have been removed.
- Bonny channel from its previous 12.50 meters draught has been deepened to its present 14.30 meters increased its width from 215 meters to 230 meters.
- **MARITIME MATTERS** by the Nigerian Ports Authority (NPA).





## Dangote to reconstruct Apapa Port Road





# Port competitive factors

## Abstract of ports statistics, Port websites, UNCTAD and World Bank statistics

S/N	Ports	Port Throughput (tonnes)	Vessel Traffic	Draught (m)	Quay Length(m)	Cargo Dwell time(days)	Vessel Pre-berth Waiting Time (hours)	Vessels Turnaround Time (hours)	Truck Turnaround Time(hours)	Crane Productivity (tonnes/hour)	Cargo Handling Charge per ton	Liner Shipping Connectivity Index (LSCI)
1	Apapa	21730426	1498	9.30	3459.00	21.00	36.00	136.80	6.00	15.00	10.47	32.68
2	Tin-Can	16103981	1725	9.50	4763.00	20.00	34.00	103.20	5.00	13.80	10.47	32.68
3	Delta	8930367	498	6.20	6286.66	23.00	32.00	93.60	14.70	8.00	10.47	32.68
4	Onne	23478848	820	10.80	4912.00	14.00	24.00	62.40	4.20	14.00	10.47	32.68
5	Rivers	4924857	447	7.60	2369.00	23.00	38.40	184.80	16.20	11.00	10.47	32.68
6	Calabar	1718518	197	6.20	1003.50	20.00	34.00	163.20	15.40	8.40	10.47	32.68
7	Cotonou	7805503	1105	11.00	220.00	15.00	48.00	161.00	6.00	15.00	9.00	17.67
8	Tema	12180615	1553	9.10	2413.00	20.00	9.60	152.00	8.00	14.00	10.00	21.85
9	Takoradi	5452025	1364	9.50	714.00	19.00	10.00	154.00	7.00	8.00	10.00	21.85
10	Abidjan	21476565	2278	12.50	840.00	12.00	2.90	52.80	2.50	16.00	14.00	31.35
11	San Pedro	4738021	392	11.50	736.00	15.00	25.00	107.30	8.00	9.00	14.00	31.35
12	Banjul	1958484	364	10.00	750.00	13.00	32.00	140.80	7.00	18.00	13.00	8.21
13	Conakry	7193636	356	8.50	1159.00	11.00	38.00	127.20	9.00	14.00	14.70	9.01
14	Monrovia	7452492	368	9.20	609.00	14.00	42.00	150.90	12.00	22.00	12.80	8.47
15	Dakar	11869557	2858	10.00	6025.00	7.00	36.00	201.20	5.00	8.00	15.20	12.19
16	Freetown	887373	214	9.40	505.00	9.00	35.00	147.50	11.00	10.00	15.20	12.19
17	Douala	6533255	841	7.50	440.00	19.00	46.00	174.40	18.00	8.00	16.80	10.96
18	Lome	8698524	1120	11.50	250.00	17.00	40.00	161.00	4.00	23.00	9.00	20.44



Overall competitiveness of the ports is the product of the Eigen values

Apapa	0.06804
Tin-Can	0.07081
Delta	0.05475
Onne	0.07955
Rivers	0.04201
Calabar	0.03549
Cotonou	0.04978
Tema	0.06358
Takoradi	0.05288
Abidjan	0.11417
San Pedro	0.04508
Banjul	0.04120
Conakry	0.04232
Monrovia	0.04278
Dakar	0.07099
Freetown	0.03553
Douala	0.03401
Lome	0.05704



### PORT KEY PERFORMANCE INDICATORS (KPI) FROM 2006-2014

YEARS	SHIP TRAFFIC		CARGO THROUGHPUT	CONTAINER (TEUS)	VEHICLES (UNITS)	TURN-AROUND TIME (DAYS)
	NOS	GRT				
2006	903	11,417,939	7,372,042	210,002	110,492	8.00
2007	1,185	16,493,822	10,003,300	266,634	165,970	7.03
2008	1,367	21,964,073	11,515,623	416,479	161,139	6.90
2009	1,583	27,482,275	13,541,016	544,649	185,344	6.60
2010	1,666	31,758,881	14,457,597	574,018	191,765	5.07
2011	1,857	36,630,054	16,230,591	709,880	242,401	4.27
2012	1,627	34,518,765	15,219,672	777,678	251,397	5.27
2013	1,724	42,702,830	16,072,031	872,263	277,974	4.52
2014	1,853	50,554,455	17,503,304	891,638	237,928	4.30



# 2014

## CARGO THROUGHPUT, NIGERIA

- The authority said in the period under review, Lagos Port Complex (LPC) recorded a gross registered tonnage of 36,969,456, showing an increase of 7.2 per cent over 34,466,291 gross tons achieved in the same period of 2013.
- Tin Can Island Port recorded a gross registered tonnage (GRT) of 50,011,289, indicating 17 per cent increase over the corresponding period of 2013 which was 42,758,161 gross tons.
- According to the authority, Calabar Port Complex recorded a total GRT of 4,085,903 showing an increase of 46.3 per cent compare with 2,792,488 gross tons recorded in 2013. Rivers Port Complex recorded a total GRT of 7,304,591, representing 14.2 per cent growth over 6,394,270 gross tons achieved in the corresponding period of 2013.
- On the other hand, Onne Port Complex recorded a GRT of 41,854,687. This reflects an increase of 7.4 per cent over 38,967,131 gross tons recorded in the corresponding period of 2013.
- Similarly, Delta Port Complex recorded 7,626,994 GRT. This showed an increase of 21.1 per cent over the year 2013 figure of 6,295,995 gross tons.



# 2014 CARGO THROUGH PUT

## continued

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- <http://www.thisdaylive.com>



Year	Container Terminal			Lagos Port			Throughput
	Inward	Outward	Total	Inward	Outward	Total	
2002	2,214,314	337,366	2,551,680	11,546,260	208,279	11,754,539	14,306,219
2003	2,384,603	337,366	2,704,053	11,653,962	221,303	11,875,265	14,579,318
2004	2,384,603	337,366	2,704,053	11,653,962	221,303	11,875,265	14,579,318
2005	2,384,603	337,366	2,704,053	11,653,962	221,303	11,875,265	14,579,318
2006	2,384,603	337,366	2,704,053	11,653,962	221,303	11,875,265	14,579,318
<b>Total</b>	<b>11,752,726</b>	<b>1,764,307</b>	<b>14,340,419</b>	<b>65,421,482</b>	<b>1,043,928</b>	<b>66,465,410</b>	<b>80,805,829</b>



# PLANNED NEW PORT DEVELOPMENT AT BADAGRY, LAGOS STATE

- [APM Terminals](#) and its consortium partners according to Sodergaard Peder, announced plans to develop a greenfield mega-port project and Free Trade Zone at Badagry in Lagos State, Nigeria.
- When fully completed the deep-water full-service port will be one of the largest in Africa.
- The facility, located 34 miles west of Apapa and the Port of Lagos on the Benin-Lagos Expressway, will boast 7 km of quay and 1,000 hectares (2,470 acres) of dedicated yard, and will include facilities for container, bulk, liquid bulk, Ro/Ro and general cargo as well as oil and gas operations support and a barge terminal.
- Plans for the adjoining Badagry Free Trade Zone will include a power plant, oil refinery, industrial park and warehousing and Inland Container Depot functions. Industry analysts have predicted that Nigerian container volume, which totaled 1.4 million TEU in 2011, will outstrip existing port capacity by 2017.
- The first phase of the project is scheduled to open in 2016. Source: (Port Technology International)





## C. BENCHMARKING ALTERNATIVE

- Notteboom recommends these three ports as good benchmarking alternatives: Port of Gothenburg and Hallsberg terminal in Sweden, Port Botany/Sydney Ports and Minto terminal in Australia, and Port of Virginia and Virginia inland port in the United States. The three seaport-inland port pairs, which fit into the
- concept of dry port according to Roso et al. (2008), were selected due to their success and
- uniqueness. Virginia Inland Port was chosen not only because it is reputable as a successful
- inland port for the Port of Virginia, but also because the Port itself initiated inland port implementation in order to expand its access to hinterland. Sydney's Port Botany has daily
- rail shuttles to six intermodal terminals situated within 45-kilometers (km) proximity of the Port, which is very unique in the world. Port of Gothenburg, with its 24 rail shuttles transporting more than 40 percent of the Port's total TEUs, is quite exceptional and considered very successful by other ports. The three port pairs are also located in three different continents with very different intermodal transportation solutions for their hinterland access.



# OTHER LOGISTICS MODELS AND TECHNICAL IMPROVEMENT

- FACILITY LOCATION MODELS FOR INLAND PORTS:
- Single Facility Location Model and Location Allocation Model: These models were implemented within the five counties' existing intermodal transportation network. In the single facility model, the researchers identified the location of a single inland port to serve all transportation nodes within the five counties. Also identified was the potential location of one inland port in each of the six regions of North of Port, Commerce, Orange, Mira Loma, East LA, and Ventura. The location allocation model started with the six regional allocations and one allocation for the ports and then begins to eliminate less efficient inland ports by identifying the impact on the total vehicle miles traveled (VMT). Francis, et al (1992) and Tompkins, et al (2003).



# Marine Transport Integration model

- A new dimension of the freight congestion problem has been created by the existence of petroleum tank farms along the Apapa-Oshodi highway adjacent to the port water fronts. The attracted tankers to this zone add to the marshalling area idling problem (a non sustainable solution). This situation requires government or regulatory body intervention through the mandation of a distribution pathway that provides for sustainable transportation. Two possible solution options suggested in this work are construction of pipelines leading to loading centres outside the city centre or increased barge transportation to special logistics tank farm centres located outside the city centre. This will mean the creation of a loading hub in locations outside the major city.
- All of the above suggestions form but a little aspect of the transport integration model being set up in this work. They may be classified as the city freight distribution optimization model created for Nigeria's Lagos Lagoon district. Onyemechi, 2013



# Port Intermodal model for Lagos ports

- A model thus arises from this work. To reduce congestion apparently present in this port district, this work suggests not only the envisaged extension of port facilities along the coast line, but a further extension of the missing intermodal link vide ;development of local marine transport capability to enhance intermodal transportation along the coastline. A connectivity must thus be made between Lagos and the Niger river to serve the emerging trade hub of Onitsha in the Eastern Nigeria. Barge transportation option can be improved through the execution of the proposed shipyard also billed for Badagry by Nigeria.



## West Africa coastline intermodal linkage recommended

- This option is sustainable in the sense that it forms a new modal shift in the over-congested Lagos Benin Onitsha road. Development of a short sea shipping group to serve not only Nigeria but the entire coastline of West Africa is also recommended in this work.
- At the West Africa level, the option will improve trade between the ECOWAS states as more goods will then be transported by these vessel bottoms.



# Financing options, Marco Polo project

- In bid to promote the
- development of intermodal transportation, the European Commission launched the Marco Polo Programme, which aims to alleviate Europe's roads
- of an annual volume of 20 billion ton-kilometres of freight.
- Marco Polo is a funding programme of the EU that seeks to facilitate the transition from road freight transportation to sea, rail and inland waterway freight transportation.
- A company implementing such a project may qualify for a Marco Polo grant (EC Marco Polo Programme, 2012), Lu and Yan 2014. West Africa can imitate this.



## E.RECOMMENDATION AND CONCLUSION

- This work analyzed multi dimensional methodologies for solving the freight distribution problems apparently visible in Nigeria's Lagos ports. Optimization and analytical solutions created from previous works were also suggested. Solution methodologies suggested in the work includes terminal to hinterland connectivity, application of the Marine Integration model created by the author, design of a workable freight village among others



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# Epilogue

- Jesus answered them and said, Verily, verily, I say unto you, Ye seek me, not because ye saw the miracles, but because ye did eat of the loaves, and were filled.
- Labor not for the meat which perisheth, but for that meat which endureth unto everlasting life, which the Son of man shall give unto you : for him hath God the Father sealed.
- John 6;26,27:Bible,KJV

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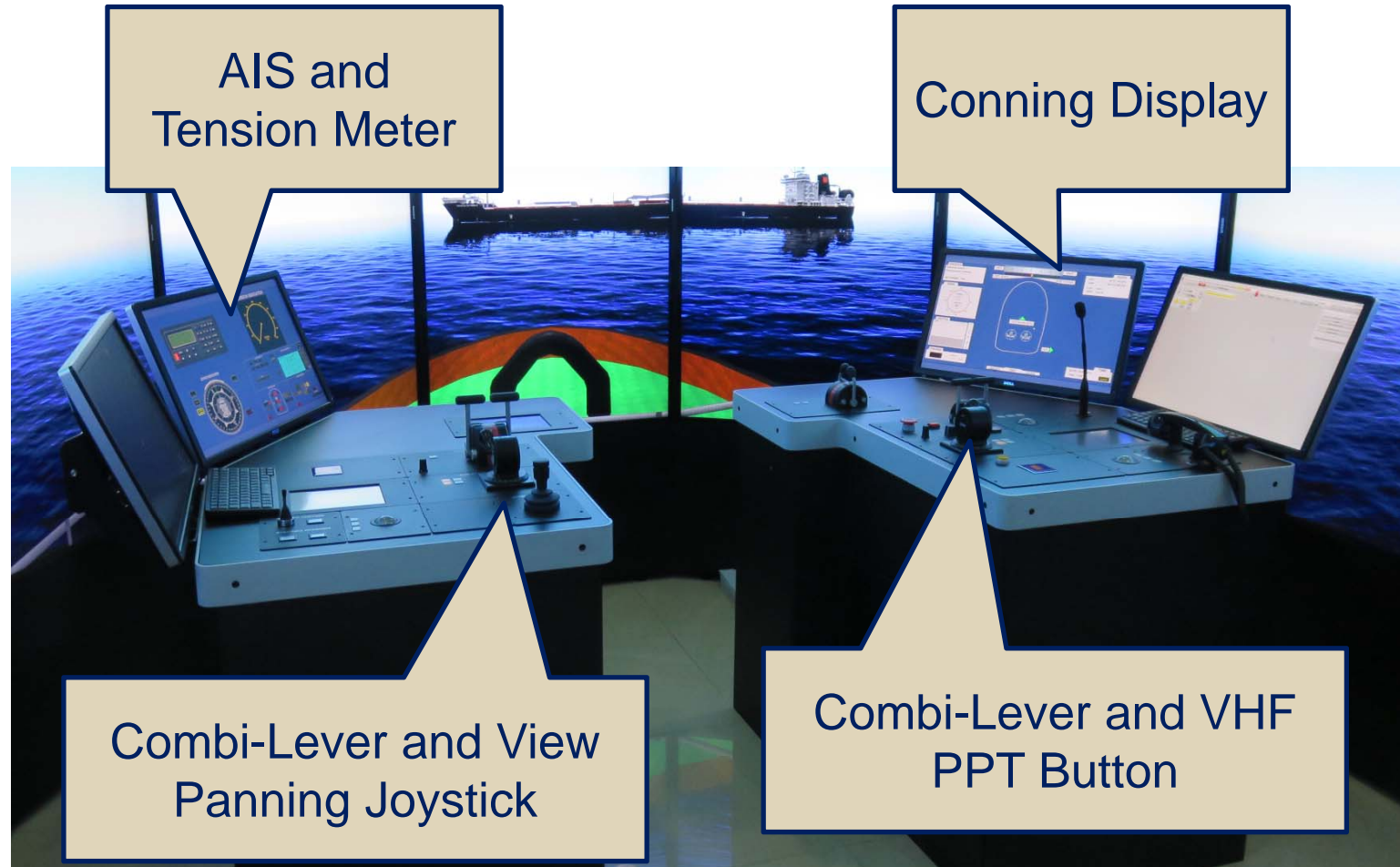
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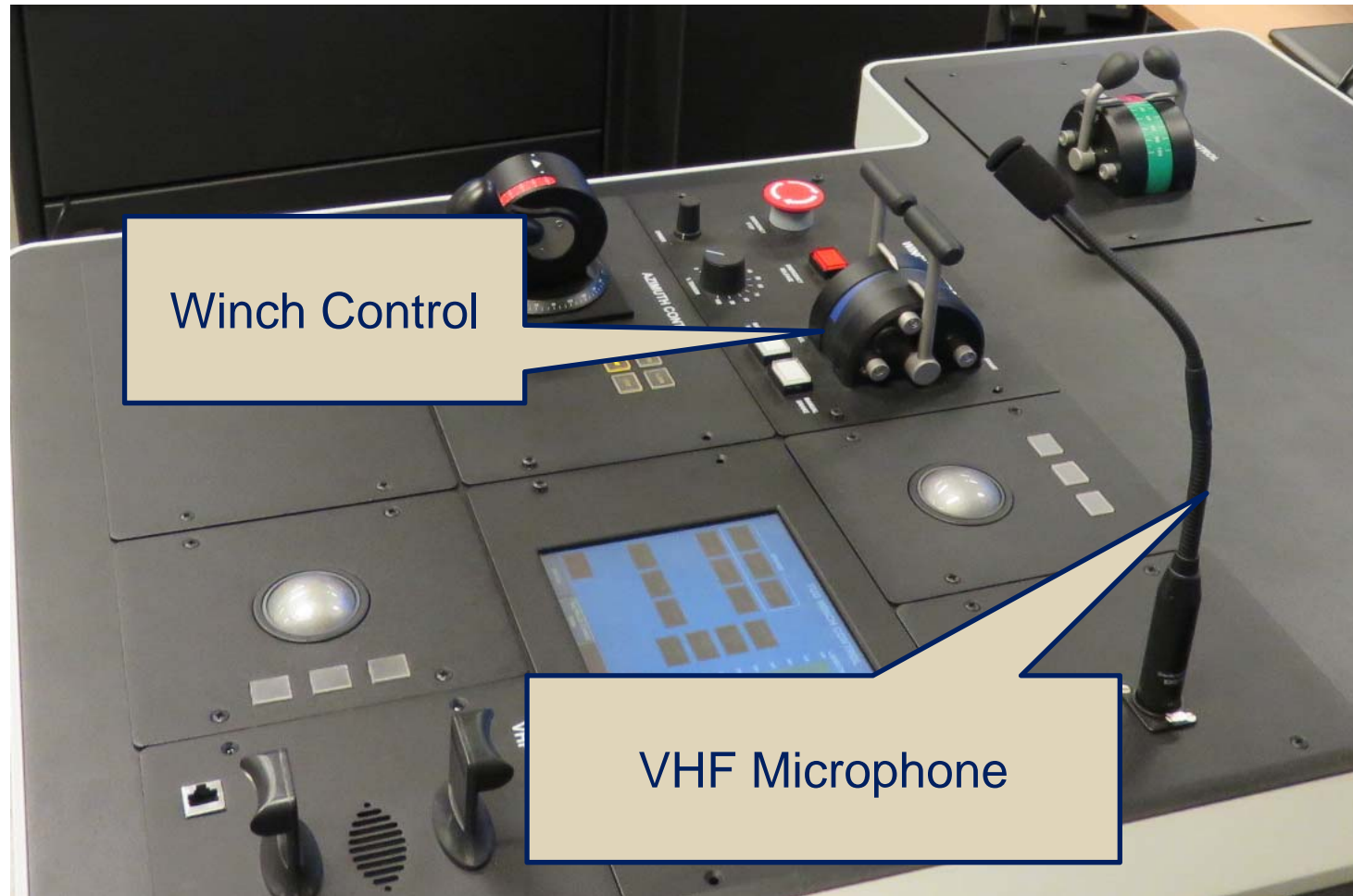
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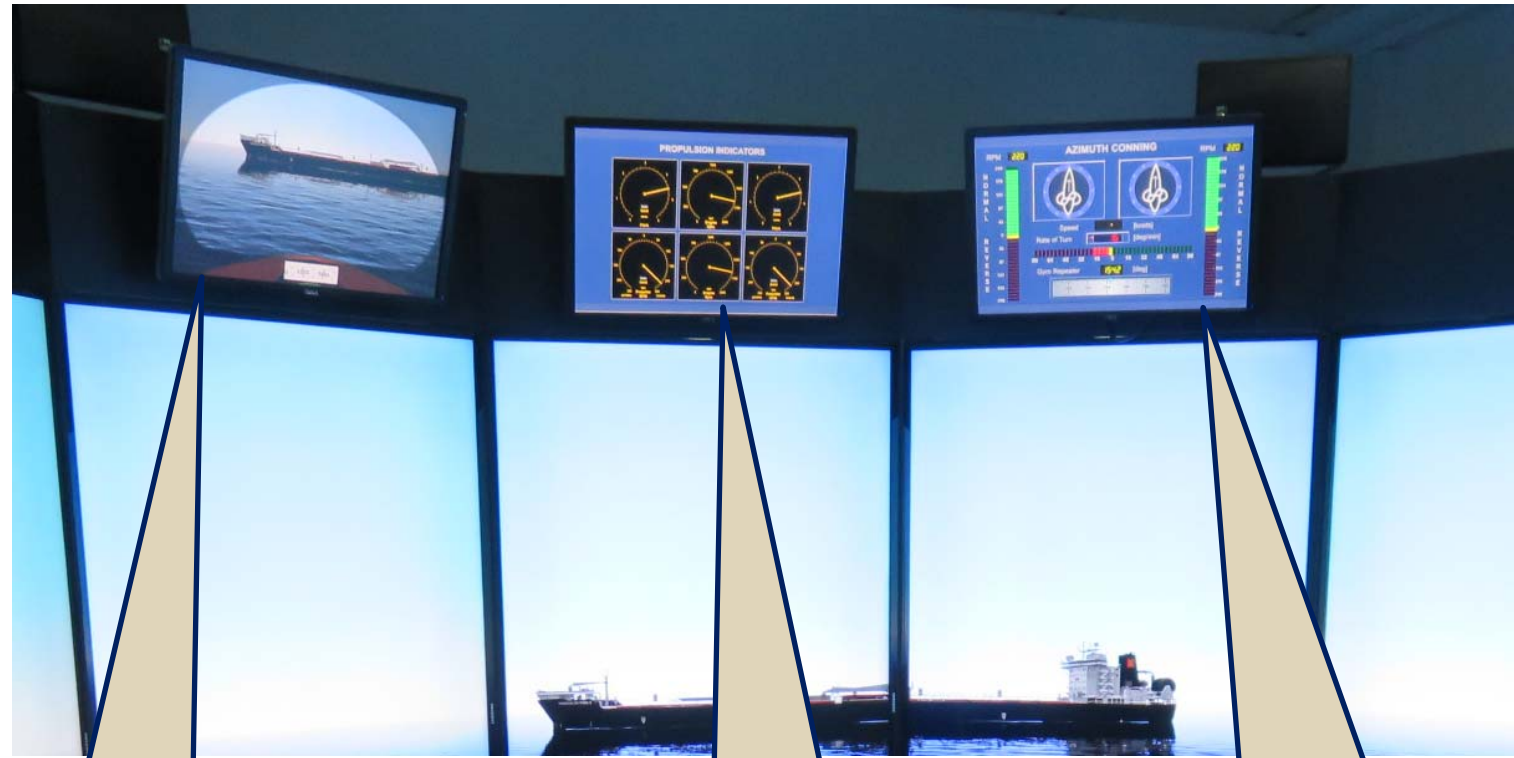
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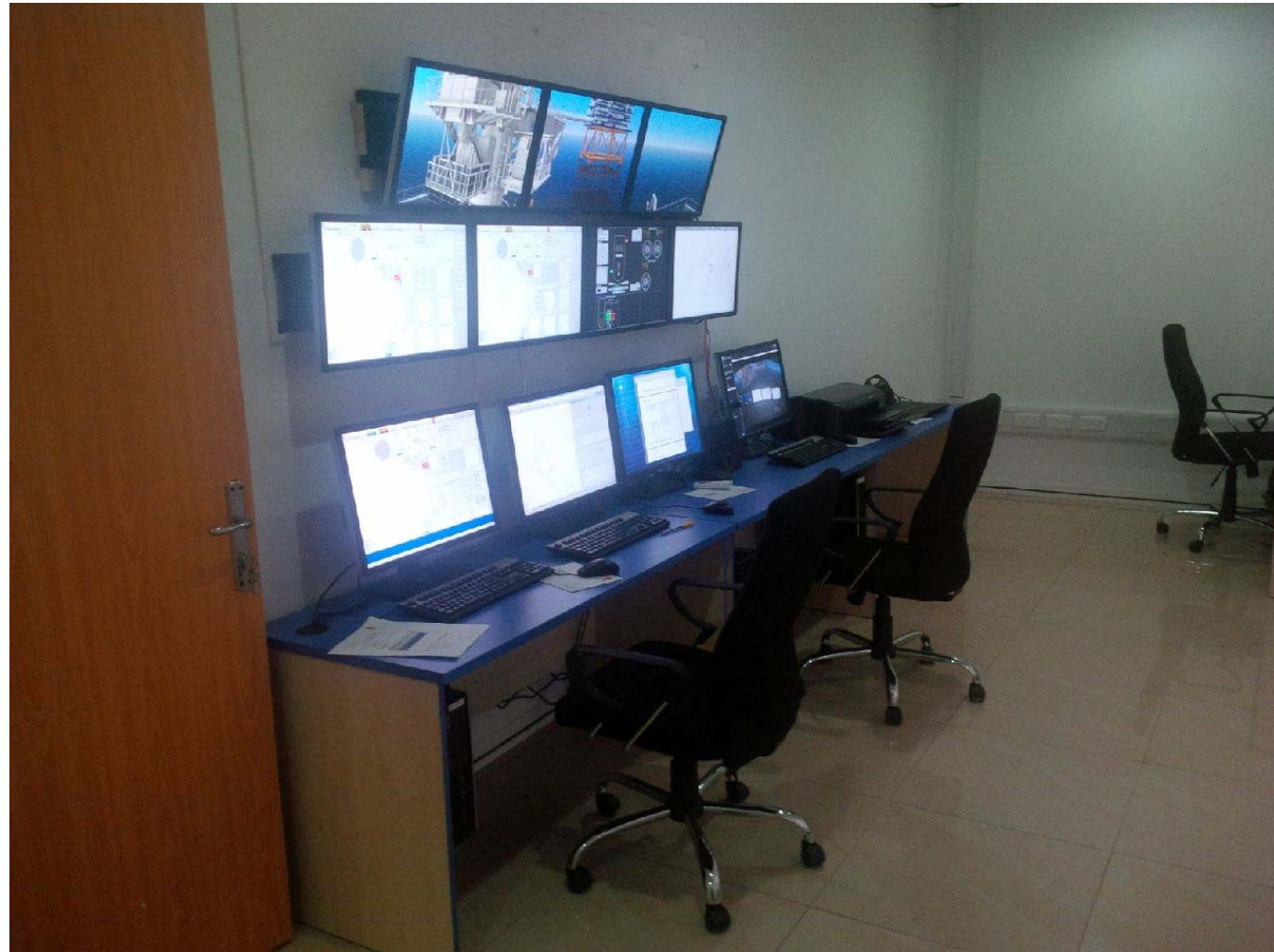
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