Fatal ferry accidents, their causes, and how to prevent them

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FATAL FERRY ACCIDENTS, THEIR CAUSES, AND HOW TO PREVENT THEM

A thesis submitted in fulfilment of the requirements for the award of the degree

DOCTOR OF PHILOSOPHY

From

the

UNIVERSITY OF WOLLONGONG

by

Neil Baird BA, ASIA, MPRIA, CNI

Australian National Centre for Ocean Resources and Security
Faculty of Law, Humanities and the Arts

2018
CERTIFICATION

I, Neil William Baird, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Australian National Centre for Ocean Resources and Security; Faculty of Law, Humanities and the Arts, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Neil W. Baird

28 February 2018
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Abbreviations, Acronyms and Initials

ABS. American Bureau of Shipping. United States’ classification society.

ACOPS. Advisory Committee on Protection of the Sea.

ACRO. Aircraft Crashes Records Office.

ADB. Asian Development Bank.

AIIB. Asian Infrastructure Investment Bank.

AIS. Automatic Identification System.

AMSA. Australian Maritime Safety Authority.

ARPA. Automatic Radar Plotting Aids.

ASR. Air Sea Rescue.

ATSB. Australian Transport Safety Bureau.

AusAID. Australian Agency for International Development.

AUSMEPA. Australian Marine Environment Protection Association.

BASI. (Australian) Bureau of Air Safety Investigation.


BOMI. Board of Marine Inquiry.

BMPVA. Baird Maritime Passenger Vessel database.

BV. Bureau Veritas. French classification society.

BWM. International Convention for the Control and Management of Ships’ Ballast water and Sediments. (of IMO).

CCG. Canadian Coast Guard.

CCS. China Classification Society.

CEFOR. Central Union of Marine Insurers.

CIC. Casualty Investigation Code (of IMO).

ClassNK. Short version of NKK Japanese classification society.
CMI. Comite Maritime International.
CNG. Compressed Natural Gas.

COLREGS. The International Regulations for Preventing Collisions at Sea (of IMO).

COI. Commission of Inquiry.

COSPASS/SARSAT. Satellite facilitated marine search and rescue system.

CSR. Corporate Social responsibility.

DBP. Development Bank of the Philippines.

DMA. Danish Maritime Authority.


DSMP. Domestic Shipping Modernisation Program (of the Philippines).

DWT. Dead Weight Tons. A measure of a ships carrying capacity including cargo, fuel, stores, crew and passengers.

EASA. European Aviation Safety Agency.

EBRD. European Bank for reconstruction and Development.

ECDIS. Electronic Chart Display and Information System.

ECS. Electronic chart system.

EEDI. Energy Efficient design Index.

EEZ. Exclusive Economic Zone.

EMSA. European Maritime Safety Agency.

EP. European Parliament.

EPIRB. Emergency Position Indicating Rescue Beacon.

EUROCONTROL. Integrates and harmonises air traffic management across all European countries.

EUROREP. European Vessel reporting System.

FAO. Food and Agriculture Organisation of the United Nations.
FOC. Flag of Convenience.

FRP. Fibre reinforced plastic. A construction material a.k.a. fibreglass.

FSF. Flight Safety Foundation.

GDP. Gross Domestic Product.

GISIS. Global Integrated Shipping Information System (of IMO).

GL. Germanischer Lloyd. German classification society. Now part of DNV.

GMDSS. Global Maritime Distress and Safety System.

GPS. Global Positioning System.

GRP. Glass reinforced plastic. A construction material, aka fibreglass.

GRT. Gross registered ton/tons. A volumetric measure of a ships capacity. Commonly used to describe the sizes of passenger vessels.

GT. Gross ton/tons, as above.

HCG. Hellenic Coast Guard.

HDPE. High density polyethylene. A rugged plastic construction material.

HELMEPA. Hellenic Marine Environment Protection Association.

HE. Human error.

HF. High frequency radio.

Hp. (hp) Horsepower.

HSC. High Speed Craft Code (of IMO).

IACS. International Association of Classification Societies.

IATA. International Air Transport Association.


ICAO. International Civil Aviation Organisation. The aviation counterpart of IMO. Based in Montreal.

ICC. International Chamber of Commerce.

ICG. Indian Coast Guard.
ICS. International Chamber of Shipping.

IFO. Intermediate Fuel Oil.

IGF. International Code of safety for Ships using Gases or other Low-flashpoint Fuels (of IMO).

IGO. Intergovernmental Organisation.


ILU. Institute of London Underwriters.

IMDG. International Maritime Dangerous Goods Code (of IMO).

IMF. International Monetary Fund.

IMO. International Maritime Organisation.

IMRF. International Maritime Rescue Federation.

INMARSAT. International Maritime Satellite Telecommunications Organisation.

INTERFERRY. International association of ferry owners and operators (Disclosure: The author is a member of INTERFERRY).

INTERMEPA. International Marine Environment Protection Association.

IRS. Indian Register of Shipping.

IRTAD. International Traffic Safety Data and Analysis Group of the OECD.

ISF. International Shipping Federation.


ISU. International Salvage Union.

ITF. International Transport Forum.

ITF. International Transport Workers Federation.

IUMI. International Union of Marine Insurers.

JAIC. Joint Accident Investigation Commission of the Estonian, Finnish and Swedish governments investigating the *Estonia* accident.

JAMRI. Japanese Maritime Research Institute.
JBIC. Japan Bank for International Cooperation.

JCG. Japan Coast Guard.

JICA. Japan International Cooperation Agency.

KRS. Korean Register of Shipping, a classification society.

Kw. Kilowatt.

kWh. Kilowatt hours.

LL. Load Line.

LMIS. Lloyd's Maritime Information Services.

LNG. Liquified Natural Gas.

LR. Lloyd's Register of Shipping. London based classification society.

LRETRU. Lloyd's Register Educational Trust Research Unit.

LRF. Lloyd's Register Foundation.

LRS. Lloyd's Register of Shipping (as above).

MAIB. Marine Accident Investigation Branch (of the UK).

MARINA. Marine Industry Authority (of the Philippines).

MARPOL. International Convention for the Prevention of Pollution from Ships. (IMO).

MAYDAY. Distress signal transmitted by radio.

MBOI. Marine Board of Inquiry.

MCA. Marine and Coastguard Authority (of the UK).

MDO. Marine Diesel Oil.

MEPC. Marine Environment Protection Committee (of IMO).

MES. Marine Evacuation Systems incorporating evacuation chutes and integrated liferafts.

MIT. Italian Ministry of Infrastructure and Transport.

MOB. Man (woman or person) over board.
MoS. Motorway of the Sea.

MRCC POM. Marine Rescue Coordination Centre in Port Moresby.

MRO. Marine Rescue Operations (library) of the IMRF.

MSAS. Member State Audit Scheme (of IMO).

MSC. Maritime Safety Committee (of IMO).

NF. Nippon Foundation.

NGO. Non Governmental Organisation.

NI. Nautical Institute (Disclosure: The author is a member of The Nautical Institute).


NLR-ATSI. NLR Air Transport Safety Institute.

nm. Nautical mile.

NMO. Norwegian Maritime Directorate.


NTSB. National Transportation Safety Board (of the USA).

NTSC. National Transportation Safety Committee of Indonesia.

OECD. Organisation for Economic Cooperation and Development.

OECF. Overseas Economic Cooperation Fund (of Japan).

OH&S. Occupational health and safety.

OSV. Offshore service vessel.

PAG-ASA, Philippine Atmospheric and Geophysical Sciences Association.

PAL. Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL) (of IMO).

PAMI. Philippine Association of Maritime Institutions.

PAN PAN PAN. Distress signal (less urgent) transmitted by radio.

P & I. Clubs. Protection and Indemnity clubs (Insurance).
PCG. Philippine Coast Guard.

PDP. Philippine Development Plan.

PIISA. Philippine Inter-Island Shipowners Association.

PM. Particulate matter.

PNG. Papua New Guinea.

PSO. Public Service Obligation.

PV. Passenger vessel, or vessels.

RAN. Royal Australian Navy.

RBG. Rescue Boat Guidelines (of the IMRF).

RCC Australia. Rescue Coordination Centre in Canberra.

RINA. Royal Institution of Naval Architects (UK).

RInA. Italian Register of Shipping (Classification society).

RN. Royal Navy.

RNLI. Royal National Lifeboat Institution of the United Kingdom and Ireland.

RNZN. Royal New Zealand Navy.

Ro-Pax. Roll on, roll off passenger and vehicle ferry.

Ro-Ro. Roll on, roll off vehicle ferry.

RPN. Republic of the Philippines Navy.

RSN. Republic of Singapore Navy.

SAR. Search and Rescue Convention of IMO. And, simply, search and rescue.

SCCG. South Korean Coast Guard.

SDR. Special Drawing Rights.

SMS. Safety Management System.

SNAME. Society of Naval Architects and Marine Engineers (USA).
SOLAS. Safety of Life at Sea Convention (of IMO).

SOS. Distress signal (traditional) transmitted by radio.

SRS. Ship Reporting System


SWATH. Small Waterplane Area Twin Hull. A type of catamaran with semi-submerging hulls.

TSS. Traffic Separation Scheme.

UN or UNO. United Nations or United Nations Organisation.


USCG. United States Coast Guard.

USN. United States Navy.

USOAP. Universal Safety Oversight Audit Program (of ICAO).

VDR. (or VDA). Voyage Data Recorder or “Black Box”.

VHF. Very high frequency radio.

VSL. Value of a statistical life.

VTS. Vessel Tracking System (or Service).

WBW. Work Boat World magazine.

WFSA. Worldwide Ferry Safety Association.


WMRC. World Maritime Rescue Congress (of the IMRF).

WMU. World Maritime University (Subsidiary of IMO).

WOC. World Ocean Council. An international maritime industry association.

WSC. World Shipping Council.
Glossary


**Accident.** An unintended event involving fatality, injury, vessel loss or serious damage, environmental damage or external property damage.

**Airworthy.** An aircraft is deemed to be airworthy if it is capable of safely flying over its intended route at the intended time.

**Allision.** An unintended, usually violent collision with a fixed object such as a bridge, wharf or quay.

*Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL).* The IMO’s PAL Convention “establishes a regime of liability for damage suffered by passengers carried on a seagoing vessel. It declares a carrier liable for damage or loss suffered by a passenger if the incident causing the damage occurred in the course of the carriage and was due to the fault or neglect of the carrier”. Entry into force 23 April 2014. (Source IMO).

* Ausmarine. Formerly known as Professional Fisherman. Australia’s maritime trade magazine. {Owned by the author’s family company.}

* Austal Ships. A leading Australian builder of large aluminium ships. One of the two main pioneers of high speed RO-Pax vessels.

* Banka, bangka, banca. Traditional Filipino craft used for fishing, cargo and passenger carrying. Can be sail, paddle or engine powered. Essentially comprising a slim, canoe-like main or central hull stabilised by two outrigger floats usually attached very flimsily. That makes them particularly vulnerable to capsize in the event of an outrigger float breaking off the vessel. Similar craft also operate in Indonesia.

* Barge. Traditionally a non-powered vessel used for carrying cargo of various kinds, sometimes people, and propelled using an associated tug.

* Beam. The extreme lateral width of a vessel.

* Boat. Generally a small vessel, often undecked.

* Bow door. A large door through which vehicles are driven and which is located at the extreme front of the vessel.

* Bridge. (Of a ship or boat). The control or command position from which the vessel is navigated or driven.

* Bridge team management. The organisation of the officers and ratings working on the bridge or wheelhouse of a vessel.
**Bulkheads.** Walls or panels dividing a vessel laterally into compartments. They structurally support the hull sides of the vessel and, if watertight, can subdivide the vessel's hull into watertight compartments.

**Bulker.** A ship designed to carry cargoes such as minerals, grain or woodchips in bulk utilising large watertight compartments.

**Bureau Veritas.** A classification society.

**Carley float.** A lifesaving device resembling a small, double-sided boat. Designed to support a number of survivors.

**Captain.** The person in command or control of a vessel and responsible for its safe navigation.

**Casino ship/boat/vessel.** Any vessel either berthed or underway, the primary purpose of which is to facilitate gambling.

**Catamaran.** A vessel having two separate hulls joined by a rigid bridge-deck. The two separate hulls normally comprise several watertight compartments. Those factors make catamarans more stable and less likely to sink than single hulled craft. They, and trimarans, have the best safety record of all ferries. Having two fine hulls normally means that catamarans incur less water resistance than conventional vessels and, thus, require less power.

**Classification society.** A mutual organisation charged with ensuring the safety and seaworthiness of vessels.

**Collision.** An unintended, usually violent, connection with another vessel.

**Compartments, watertight.** Are compartments in a vessel's hull separated from the adjoining compartment by a water-tight bulkhead. They enhance the buoyancy of the vessel especially in the event of an accident.

**Consequence.** The outcome of an accident.

**Contact.** Striking any fixed or floating object other than those involving a collision, allusion or grounding.

**Container ship.** A ship designed and constructed to carry standard steel shipping containers of either 6x2.5x2.5 m or 12x2.5x2.5 m external dimensions.

**COSPAS- SARSAT.** The joint American/Russian satellite radio distress monitoring system that forms the basis for the use of EPIRBs.

**Crew.** Persons employed to work on a vessel at the direction of its captain.
Crew Supply Boat (Vessel). A fast offshore service vessel used to carry personnel and light supplies to and from offshore oil and gas installations and vessels.

Critical wash. Vessel wake that causes damage to other vessels or shorelines.

Cronyism. Organisation of business among a group of friends or acquaintances who have undue influence over a government.

Crony capitalism. An economic system based on cronyism (see above).

Cruise ship/liner/vessel. A live-aboard passenger vessel that voyages on irregular routes.

Developed country. Any country with a gross domestic product per capita measure that places it in the top quartile of nations. A euphemism for “rich” country.

Developing country. Any other nation. A euphemism for “poor” country.

DNV-GL. A Norwegian/German classification society.

Domestic shipping. Any shipping activity undertaken within the maritime boundaries of the home country of the vessel concerned.

Explosion. An accident or incident where an explosion is the initiating event.

Fast ferry. Any ferry having a service or operating speed of 25 knots or more.

Fast catamaran ferry. A twin-hulled ferry with a service speed exceeding 25 knots.

Fast hydrofoil ferry. A fast ferry, usually single-hulled, that uses the speed of the vessel acting on hydrofoils to lift its hull clear of the water's surface.

Fast jetfoil ferry. Similar to a hydrofoil but with waterjet propulsion operating through the hydrofoils.

Fast monohull ferry. A single-hulled ferry with a service speed exceeding 25 knots.

Fatalism. A belief that whatever happens in one’s life is pre-ordained so that it is pointless to try to change or improve it.

Fatigue. Tiredness arising from lack of sleep or overwork or a combination of the two.

Ferry. A vessel carrying paying passengers on a regular service on a defined route.
Fire. Accidents where fire is the initiating event.

Flags of convenience. Are flown by vessels registered in a particular flag state for reasons of reduced taxation, lower crewing costs or less stringent safety or seaworthiness standards.

Flag state. The country where a vessel is officially registered. Its home country.

Float. A buoyant device normally used in the sense of life saving.

Flotsam. Rubbish floating on the sea.

Frequency. Number of times an action occurs.

Gangway. A plank or ramp used to provide access to a vessel in harbour.

Grandfathered. An allowance in regulation or rule-making for pre-existing conditions prior to the rule or regulation being implemented.

Grounding. When a vessel strikes the bottom of a waterway or an underwater object such as a rock or coral.

Hazard. Any kind of object such as a reef or rock or man made structure that presents a danger to a vessel. Can also be a weather hazard such as a storm.

High speed ferry. Any ferry having a service or operating speed exceeding 25 knots.

Hull. The main, outer shell of a vessel below its sheerline.

Human error. Can be defined as wrongful decisions, mistakes, blunders, carelessness, miscalculations or negligence made by or on the part of human beings.

Human factors. Any action, usually malign or dangerous, that can be attributed to human action or negligence.

Hydrofoil. Any fast craft with a main hull that lifts clear of the water by means of its forward speed creating lift using hydrofoils.

Hypothermia. A dangerous human condition caused by excessively low body temperature.

Incat Tasmania/Australia. An Australian builder of large, fast, aluminium Ro-Pax ships. One of the pioneers in the development of such vessels.

Incident. An unplanned activity.
**INTERFERRY.** International association of ferry owners, operators and their suppliers. {Disclosure: The author is a member of INTERFERRY).

**International shipping.** Shipping activity that involves voyages between two or more sovereign states.

**Jetfoil.** See *Fast Jetfoil Ferry,* above.

**Jetty.** A man-made structure extending from the shore into the sea to facilitate access to vessels.

**Life boat.** A small boat used to provide a means of escape from and survival in the event of a larger vessel sinking.

**Life float.** A simple buoyant raft-like device with the same purpose as a life boat.

**Life jacket.** A personal, wearable floatation device.

**Life preserver.** Similar to a life jacket.

**Life raft.** A compact floatation device, usually inflatable, that provides refuge for survivors in the event of a ship or boat sinking.

**Lloyd's Register.** Classification society.

**Long-tail boat.** Small, about 12 metres LOA, engine powered, fast, narrow boats used as ferries and tourist boats in Thailand


**Master.** The person in command or control of a vessel who is aboard the vessel and directing its navigation and operations.

**Mayday.** A distress signal broadcast by radio or telephone indicating that the sender is in serious and immediate danger.

**Motor bangca or banca.** An engine powered bangca. Common in the Philippines.

**Nautical Institute (The).** The Nautical Institute, a British based international organisation of master mariners which promotes safety at sea and greater professionalism among its members. {Disclosure: The author is a member of The Nautical Institute.}

**Near miss.** An incident such as a collision, allusion or grounding that is narrowly avoided.
**Negligence.** Negligence is the failure to exercise reasonable care under the circumstances. It has been defined in the New Shorter Oxford English Dictionary, 1993, as: “Lack of attention to what ought to be done; failure to take proper or necessary care of a thing or person; lack of necessary or reasonable care in doing something; carelessness”.

**Officers.** The trained, experienced and educated executives charged with the safe and economical operation of a vessel.

**Open registry.** A legal device designed to attract shipowners to register their ships on a normally more expensive or rigorous national ship registry.

**Outboard motor.** An easily removable marine engine that is attached on a smaller vessel, usually at the stern.


**Pan Pan Pan.** A distress message transmitted by radio when a situation is threatening but not yet catastrophic. Assistance is required but not necessarily immediately.

**Passenger.** A person who has paid to undertake a voyage on a ship or boat.

**Passenger vessel.** A vessel having the primary purpose of carrying passengers.

**Pilot.** A highly qualified mariner with considerable local knowledge who advises vessel masters on their transits through navigationally complex areas, usually in to or out of ports.

**Pool noodle.** A cheap, simple, pipe shaped device made from foam plastic that is used to provide buoyancy to recreational swimmers in pools and at beaches.

**Poor country.** Any sovereign nation having a Gross Domestic Product (GDP) per capita of less than USD 3,000 per annum at 2015 prices.

**Port side.** To the left side of a vessel, looking forward.

**Port State Control.** The regulation and control of ships by the government of the country in which they are currently located.

**Port State Inspections.** The enforcement of the above.

**Quay.** A man-made structure designed to preserve a shoreline and to provide convenient access to vessels berthed alongside it.
Ratings. Junior ship’s personnel whose activities are directed by the vessel’s officers.


Risk. The possibility of an accident or disaster occurring.

Roadworthiness. The ability of a road vehicle, truck, bus or car, to safely reach its destination.

Ro-Pax ferry. A ferry designed, constructed and equipped to carry passengers and road vehicles. Conventional monohull Ro-Pax ferries have proved to be especially vulnerable to accidents caused by human error.

Ro-Pax/Train ferry. A ferry designed, constructed and equipped to carry passengers, road vehicles and railway trains. They have similar vulnerabilities to conventional Ro-Pax ferries.

Ro-Ro vessel. A cargo vessel designed, constructed and equipped to carry road vehicles, usually trucks.

Satcom. Satellite communications. Such as by INMARSAT, Iridium and Thuraya.

Seafarers. Seagoing personnel generally.

Seamanship. “…the art or practice of managing a ship or boat at sea; the skill of a good seaman”. The New Shorter Oxford English Dictionary, 1993.

Seaman. A skilled seafarer.

Seaworthiness. A ship is seaworthy if it is fit to put to sea and able to survive the prevailing or expected sea conditions when fully loaded. It should be fully and competently manned, properly navigated and carrying appropriate stores and fuel for the intended voyage.

Sheer line. The curve of a vessel’s deck between the top of the bow and the top of the stern. Can also be described as the curvature of the deck in a longitudinal direction.

Ship. A vessel, usually fully enclosed or decked, used primarily for commerce or war.

Ship management. The management of vessels with the objectives of profitability, safety, environmental soundness and longevity.

Situational awareness. The self-knowledge of precisely where a person or, particularly the vessel he is operating, is located related to other vessels, the shore, the sea bottom or other hazards.
SKYbrary. Library and database of aviation safety data and statistics. A joint venture of ICAO and EUROCONTROL.

Snag. A log, branch or other piece of wood floating or submerged in water.

Special Drawing Rights. (SDR). SDRs can be exchanged for freely usable currencies. Their value is based on a basket of five major currencies. That value is calculated daily and posted on the IMF website. On 26 May 2017 SDR 1 = USD 1.38.

Starboard side. On or to the right hand side of a vessel, looking forward.


Super critical wash. A vessel's wake or wash that can cause significant danger or damage to other vessels or the shoreline if the vessel is operated negligently.

Superstructure. The part of a vessel that is constructed above its sheer line.

Tanker. A ship designed, constructed and fitted-out for the carrying of liquid cargoes.

Tourist boat. A usually small ferry used to carry tourists to view or experience local marine attractions.

Trimaran. A triple hulled vessel.

Tug. A powerful, usually small, vessel used for towing or pushing other vessels.

Unseaworthy. A vessel that is unfit to go to sea because of deficiencies in design, construction, maintenance, equipment or crew competencies.

Vessel. A ship or boat capable of navigation while carrying a cargo or passengers or both.

Voyage planning. Utilising a navigational plan to ensure the safety and predictability of a voyage.

Wake. The area of disturbed water behind a vessel caused by the vessel's progress through the water.

Wash. Similar to wake above.

Waterjet. A pump-like device used to propel a vessel by forcing water astern under very high pressure.
Watertight compartments. Sections of a vessel's hull separated by watertight bulkheads.

Wharf. Similar to a jetty in being a man-made structure providing access to vessels. Usually constructed parallel to the shore.

Work Boat World. International maritime trade magazine specialising in non-cargo commercial and government vessels. (Disclosure: WBW is owned by the author's family company.)
Personae

Adamson, Lee, Head, Public Information Services, IMO

Andrew, Warwick, Judge, Chairman of the PNG Government”s Commission of Inquiry into the sinking of the Rabaul Queen.


Augustin, Carlos, Commodore Retd. Republic of the Philippines Navy. Founding Commandant of the Philippines Coast Guard.

Ballantyne, Stuart, Dr(Hon). Principal of Sea transport Solutions Pty Ltd, naval architects, Queensland, Australia. Strong advocate of sensible, affordable sea safety.

Bateman, Sam, AM, PhD, Commodore RAN Retd. Professor (Emeritus), Founder of Australian National Centre for Oceanic Security and Research, University of Wollongong.

Boisson, Philippe, PhD, Author and legal counsel to Bureau Veritas.

Clifford, Robert, Dr (Hon), AO, Founder and Chairman, Incat Pty Ltd, ship builders, Tasmania.

Corrigan, Michael, Chief Executive Officer of INTERFERRY from January 2017. Previously CEO of BC Ferries, Canada.

De la Cruz, Gualterio, Commodore Retd. Republic of the Philippines Navy. Former Chief of Staff of the Philippines Coast Guard.

Go family, Owners of Cebu based Sulpicio Lines, now Philippine Span Asia, the world”s worst, in terms of passenger fatalities, ship owning company.

Grainger, Michael, Chairman Interferry 2015-2018, Chairman TT Line (Tasmania) 2012 -, Founding Managing Director Liferaft Systems Australia.

Grech, Michelle, PhD, Australian academic specialising in human error especially as it relates to shipping operations and fatigue.

Grey, Michael, MBE. Master mariner, journalist, former editor of Lloyd”s List, columnist. Strong exponent of maritime safety and common sense.

Islam, A.K.M. Fakhrul, Chief Engineer and Ship Surveyor, Department of Shipping, Bangladesh. Strong exponent of improved shipping safety in Bangladesh.

Lim, Ki Tack, The Hon, Secretary-General of the International Maritime Organization, 2016-.

Mahapatra, Ashok, Director of the Maritime Safety Division of IMO, 2015 -


Morris, Peter, The Hon, OAM. Former Minister of Transport in the Australian Government. Instigator of the “Ships of Shame” parliamentary inquiry and convenor of the “ICONS” inquiry into ship safety.


Pastrana, Christopher (Chet), Founder, Chairman and Chief Executive of Archipelago Ferry Corp, owners of FastCat ferries, Manila Philippines.

Penny, David, Manager Ship Safety – East and North, Australian Maritime Safety Authority, seconded to raise safety standards of domestic shipping in Indonesia.

Pike, Dag, Master mariner, journalist, author. Campaigner for better seamanship and safety.

Plimsoll, Samuel, MP. British Member of Parliament mid-nineteenth century. Ceaseless campaigner for shipping safety. Promoter of the “Plimsoll (load) Line”.


Richardson, Toby, Managing Director of Richardson Devine Marine Pty Ltd, ship builders, Tasmania.

Roos, Johan, Director of Regulatory Affairs for INTERFERRY, Represents INTERFERRY at IMO.

Roueche, Len, Chief Executive Officer of INTERFERRY 2002-2016. Strong advocate of greater ferry safety.

Sharp, Peter, Owner and CEO of PNG based Rabaul Shipping. Ultimately responsible for the Kris and Rabaul Queen ferry disasters.


Stehr, Hagen AO, Chairman Stehr Group. Noted Australian fisherman, fish farming pioneer, columnist and Founder/Chairman of Australian Maritime and Fisheries Academy. Strong advocate of improved maritime training and education to improve safety.

Stokke, Torleif, Managing Director Servogear AS, Norway.

Walker, James, American lawyer. Publisher of www.cruiselawnews.com, a blog. Specialist in litigation against cruise lines. General maritime lawyer.

Weisbrod, Roberta, PhD. Founder and Convenor of the Worldwide Ferry Safety Association.

Yoo Byung-eun, Owner of the South Korean ferry Sewol which sank in 2014 killing 304 passengers and crew. He was found negligent and was to have been charged with murder had he not suicided.
FATAL FERRY ACCIDENTS, THEIR CAUSES, AND HOW TO PREVENT THEM

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ABSTRACT

Almost 2,000 deaths are known to occur annually as a result of passenger vessel accidents. Practically all of them (91%) involve ferries. Because of reporting deficiencies it is estimated that the actual total toll could well be at least 50 per cent higher. While even that number is relatively insignificant compared with the numbers of deaths caused by cigarette smoking, road accidents, Hepatitis, Malaria, Tuberculosis, illegal drug use, American guns and similar preventable causes of death, it still involves considerable personal tragedy and substantial economic cost. The accidents occur more frequently and their impacts are significantly more severe than, for example, aviation and railway accidents.

Importantly, some 76% of those known accidents and 95% of their resulting deaths occur in the poor, tropical regions of the world. Indeed, 80% of them have occurred in just ten developing countries. Some 93% of them occur on usually unavoidable domestic voyages. Their victims are thus the least able to prevent or avoid them. Moreover, by the author’s estimate, about 88% of the accidents and 98% of the deaths are directly attributable to human error. This is mainly in the form of unseaworthy vessels, poor lookout, overloading, general negligence and poor seamanship. These factors are exacerbated by evacuation, lifesaving equipment and search and rescue deficiencies. Put simply, the causes are overwhelmingly behavioural and cultural rather than structural or mechanical.

This multi-disciplinary study is based on an analysis of a database of passenger vessel accidents that the author has compiled since 1985 and which, in total, covers all known passenger vessel accidents that have occurred in the world since 1800. In attempting to make objective and valid assessments of the causes of the accidents, the period covered has been reduced to the final 50 of those 215 years. The study has then been further focused on ferries and tourist boats. Some 681 fatal ferry accidents, resulting in nearly 60,000 deaths, have occurred over that half century involving such vessels.
Thanks to the introduction of the Internet a much greater availability and accuracy of data has enabled an even more intense focus to be made on the most recent sixteen years since 1 January 2000. This means, particularly, that the vessels concerned are comparatively modern and are more likely to be operating under current national and international rules and regulations. It also means that many more accidents that occur in remote parts of the world are being reported.

The analysis is wide-ranging and comprehensive even if somewhat subjective in attributing accident causes. In any case, no more objective method has been found or can be envisaged. The statistics derived from the database show conclusively that as the great majority of deaths are the result of human error, they should be preventable.

Those figures are compared with those arising globally from commercial aircraft accidents, oil tanker shipping accidents and from road accidents occurring in developed countries. Those modes of transport have far superior accident reduction records than does the ferry sector, particularly over the past three decades. Their accidents, too, have been incomparably better recorded than have ferry accidents. They provide valuable ideas as to how the latter sector could improve significantly.

The careful historical statistical analysis involved has exposed some previously unforseen facts. For example, conventional monohull Ro-Pax ferries, especially older vessels, are disproportionately dangerous. Their sale to developing countries should be banned. Conversely, however, fast catamaran ferries are disproportionately safe. Their adoption and use should, therefore, be encouraged.

Taking a holistic approach, the study has involved elements of history, politics, economics, psychology, sociology, law, naval architecture, ergonomics and geography. The summary and conclusion describes and recommends a number of improvements to ferry design, construction, outfitting, and, most particularly, regulation, enforcement and operation.

It strongly urges major reforms to the International Maritime Organisation, using the International Civil Aviation Organisation as a model. The objectives of those reforms are to assist and encourage developing nations in reducing their incidence of domestic ferry accidents. If widely implemented, those reforms and improvements, most of which should not be prohibitively costly, should lead to significant reductions in the number of passenger vessel accidents and the death toll arising from them.

1 February 2018
Acknowledgements

The creation of this thesis has involved a very lengthy voyage. It commenced in 1975 when, enjoying our honeymoon in the Aegean Sea, I noticed the dangerous physical state and the sometimes poor handling of many of the ferries my wife and I sailed on. I was so concerned that we remained on deck throughout our Greek "Odyssey" with some buoyant material close by. I certainly did not trust the lifeboats.

By the mid-eighties our maritime publishing company was becoming well-established and had gone "global". In 1986 we published a series of articles by Dag Pike, a well known and respected master mariner, adviser to the British Royal National Lifeboat Institution, and maritime journalist. They exposed the design, equipment and operational deficiencies that were then rampant on many North Sea and English Channel ferries. We did not name any of the ferry owning companies individually.

However, our articles upset one company in particular. Despite having already lost a ferry and six people a few years previously, mainly due to the deficiencies highlighted in our articles, its lawyers threatened to sue us for defamation unless we retracted our very general allegations and apologised. Shortly thereafter, another of their ferries capsized killing nearly 200 passengers and crew. While, probably unsurprisingly, we never heard from that company again, the experience certainly piqued my interest in ferry safety. Albeit perversely, I thank them for that.

I have been particularly fortunate in my choice of career because it has enabled me to travel frequently and extensively to maintain contact with the global maritime industry. Among many other vessels from canoes to nuclear aircraft carriers, I have travelled on vast numbers of ferries of all types, shapes and sizes in many parts of the world. I have come to know numerous ferry designers, builders, equipment suppliers and regulators. Almost invariably they have politely and very informatively answered my many queries about ferries and their operations. There are too many of them to thank individually but they know who they are.

Regrettably, I cannot say the same for a minority of the ferry owners I have queried. While most have been politely forthcoming, some have been, to put it generously, guilty of obfuscation. That, of course, further piqued my interest in their operations.

That interest was maintained throughout my subsequent maritime publishing career and, when I "semi-retired" in 2013 I realised that the material I had compiled would make a good basis for a book on the subject. A friend, who had recently completed an "advanced age" doctorate, suggested that I follow the same course to ensure its disciplined completion.

Accordingly, in early 2015, I contacted another friend, Professor Sam Bateman, a former Commodore in the Royal Australian Navy and, subsequently, the founding director of the Australian National Centre for Oceanic Research and Security (ANCORS) at the University of Wollongong (UOW). He put me in touch with his successor, Professor/Captain Stuart Kaye, who agreed to supervise my doctoral
efforts. Stuart turned out to be both very knowledgeable and enthusiastic about the subject.

At ANCORS and the wider UOW I have been fortunate to meet other interested people whose input I value. Professor Alistair McIlgorm and Associate Professor Marijke Batterham advised me on statistical analysis and Dr Heather Jamieson and her colleagues provided invaluable "how to" advice in their pre-doctoral tutorials. Ms Myree Mitchell, the "Queen Bee" of ANCORS, always knew where everyone and everything were to be found. The UOW librarians were helpful despite the obscurity of my thesis subject.

Dr Roberta Wiesbrod, New York based Executive Director of the Worldwide Ferry Safety Association, and one of the very rare people who shares my obsession with the unfortunately too obscure subject of ferry fatalities, has very generously shared information and ideas with me for many years.

I have also been very fortunate in my choice of sons. All three have been interested in and contributed ideas to this project. Andy, in particular, has given me considerable advice about the information technology it has involved. Given how little I knew at the outset, that has been invaluable. Cam has filled in gaps in my knowledge of naval architecture and Alex has helpfully published many articles that have arisen from this work.

Rose, my partner in both life and business has, as always, supported me strongly throughout this undertaking and, very importantly, kept us solvent. She has contributed many valuable ideas, a steady hand and endless common sense. She has also endured considerable neglect from a husband who has probably been boringly over focused on this work. I trust that some of the conferences we have attended and the more interesting ferry trips we have undertaken have, at least partially, compensated for that.

My late parents imbued me with a great love of and fascination with the sea, ships, boats and literature. Without that, this work would never have commenced.

This research has been conducted with the support of the Australian Government Research Training Program Scholarship.

Neil William Baird

Clareville, NSW, February 2018.
Chapter 1

Introduction

_The best-built, equipped and „safest“ ship is doomed if its commander and officers fail to exercise good seamanship and common sense._

1.1.0. Introduction.

In 1901 Captain J.C. Voss sailed a primitive eleven metre dugout canoe most of the way around the world from Vancouver in Canada.¹ Eleven years later the world’s acclaimed safest, fastest and most luxurious ship, the „unsinkable“ Titanic, collided with an iceberg off Newfoundland and sank with massive loss of life.²

![Image 1.1. The sinking of the „unsinkable“ Titanic significantly raised the wealthy world’s awareness of maritime safety and led to some important improvements (Willy Stower painting ex Wikipedia).](image)

These two events highlight the dichotomy with respect to maritime safety that has seemingly always existed. That is between behavioural and cultural approaches and structural, mechanical and regulatory ones. Put simply, good

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¹ Voss, J. C. _The Venturesome Voyages of Captain Voss_ (Century Hutchinson, first published 1913, Third ed, 1989)
² Gardiner, R. _The Great Titanic Conspiracy_ (Ian Allan Publishing, 2010)
seamanship and common sense can ensure the safe navigation of almost anything that can float. Conversely, the best-built, equipped and „safest” ship is doomed if its commander and officers fail to exercise good seamanship and common sense.

Fortunately, good or, at least, adequate seamanship and seaworthiness are the norm. Of the 2.2 billion ferry passenger voyages estimated by industry body INTERFERRY to be made annually (probably more like 5 billion), only about 36 voyages are known to have resulted in disaster. The record for the cruise and tourist vessel sectors is even better. Indeed, cruise ships, cargo liners and casino ships have been involved in only eight per cent of the fatal accidents and were responsible for only 1.2 per cent of the fatalities described in the *Baird Maritime Passenger Vessel Accident* database. Arguably, a significant proportion of those fatalities could be attributed to suicides. It is nearly impossible, in most cases, to determine whether a „person overboard” is an accident or a suicide. It should be noted, though, that sea travel is the third safest mode of public transport after aviation and rail. It is far safer than travel by road.

**1.2.1. The problem in proportion.**

About 2,000 „known”, and possibly as many as 3,000, deaths have occurred annually from 2000 to 2015 as a result of passenger vessel accidents. That figure comprises the deaths known to have occurred from January 2000 to December 2015 when, thanks largely to the widespread adoption of the Internet, the average number of known fatalities recorded in the *BMPVA database* nearly doubled from the average of the previous 34 years.

The author estimates, by very careful and conservative extrapolation, that the actual figures for both accidents and fatalities must be at least 50 per cent higher than the „known” figures. As described in chapters 2 and 5, and in item 1.3.1, accidents were significantly under-reported in many of the countries discussed. It is believed that is still the case in some such as DR Congo, Myanmar, Brazil, Peru and the Philippines. It must be emphasised that reports from remote places in developing countries, while much more prolific than in pre-Internet days, are still believed to be far from comprehensive.

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3 The international association of ferry owners, operators and suppliers. Even that figure is probably little more than a guess. The real number is probably considerably higher, most likely at least double. In an internal memo, the Chairman of the Interferry Domestic Ferry Safety Committee noted in December 2017 that the Chinese Maritime Safety Administration presented a ferry ridership figure of 1.8 billion in China alone. Unfortunately, little accurate global data is available. [www.interferry.com](http://www.interferry.com).


5 Author estimate. See comments on Gabon, Congo and Nigeria on next page and on the Philippines in 1.3.1. and 1.3.2

6 Appendix A, Ibid.

7 Ibid.

8 Described in 1.3.1.
For example, no reports of ferry fatalities have been found for Gabon and Congo. They adjoin DR Congo and have very similar geographic, cultural and economic conditions and ferry activities but smaller populations. It seems very unlikely that no fatalities have been occurred there. Similarly, a recent paper analysing boat and ferry fatalities on inland waterways in Nigeria, without providing details, lists numerous fatal accidents that have not been recorded elsewhere. That list comprises accidents that occurred between 2004 and 2009. The BMPVA database lists three fatal accidents resulting in 323 fatalities over that period. That compares with 308 fatal accidents with an unknown but obviously much larger number of victims listed in the Nze paper.

There is no evidence to indicate that a sudden and dramatic increase in the number of accidents has occurred since 1 January 2000. The most likely reason is a dramatic, Internet facilitated, reporting improvement.

While even 3,000 fatalities is relatively insignificant compared with the numbers of deaths caused by cigarette smoking, road accidents, Hepatitis, Malaria, Tuberculosis, illegal drug use, American guns and similar preventable causes of death, it still involves considerable personal tragedy and substantial financial cost. The accidents occur more frequently by every measure than do, for example, aviation and internally caused railway accidents described in Chapter 4.

Unfortunately, though, the accidents that do occur mostly do so in the poorest, most ferry dependent parts of the world. In fact, in the half century to the end of 2015, eighty per cent of fatalities arising from passenger vessel accidents occurred in just ten poor or comparatively poor developing countries. Indeed, 90 per cent of ferry fatalities occurred in just 20 countries from 1966 to 2015 and from 2000 to 2015 that percentage rose to 91 per cent of all global fatalities. Those fatalities almost invariably (93%) occur on domestic voyages. Fifteen of those countries were included in both periods. The dangers to passengers there are both very real and very preventable. They, and their potential solutions, are explored in detail here and especially in Chapters 5 and 10.

It should be noted that fewer than ten per cent of fatal passenger vessel accidents involved cruise ships, casino vessels or cargo liners. They resulted in 688 or 1.2 per cent of fatalities over the half century described and analysed. Almost all cruise ships, casino ships and cargo liners have been engaged in international voyages when involved in accidents. They tend to carry wealthier passengers. That ensures that cruise ship accidents are accorded much more publicity than ferry accidents. Since 1988 there has only

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10 Appendix A, Ibid.
11 Ibid.
12 Ibid.
13 Ibid. Bangladesh, the Philippines, Indonesia, DR Congo, India, China, Tanzania, Haiti, Egypt, Greece, Senegal, Peru, Brazil, Myanmar, and USA.
14 Appendix A, Ibid.
been one cruise ship accident resulting in the deaths of more than nine people, the 2012 grounding and capsize of the *Costa Concordia* which led to 32 deaths.\textsuperscript{15} The great majority of cruise ship fatalities have been individual person overboard incidents.\textsuperscript{16} There is very little the cruise lines can realistically do to prevent those.

![Image 1.2. Coffins of some of the 4,386 victims of the Dona Paz collision, fire and sinking off Mindoro Island in the Philippines in December 1987. It was the world’s worst passenger vessel disaster in peacetime (Wikipedia).](image)

It should be noted here, however, that this work most emphatically does not look at the problem of maritime fatalities affecting refugees or illegal immigrants. There is no realistic solution to the dangers posed by the vessels they voyage on except by totally preventing their operation. Tragically, going to sea on „people smuggling“ boats operated by criminal gangs is akin to playing Russian roulette. If refugee and illegal immigrant fatalities were to be included in this study, the death toll would be considerably higher.

This thesis, which has drawn extensively on its author’s study of more than two centuries of maritime accidents, has focused most intensely on and more closely examined and analysed all known fatal passenger vessel accidents that have occurred globally in the fifty years from 1966 to 2015.\textsuperscript{17} This obviously subjective but very careful analysis of the causes of those accidents led to the author’s assessment that 88 per cent of the fatal accidents and 98 per cent of the resulting fatalities were the result of some kind of human error. Human error can be defined as wrongful decisions, mistakes, blunders, carelessness, miscalculations or negligence. This is higher, but not significantly so, than the estimate of 88 per cent of fatalities derived by a

\textsuperscript{15} Ibid
\textsuperscript{16} Ibid.
\textsuperscript{17} Appendix A, Ibid.
similar but less extensive study published in 2014. That study, by the Worldwide Ferry Safety Association covered only ferries and not all passenger vessels and was for a shorter period.

The data in the BMPVA database has largely been compiled from contemporary newspaper, trade magazine and, more recently, Web news reports. They have been cross-referenced and verified wherever possible from other sources including IMO and national government reports, books, directories, academic papers and other databases. The latter include the IMO Global Integrated Shipping Information Service (GISIS) database and that of the Worldwide Ferry Safety Association. The Lloyd’s Casualty Reports, IHS Fairplay and International Union of Marine Insurers (IUMI) casualty databases have also been consulted although they tend to focus on larger vessels and are somewhat “North Atlantic centric” in focus.

This project, therefore, has become a very wide-ranging one that has involved a comprehensive study across a number of disciplines including: psychology, sociology, economics, law, ergonomics, education, naval architecture, political science, geography, history, demographics and meteorology. It is truly multi-disciplinary.

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19 Accessible through the IMO website, www.imo.org.
20 Refer to www.ferrysafety.org.
23 From www.iumi.com/statistics/.
1.2.2. Human error the major cause.

Figure 1.1 Author assessed causes of fatal passenger vessel accidents 1966-2015. By accidents on the left and by fatalities on the right. (BMPVA database).

The most common cause of fatal maritime accidents is vessels that are seaworthy due to poor design or construction and inadequate maintenance. That, along with collisions, groundings, allisions, overloading, negligence and poor seamanship comprise the great majority of factors that can clearly be attributed to human error. From the frequently scant facts available from the news sources cited in the *Baird Maritime Passenger Vessel Accident database*, the author has carefully assessed the cause of each accident.²⁴

Obviously, however, there can be no argument about the underlying cause in cases involving collisions, allisions, groundings and overloading. The often related factors of negligence, inadequate seaworthiness and poor seamanship are more subjective and perhaps nebulous assessments but they have been based on a careful review of the only known facts available to the author.

This, as described in 1.2.1, has involved compiling as much information as possible from numerous diverse sources. That have been further verified and cross-referenced using government reports, focussed histories, books, academic studies and other marine casualty databases.²⁵

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²⁴ Appendix A. Ibid.
²⁵ The books, reports, directories and academic papers are all cited here as appropriate but some of the marine casualty databases referred to were:- the IMO’s GiSIS ([www.imo.org](http://www.imo.org)),
since about 2000, considerably more information has become accessible via
the Internet. In many cases this data is still considered to be inadequate but it
is all that is publicly or, even, privately available.

1.3.1. Inadequate reporting or recording of accidents.

Sparse reporting of fatal accidents, particularly prior to the widespread
adoption of the Internet around the year 2000, means that the statistics
analysed are not globally comprehensive because reports from poorer, more
accident prone, regions or countries were even rarer in the earlier period. For
every example, the *BMPVA database*\(^{26}\) records five accidents resulting in 303
fatalities in China in 1999 whereas *Fairplay News online* quotes China’s
communications minister mentioning 249 “sinkings” and 769 deaths in the
same year.\(^{27}\) Similar comments have been made by officials of the Philippines
Navy about fatal ferry accidents in that country.\(^{28}\) They have apparently been
significantly under reported as have, similarly, fatal ferry accidents on inland
waterways in Nigeria.\(^{29}\)

By contrast, fatal accidents aboard cruise and casino ships tend to be widely
reported and have been throughout the study period. Those ships are large
and conspicuous and tend to be engaged in international voyages. More
importantly, they tend, obviously, to be populated with passengers from richer
countries. Thus the „Clapham Omnibus” hierarchy of relative news importance
prevails.

Tellingly, the *BMPVA database* records only 176 accidents in the 34 years
from 1966 until the end of 1999 whereas it shows 570 occurring over the next
sixteen years.\(^{30}\) Obviously and logically that cannot possibly be an accurate
reflection of reality, hence the estimate of at least 3,000 fatalities per annum.
The author, however, has been unable to find a more extensive or
comprehensive accident database anywhere.

Certainly, the International Maritime Organisation"s *GISIS* database is wholly
inadequate.\(^{31}\) *GISIS* lists accidents and fatalities that occurred in western
developed countries quite comprehensively although it tends to focus most on
those that were most extensively covered by the news media. Beyond the
OECD member countries, however, its coverage declines significantly.
Similarly, other databases are limited by vessel size. *Lloyd’s List Casualty
Reports* ignore anything under 100gt and IUMI under 500gt.\(^{32}\)

\(^{26}\) Appendix A, Ibid.
\(^{27}\) Report in *Fairplay News* (online) 31 January 20000.
\(^{28}\) Retired Rear Admiral, Feliciana G Salonga, Chairman of the Subic Bay Metropolitan
Authority, suggested there are around 40,000 marine fatalities annually in the Philippines.
\(^{29}\) Nze, I. C. Ibid.
\(^{30}\) Appendix A, Ibid.
\(^{31}\) Accessible through the IMO website [www.imo.org](http://www.imo.org)
\(^{32}\) Refer to [www.maritimeintelligence.informa.com](http://www.maritimeintelligence.informa.com) and [www.iumi.com/statistics/](http://www.iumi.com/statistics/).
They and Fairplay also tend to record only very major accidents in developing countries. Their exclusion of smaller vessels inevitably ignores a large proportion of the accidents described in this work. For example, they record the Dona Paz and Princess of the Stars accidents in the Philippines but not those involving the Kim Nirvana or the Catalyn D.\textsuperscript{33} The absence of reliable confirmatory data is a major factor in the difficulty of defining the real extent of the problem and has been commented on elsewhere.\textsuperscript{34}

Indeed, as recently as 27 November 2017, at the opening of IMO’s 30\textsuperscript{th} Assembly Session in London, the Secretary-General, Mr Kitack Lim, admitted that: “For IMO, we need to have more detailed and deeper analysis of statistics and data so that we can really understand underlying trends and causal factors behind shipping casualties…”\textsuperscript{35} That comment reflects very badly on the strange and completely unrealistic manner whereby IMO compiles the data for its GISIS database.

1.3.2. The ’Internet Effect’:

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Fatal accidents reported annually worldwide. Note the dramatic increase from around the year 2000. The Internet Effect. (BMPVA database).}
\end{figure}

The realities of inadequate reporting of accidents are starkly highlighted by the dramatic increase in the number of fatalities recorded each year since 1 January 2000 in the BMPVA database. For the first 34 years of the study the average known annual global death toll was 818 whereas for the next sixteen years it was 1,975. The advent and widespread adoption of the Internet has led to much more extensive and comprehensive reporting of maritime accidents. Further, as noted in IHS-Fairplay in December 2015, the

\begin{itemize}
\item\textsuperscript{33} Appendix A, Ibid
\item\textsuperscript{34} See, for example, Shettar, G. EU maritime casualty rise „due to improved reporting”, IHS-Fairplay, London, 1 December 2015.
\item\textsuperscript{35} From a speech delivered by the Secretary-General of IMO at the opening of its 30\textsuperscript{th} Assembly, London, 27 November 2017. www.imo.org/en/MediaCentre/.
\end{itemize}
establishment of the *European Marine Casualty Information Platform* in 2011 has brought about a more than doubling of reported accidents per annum on that continent in the four years from 2011-2014.\(^{36}\) The author, however, believes very strongly that because of continuing under-reporting, the real annual global death toll would be more than 3,000 on average and that it would have been so for the full 50 years examined.

For example, there are only three accidents recorded in the *BMPVA database* for Myanmar/Burma from 1966 until 2006.\(^{37}\) They resulted in 667 fatalities (an average of 17 fatalities per annum) and all three vessels involved were nameless. Since the once „pariah”\(^{38}\) state started to open to the outside world in 2007, twelve accidents affecting named vessels and causing 584 fatalities have been recorded (an average of 65 fatalities per annum).\(^{39}\) The earlier data, obviously, is wholly inadequate. Extrapolating from the 2007-2015 statistics, a case can be made for more likely figures of at least 75 accidents and 3,250 fatalities in Myanmar/Burma over the period 1966-2015.

Whatever the true number, however, the information that is available about the known accidents is sufficient to enable sensible decisions to be made as to causality, underlying trends and practical preventative measures.

### 1.3.3. Poor, hot, „wet” developing countries are hit hardest.

Further, the figures for the first 34 years show a much higher proportion of fatalities occurring in so-called „developed” countries than in the next sixteen years. Overall, though, and as illustrated clearly in Figure 1.3 below, 76 per cent of accidents and 95 per cent of fatalities over the complete fifty-year study have occurred in poor, hot and mostly wet, archipelagic, riverine and Lakeland „developing” countries.

Because the numbers of accidents and fatalities occurring in developed countries have marginally declined over the last two decades, it could be assumed that the rate has increased in poorer countries over the same period. That seems to be a reasonable assumption even allowing for the Internet effect on reporting. As described in Chapter 2, the total numbers of „known” fatal ferry accidents globally are clearly not declining and are in fact significantly increasing as people in developing countries seem to be travelling more frequently and because they are better reported.

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\(^{36}\) Shettar, G. *EU maritime casualty rise „due to improved reporting”,* IHS-Fairplay, London, 1 December 2015.

\(^{37}\) Appendix A, Ibid.


\(^{39}\) Appendix A, Ibid.
1.4.0. Geographical analysis of accidents.

Figure 1.3 Geographical analysis of accidents and fatalities. By accidents on the left and fatalities on the right. 1966-2015 inclusive. Note the absence of Myanmar/Burma from this data. (BMPVA database).

So, the much higher incidence of fatal accidents in developing countries is at the crux of the problem that will be addressed here. While ferry accidents will continue to occur in developed countries, at least some constructive attempts are being made to reduce their incidence and effects. Voyages in the developed world are still not totally free from danger, especially if conventional monohull Roll On-Roll Off (Ro-Ro) or Ro-Pax ferries with wide-opening bow doors and full-length, low vehicle decks cannot be avoided, as is explained in detail in chapters 2 and 6. However, the risks in the developed world are, in reality, now very low thanks partially to better on board responses and superior search and rescue (SAR) services.
1.5.1. The „Danger Zone“.

Map 1.1. The „Danger Zone“ The poor, hot equatorial belt where the majority of fatal passenger vessel accidents occur.

In developing countries, however, reductions in their ferry accident death tolls are especially difficult to achieve. Obviously, less developed countries suffer also from very high road and rail accident death tolls. A similar lack of success is evident with respect to reducing those. This lack of remedial results is a product of cultural and behavioural problems that can largely be blamed ultimately on poverty. This can also be attributed to all the poverty driven reasons of overloading, negligence, lack of maintenance, poor training, fatalism, corruption, panic, absence of life-saving equipment and inability to swim.\(^{40}\) It is obvious that most developing countries will require considerable assistance from the wealthier world before they achieve significant reductions in their numbers of ferry fatalities.

1.5.2. Authorities appear unconcerned.

While national and local governments in developing countries must be well aware of the problem of such preventable accidents, they do little or nothing about them. That phenomenon is described in detail in the national case studies in Chapter 5 and in the consideration of national and international regulatory and enforcement deficiencies in Chapter 9. Of the ten worst countries for passenger vessel accidents only the Philippines pays any serious attention to them and its responses are far too little and much too late.

At the INTERFERRY conference in Cebu in 1999 the author spoke at length with the then Vice-President of the Republic of the Philippines (Later President), Hon. Gloria Macapagal Arroya who was well aware of her country’s high incidence of ferry disasters.\(^{41}\) She claimed the government was “working on it” by trying to reduce the corruption of the Marine Industry Authority (MARINA) and the Philippines Coast Guard and by implementing more transparent and effective Marine Boards of Inquiry.

Now, nearly eighteen years later and after six years with Ms Arroya powerfully in charge as President, there has been a small, albeit welcome, improvement. In 2015, for example, there were four known fatal ferry accidents in the Philippines. A total of 154 people perished in them.\(^{42}\) 2015 was a

\(^{40}\) See Appendix A generally.  
\(^{41}\) Hon. Gloria Macapagal Arroya. Discussion with author, Cebu, October 1999. INTERFERRY is the international trade association of ferry owners.  
\(^{42}\) Appendix A, Ibid
comparatively good year. However, more recently, there has been impressive improvement. In 2016 there were three known fatal accidents producing 24 fatalities. In 2017 there was only one known fatal ferry accidents in the Philippines with 11 fatalities resulting.\textsuperscript{43}

The same lack of concern is evident internationally. On a number of occasions in the late 1990s and early 2000s the author met with the Hon William O’Neil, then Secretary-General of the International Maritime Organisation in London.\textsuperscript{44} Questioned on what IMO could do to bolster the obviously inadequate efforts of many national governments with respect to passenger vessel safety, his response was to the effect that: “We are not able to interfere in the internal affairs of sovereign member nations”. When pressed on the fact that the IMO’s sister organisation, the International Civil Aviation Organisation (ICAO) was doing just that with respect to purely internal airline companies, the response was, “they operate under a different charter from us”.

Subsequent enquiries made indirectly of Secretary-General O’Neil’s immediate successor, Rear Admiral Efthimios Mitropolous, and various of his senior colleagues elicited much the same answer. Further, when asked whether IMO’s charter could be changed to something more like ICAO’s, Mr O’Neil’s response was, “our member countries wouldn’t wear that”. Realistically, until very recently, IMO has only shown interest in international, as opposed to domestic, passenger vessel activities.\textsuperscript{45} Even now, IMO seems to recoil from accepting any responsibility for or involvement with domestic ferry activities.

There is no doubt that the IMO mandate is restrictive. It describes itself thus:-

\textit{IMO is the global standard setting authority for the safety, security and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented. Further, it describes, …its role is to create a level playing-field so that ship operators cannot address their financial issues by simply cutting corners and compromising on safety, security and environmental performance.}\textsuperscript{46} The key word here is “international”, it most definitely does not mean “domestic”.

In a 2008 Secretary-General’s Report on the Contribution of IMO on maritime safety and security, IMO defines its Mandate as follows:-

\textit{Since 1959, the International Maritime Organization(“IMO”). As the sole United Nation’s (sic) specialized agency exclusively devoted to maritime affairs, has been providing a forum for co-operation among Governments in the field of government regulations and practices relating to all kinds of}

\textsuperscript{43} Ibid.
\textsuperscript{44} Hon. William O’Neil. Various discussions with author, London, 1998-2002
\textsuperscript{45} IMO’s 2015 Manila Statement on Enhancement of the Safety of Ships Carrying Passengers on Non-International Voyages is a small but very encouraging change of approach (See Appendix G).
\textsuperscript{46} From Introduction to IMO, www.imo.org/en/About/.
shipping engaged in international trade, facilitating the adoption of comprehensive multilateral treaties for a wide range of technical measures and, in particular, the adoption of the highest practicable standards, designed to enhance safety, security and efficiency in shipping engaged in international trade”.

The same document, in claiming the “wide acceptance and legitimacy of IMO’s mandate”, states that there are 167 sovereign member states of IMO and that between 138 and 158 have adopted various of its conventions. While IMO has undoubtedly achieved that wide acceptance and legitimacy of its mandate among all, or at least the great majority, of developed nations, it has clearly failed to do so in any of the developing nations discussed here. Further, in practice in many developing countries, “adoption” of conventions does not mean that they will be implemented, much less enforced.

In fairness to Mr O’Neil, he did publicly urge domestic ferry safety reforms on a number of occasions. He publicly offered IMO’s assistance to national governments but none are known to have taken up his offers except in the most limited fashion. His hands were tied, in effect, by the fact that in practice IMO is a secretariat. Its member states control it. Its system requires that in order for new rules to be considered, any states proposing such changes must demonstrate a compelling need for them.

Regrettably, his successors have been less forthcoming and, apart from a handful of small conferences and seminars, attended by carefully chosen delegates, in developing countries, nothing notable seems to have been achieved except for the laudable, but severely limited by its small number of participating countries, Manila Statement of 2015. Regrettably, its effects have been negligible to date.

This attitude contrasts sharply with the sentiments expressed on the establishment of IMO in 1948 as the Inter-Governmental Maritime Consultative Organisation (IMCO). IMO is self-described as: “…the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships”. On the same web page, IMO describes itself further as: “…the global standard setting authority for the safety, security and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented”. The word “international”, as opposed to “domestic” keeps creeping in as a very effective “escape clause”.

48 Most notably IMO’s assistance and guidance was offered via the 8 November 1999 Technical Assistance Subprogramme in Maritime Safety.
49 IMO’s 2015 Manila Statement, Appendix G, Ibid.
50 Details from www.imo.org generally.
51 From Introduction to IMO, www.imo.org/en/About/Pages/.
52 IMO, Ibid.
It also contrasts strongly with IMO’s civil aviation counterpart, the International Civil Aviation Organization’s (ICAO) “core mandate” which, “…was to help States achieve the highest possible degree of uniformity in civil aviation regulations, standards, procedures, and organization”.  

In even stronger contrast: “ICAO works with the Convention’s 191 Member States and industry groups to reach consensus on international civil aviation Standards and Recommended Practices (SARPS) and policies in support of a safe, efficient, secure, economically sustainable and environmentally responsible civil aviation sector. These SARPS and policies are used by ICAO Member States to ensure that their local civil aviation operations and regulations conform to global norms, which in turn permits more than 100,000 daily flights in aviation’s global network to operate safely and reliably in every region in the world”. Note the use of the very important word “local”. It very effectively and unfortunately differentiates ICAO from IMO.

Reinforcing that: “ICAO also coordinates assistance and capacity building for States in support of numerous aviation development objectives; produces global plans to coordinate multilateral strategic progress for safety and air navigation; monitors and reports on numerous air transport performance metrics; and audits State’s civil aviation oversight capabilities in the areas of safety and security”.  

In practice, ICAO takes an inspirational leadership role in an endeavour to improve aviation safety globally. IMO avoids that and appears largely to do as its member states direct.

1.5.3. Few others appear to care or even notice.

There lies a large part of the problem. No one in a position to do anything about the problem cares enough to do so. It has much to do with the clichéd and probably apocryphal but true joke about the hierarchy of news, viz: An article was allegedly published prominently on page 1 of The Times of London headed “Three killed in Clapham omnibus tragedy”. In the same issue on the bottom of page 8 there was a small article headed “Earthquake in Chile, 36,000 dead”. It may be apocryphal but that is the attitudinal reality.

This arrogant and ignorant, North Atlantic centric attitude is exemplified in the prestigious Oxford Encyclopedia of Maritime History which, published in 2007, lists only the Titanic, Herald of Free Enterprise, Scandinavian Star and Estonia in its item on Ship Disasters involving passenger ships. It fails to mention any of the far worse accidents that occurred elsewhere until that time. Remarkably, but perhaps not surprisingly, the Dona Paz tragedy, that

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53 From The History of ICAO and the Chicago Convention, www.icao.int/about-icao/History/ and, directly, Convention on International Civil Aviation done at Chicago on the 7th Day of December 1944.

54 Described in About ICAO, www.icao.int/about-icao/.

55 Ibid.

resulted in far more fatalities than in all four of those accidents combined, is not mentioned at all in any of the four 700 page volumes of the *Encyclopedia*.

Of course, when North American, Australasian, Japanese or European tourists die in passenger vessel accidents in developing countries, we quickly learn about it from their hometown newspapers and, increasingly commonly, on news websites. At least such reports alert us to the fact of the accident.

In fairness, it must be pointed out that in conjunction with INTERFERRY and the Worldwide Ferry Safety Association, and at their initiative, the International Maritime Organisation has made some tentative approaches aimed at safety improvements to local vessel owners and regulators in the Philippines, Bangladesh and Indonesia since 2006. Sadly, apart from in the Philippines, little seems to have come of that well-intentioned initiative. Perhaps it raised awareness minutely in some of the world’s richer countries. No measurable change has been noted in the other two target countries. There has simply been a re-arrangement of their fatality rankings.

1.6.0. Data and reporting deficiencies conceal real toll.

While the data in the *Baird Maritime Passenger Vessel Accident database* is not comprehensive, it is the best available and is estimated to be at least 66 per cent accurate in terms of numbers of accidents and their resulting fatalities. It has been compiled for longer than all but the *Lloyd’s List Casualty*...
Reports and the Lloyd’s register of Shipping (LRS) Casualty Review and also covers smaller vessels that are not included in the Lloyd’s List statistics. It has been cross-referenced against all the other known databases revealed in literature and Google searches. The numbers, though, are conservative and probably underestimate the real totals by about 50 per cent. It is estimated, therefore, that probably at least 3,000 people die in passenger vessel accidents annually compared with the 2,000 per annum listed for the past sixteen years in the BMPVA database.

Even after acknowledging the deficiencies in available data, the world still has a serious problem in that as many as 3,000 innocent, mostly fare paying, public transport passengers are dying at sea or in inland waters each year. They are dying miserable deaths in accidents that are mostly preventable. The majority of victims appear to be women, children and the elderly, the reports listed in Appendix A tell us. They are less likely to be able to swim and usually not strong enough to beat men to whatever floating debris may be available to save them.

Further, the accidents usually also result in many injuries and considerable property damage even if only to the vessels involved. Obviously, this, too, affects poor people more than their richer counterparts. Environmental damage, while slight, is also a factor.

1.7.0. Ferry accident rates compared with road, rail and aviation

It is estimated that nearly 1.3 million people die each year in road accidents world-wide. That is more per day than ferry deaths per year. Again, the vast majority – around 90 per cent – of them occur in low to middle-income countries. Indeed, as could be expected, the worst affected countries are the same as those similarly affected by ferry accidents. The causes similarly arise from poverty and are mainly overloaded, unroadworthy vehicles driven by incompetent, negligent and/or fatigued drivers.

As well as having the best safety record of all modes of public transport, the aviation industry has the best reporting and most accurate data. It is also significantly more safety-conscious than the other modes and its international regulator, the International Civil Aviation Organisation (ICAO), more determined than its United Nations counterpart IMO to have a positive influence at the local level. According to the Aviation Safety Network, a division of the Flight Safety Foundation, which appears to have the most comprehensive statistics, there have been an average of 32 fatal accidents involving scheduled commercial aircraft carrying 14+ passengers each year since 2000. The average death toll per annum over the same period has been 713. That is less than a quarter that of ferries.

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60 From www.asirt.org.
Railway accidents are more problematic. A significant proportion of them involve suicides. Many others are the result of road vehicle driver stupidity manifested in driving over railway tracks in the face of oncoming trains. Discounting those to look at derailments, train-to train collisions and similar, train only events, the numbers of accidents and their resulting deaths fall significantly.

As with passenger vessels, though, accurate data is difficult to find. It is also very difficult to obtain direct comparisons. Every data compiler approaches their project differently. One comparison that covers the three main streams is Numberwatch.\(^{63}\) It compares fatalities per kilometre travelled, per journey and per hours travelled.

Probably the most accurate list of fatal railway accidents is provided by www.list25.com.\(^{64}\) It is supported by figures compiled by the BBC which show that railway passenger accident fatalities at an average of about 300 per annum from 1966 to 2015 inclusive are negligible compared with ferries at about ten times as many.\(^{65}\) That figure is confirmed by www.infoplease.com.\(^{66}\)

While not highly accurate, the statistics comparing the accident and fatality rates of road, rail, air and water transportation of passengers are accurate enough to show their relationships starkly. As will be shown in more detail in Chapter 3, passenger vessel travel is very much safer than road travel, other than, arguably, by bus, but significantly less safe than rail or air travel. Bus travel, perhaps surprisingly, according to Numberwatch, is the safest means. The author, however, finds that difficult to believe and refutes it in Chapter 3.

<table>
<thead>
<tr>
<th>km</th>
<th>journeys</th>
<th>hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air 0.05</td>
<td>Bus 4.3</td>
<td>Bus 11.1</td>
</tr>
<tr>
<td>Bus 0.4</td>
<td>Rail 20</td>
<td>Rail 30</td>
</tr>
<tr>
<td>Rail 0.6</td>
<td>Van 20</td>
<td>Air 30.8</td>
</tr>
<tr>
<td>Van 1.2</td>
<td>Car 40</td>
<td>Water 50</td>
</tr>
<tr>
<td>Water 2.6</td>
<td>Foot 40</td>
<td>Van 60</td>
</tr>
<tr>
<td>Car 3.1</td>
<td>Water 90</td>
<td>Car 130</td>
</tr>
<tr>
<td>Pedal cycle 44.6</td>
<td>Air 117</td>
<td>Foot 220</td>
</tr>
</tbody>
</table>

Table 1.1. The Numberwatch table showing the numbers of fatalities per billion kilometres, journeys and hours of travel. The bus and rail figures appear unlikely (Numberwatch.com).

\(^{63}\) www.numberwatch.co.uk/risks_of_travel
\(^{64}\) See www.list25.com/25-worst-train-wrecks-in-history/.
\(^{65}\) Refer to World's worst rail disasters, www.news.bbc.co.uk/l/hi/world/south-asia/.
\(^{66}\) See Railroad Accidents at www.infoplease.com/world/disasters/railroad-accidents.
1.8.0. Geographic, cultural, behavioural and economic factors.

1.8.1. The poverty factor.

Geographic, cultural, behavioural and economic factors, the author has concluded, are the predominant reasons why human error dominates the causes of passenger vessel accidents. An economic factor, poverty, is common to all the regions and countries where the most frequent and most deadly accidents occur. Poverty appears to be the most important factor. As will be shown in detail in Chapter 5, the poverty factor can be seen to apply just as significantly in road, rail and aviation accidents as in passenger vessels.

<table>
<thead>
<tr>
<th>Country</th>
<th>Road fatalities per 100,000 inhabitants</th>
<th>Road Fatalities per 100,000 motor vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Libya</td>
<td>73.4</td>
<td>128.2</td>
</tr>
<tr>
<td>Thailand</td>
<td>36.2</td>
<td>74.6</td>
</tr>
<tr>
<td>Malawi</td>
<td>35</td>
<td>1,310.4</td>
</tr>
<tr>
<td>Liberia</td>
<td>33.7</td>
<td>133.4</td>
</tr>
<tr>
<td>DRC</td>
<td>33.2</td>
<td>6,405.4</td>
</tr>
<tr>
<td>Tanzania</td>
<td>32.9</td>
<td>1,073.7</td>
</tr>
<tr>
<td>CAR</td>
<td>32.4</td>
<td>4,336.5</td>
</tr>
<tr>
<td>Rwanda</td>
<td>32.1</td>
<td>3,521.1</td>
</tr>
<tr>
<td>Iran</td>
<td>32.1</td>
<td>92.7</td>
</tr>
<tr>
<td>Mozambique</td>
<td>31.6</td>
<td>1,507</td>
</tr>
</tbody>
</table>

*Table 1.2. The poverty factor. The world’s ten worst countries for road accidents on an annual basis. Of the countries listed, only Iran and Thailand could be described as middle income (Source: World Health Organisation – Global Status Report on Road Safety 2015).*

Poverty can be causally linked to cultural and behavioural factors in terms of education, training, awareness and care as well as purchasing, maintenance and operational disciplines. A significant factor in that causal link is poverty induced malnutrition. It, unsurprisingly, has been found to lead to cognitive weaknesses that cause low levels of situational awareness, slow reactions and illogical responses to problems. While not the only cause of such deficiencies, it is undoubtedly a significant contributor to them. Poverty, obviously, is also directly linked to the poor seaworthiness of vessels and their lack of even the most basic life-saving equipment. Safe new vessels and equipment are comparatively expensive.

Even in terms of the health of vessel crews, poverty is a factor. An ill or fatigued crewman is unlikely to be an alert or careful crewman. Further, the sanctity of human life is inevitably accorded a much lower priority in poorer

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\(^{67}\) There is considerable literature on this subject. Some concise descriptions can be seen in: www.who.int/features/qa/malnutrition/, www.ncbi.nlm.gov/pmc/articles/, www.orphannutrition.org, and www.richmondvale.org/effects-of-malnutrition/.
countries than in richer ones. Having travelled extensively by sea and river in poorer countries, the author has noted the disdain with which crews have treated fellow human beings who were obviously in trouble. Rather than helping fellow mariners in trouble, which is almost an instinctive reaction in the wealthier world, the attitude often appears to be: “He’s got into that trouble himself so he should get out of it himself. I don’t want to be involved”.

1.8.2. The fatalism factor.

An attitude of resigned neglect or fatalism seems to be common in the countries where accidents are more frequent. If some form of reward is not on offer, many seem to believe that assistance is not worth the effort or risk. Perhaps that, as well as poverty, is the reason for an almost complete absence of organised, search and rescue facilities or services from poorer jurisdictions. Poverty does, thanks to its resultant malnutrition, seem to be a major contributing factor to cognitive weakness, fatalism and a negligent state of mind in much the same way as drug and alcohol addiction are in the wealthier world.

Poverty also contributes to another factor in that employees who question the status quo are usually penalised with the result that few do so. Such employees fear losing their jobs in areas of high unemployment.

As well as by poverty, behavioural factors are strongly influenced by culture and religion as will be shown in more detail in Chapter 5. These can be particularly important after the event of an accident when a strong belief in karma or similar can make it difficult to encourage rescue and recovery efforts.

There is much, though, that can be done, even in the absence of a poverty reduction, economically and practically to modify and improve the human behaviour that leads to the vast majority of passenger vessel accidents.

1.9.0 Technical factors – mechanical and structural.

A careful review of the Baird Maritime Passenger Vessel Accident database shows that mechanical and structural failures represent only a minute proportion of the reasons for passenger vessel accidents. Almost without exception such failures can be fairly attributed to the human error factors of poor seaworthiness or neglect. Engine breakdowns, fires and structural failures rarely occur without some form of human assistance or influence either positive or negative, mainly incompetence, neglect or, even, sabotage.

68 Personally observed by the author in Tanzania, Thailand and Malaysia. See video in Appendix F.
69 Discussed in greater detail in 5. 4. 2.
70 See articles cited in Footnote 68 above.
71 Appendix A, Ibid.
For example, structural failures involving vessels of even the most primitive kind are extremely rare. There are, however, certain types of vessels that are prone to suffer from them with alarming frequency. Most notable of those are the motor bancas that are commonly used as ferries in the Philippines.

![Image 1.4. The wreckage of the large motor banca Kim Nirvana which capsized in the comparative calm of Ormoc harbour in 2015 when an outrigger broke off while turning. There were 113 fatalities (Wikipedia).](image)

When poorly maintained and or negligently operated, these simple vessels, that are effectively canoes stabilised by two outrigger floats, tend to shed an outrigger and, in the ensuing panic, capsize. Such accidents can be fatal, especially when the vessel is comparatively large as in the July 2015 case of the *Kim Nirvana* which capsized when an outrigger broke off close to shore in Ormoc harbour on Leyte Island.\(^{72}\) The result of that capsize was 113 fatalities.

Other vessel types that have suffered structural failures are conventional monohull Ro-Pax ferries that have shed bow door visors as in the case of the *Estonia*.\(^{73}\) However, as is discussed below, such failures can usually be attributed to poor seamanship in sailing too fast for the conditions or operating with vehicle deck doors open.\(^{74}\)

It is indeed encouraging that non-human caused structural and mechanical failures are so rare. There is probably little practical that can be done about reducing them as is explained in Chapter 6.

### 1.10.0. Search and rescue deficiencies.

This is a very important factor in passenger fatalities. Even in the wealthier world, such deficiencies have been major causes of death. If survivors can be found and recovered quickly, their chances of long-term survival are obviously considerably higher. Drowning, shark attack, thirst, starvation or hypothermia are all less likely to kill if survivor recovery operations are quick and efficient.

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\(^{72}\) Appendix A, 2 July 2015, Ibid.

\(^{73}\) See detailed report in Chapter 3, 3.13.

\(^{74}\) See case studies on *Herald of Free Enterprise* and *Estonia* in 3.6. and 3.13.
Despite the considerable attention paid to this subject and the government and charity money directed at it in wealthier countries, there are still significant capacity deficiencies in most parts of the world. IMO has developed a Search and Rescue Code (SAR) that guides the maritime world in such matters. While undoubtedly well-intentioned, and widely-adopted in principle, in reality it suffers from the inability or unwillingness of IMO to interfere in the internal affairs of its sovereign member states to encourage its implementation.

The Worldwide Ferry Safety Association (WFSA) has sponsored and coordinated considerable research on this problem in conjunction with the International Maritime Rescue Federation. A paper it presented at the IMRF’s World Maritime Rescue Congress in Bremerhaven, Germany in 2015 highlighted some of the search and rescue deficiencies that fail ferry accident survivors, particularly in poorer countries.

Chapter 8 examines these deficiencies in considerable detail and that examination leads on to a number of simple and economical solutions that are proposed in Chapter 10. The important fact that arises from the study of SAR deficiencies is that there are numerous effective solutions that are currently being worked on by dedicated people in a number of parts of the world.

There are many examples of SAR failures but one of the more notable was the multi-national mess that followed the sinking of the Estonian Ro-Pax ferry Estonia in September 1994. This accident occurred in the Baltic Sea in an area where the Estonian, Finnish and Swedish jurisdictions overlapped. Essentially, the various rescue services used different radio channels and were largely unable to communicate. Worse, some of the rescue helicopters were overloaded with press photographers and, so, unable to retrieve survivors from the very cold sea.

Even where supposedly high quality, well-equipped rescue services are available as in South Korea with the Sewol and Belgium, with the Herald of Free Enterprise, they were remarkably ineffectual in the face of a real disaster. The Belgians and British, though, were much more effective than the Koreans.

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76 Discussion by the author with Hon. William O’Neil, Ibid.
78 Bjorkman, A. Lies and Truths about the M/V Estonia Accident (Editions EGC, 1998)
79 Bjorkman, A. Ibid.
Image 1.5. Search and rescue efforts vary enormously in availability and quality. The Bangladeshi approach has not been notably successful. It is usually poorly organised and too little, too late (news.cn).

Of course, as could be expected, in the poorer parts of the world SAR services are practically non-existent. Survivors have to rely on the awareness, observation and benevolence of the crews of any passing vessels. Better than nothing but hardly dependable.

1.11.0. Human factors – the roles of training, enforcement, education, psychology and insurance

As this thesis strongly emphasises, human error in its many manifestations has been the primary cause of 88 per cent of passenger vessel accidents and of 98 per cent of the deaths arising from them. Poverty, and its often resultant malnutrition, is generally likely to be the ultimate reason for many such errors.80

Human error in the maritime industry has been the subject of considerable study, particularly over the last half century. Indeed, human error is probably the most closely studied, inquired into and commented upon phenomenon in all forms of maritime operations. Some very important and informative books have delved into the subject. One of the most illuminating is Human Factors in the Maritime Domain.81

Much has been done in the wealthy world to encourage improvements in human behaviour but there is still a long way to go even there. In developing countries, regrettably, maritime human performance remains a very serious problem indeed. The Philippines, notably, has 140 maritime training and

80 See footnote 67 on page 19.
educational institutions, more than any other country, but, until very recently, still suffered from one of the worst rates of fatal marine accidents.\textsuperscript{82}

While the outlook is discouraging, it is not beyond hope. The aviation industry offers a very encouraging model. It has seen dramatic safety improvements in rich and poor countries alike over the last three decades. These have been described very well against a maritime background in an excellent handbook published by The Nautical Institute.\textsuperscript{83}

The London based, Nautical Institute is an international association of master mariners that works diligently to improve the professionalism of mariners globally. It is an organisation that provides hope for this thesis. Because of it, worthwhile improvements in mariner performance and behaviour can, are being, and will be made. It has made significant and very valuable contributions to mariner education, training and even psychology. It clearly illustrates what can be achieved when serious, professional industry participants work together to achieve positive behavioural change.

Most developed countries have made major advances in Occupational Health and Safety (OH&S) regulation, enforcement, training and encouragement. It has become an accepted component of employment activity in many such countries and has contributed substantially to significant reductions in employment related death and injury rates.

Insurance is another important motivator of human behaviour. It can have either positive or negative effects. It can insist that insured vessels are seaworthy and their crews competent. That, after all, is what the classification societies that arose from the marine insurance business are meant to ensure. On the other hand, awareness that a vessel is well insured can lead to negligence because of the moral hazard „safety-net“ that insurance provides. In Chapter 7 the role of marine insurance is reviewed in detail. The author believes that the insurance industry could do more to positively modify mariner behaviour, particularly with respect to domestic ferry operations in developing countries.

So also could the role of classification societies be extended into developing countries, perhaps even as a philanthropic activity. Classification societies promote themselves as experts on vessel and operational safety. They are mostly structured as not-for-profit businesses that, in reality, make very useful surpluses, read profits. Some pro bono contributions to the maritime industries and relevant government bodies in poorer countries would seem to be a useful gesture of Corporate Social Responsibility (CSR) from them.

\textsuperscript{82} Members of the Philippine Association of Maritime Institutions (PAMI). www.pami.org.ph
1.12.1. Regulatory and enforcement deficiencies.

These, the author contends, are the most important ultimate reasons for the high frequency of fatal ferry accidents in developing countries. Where there is inadequate enforcement of such local regulations as do exist, combined with an almost total disdain for international regulations, it is almost guaranteed that passengers will suffer.84

Corruption, inevitably, is a close relative of poverty. When bureaucrats, police and coastguard personnel who are responsible for ensuring ferry safety, are poorly remunerated, they will inevitably seek other sources of income. Unfortunately, that can be easy to come by from corrupt ship owners who want to reduce their maintenance, safety equipment and crewing expenses. That kind of corruption is obviously endemic in the poorer tropical countries where a disproportionately large number of the world”s passenger vessel fatalities occur.85 Its corrosive effects are probably matched by the callous lack of concern shown by the national and international regulators mentioned above. In an ideal world, unseaworthy vessels and incompetent crews would be prevented from operating by professional and ethical authorities.

The author has personally observed some of the worst examples of such corruption in jurisdictions such as Tanzania. There, the ferry route between Dar-es-Salam and Zanzibar is both busy and highly dangerous despite the usually relatively benign prevailing weather. The death toll from ferry accidents on that route is horrifying. Over the past twenty years it has been more than 5,000.86 Even on some of the modern and seaworthy vessels operating there, severe fatal accidents have occurred due to appalling seamanship.

The near-new and very seaworthy and safe catamaran fast ferry Kilimanjaro II, for example, was driven into a wave at speed on 5 January 2014. At least 25 passengers were swept off the foredeck, where they should not have been riding, and lost.87 No serious effort seems to have been made to recover them even though the ferry remained completely seaworthy. In the thirty months prior to that accident 3,270 passengers perished when the old and unseaworthy ferries Skagit and Spice Islander capsized and sank.88 The existence and enforcement of safety standards were certainly not evident there. Rather, the behaviour of local, passenger-carrying mariners showed an almost total absence of safety-consciousness or good seamanship.

85 See 5.2.
86 Appendix A, Ibid.
87 Ibid.
88 Ibid and 3.23.
Image 1.6. Where corruption prevails, passenger safety or survival is not a major consideration. The Spice Islander capsized and sank near Zanzibar on 10 September 2011 with the loss of 2,976 lives. Apart from being old and grossly overloaded, it was in very poor condition and badly “hogged” as this image shows. It should never have been permitted to go to sea (Wikipedia).

The Philippines is another jurisdiction where, while facts are generally known, thanks to a comparatively free press, the official details of ferry accidents are often difficult to obtain. One difficult to comprehend and accept fact is very well known is that over an eighteen year period one family of ship owners, under its various guises, lost about 6,000 of its passengers. 89 Most of them died in the biggest peacetime maritime disaster in history, the 1987 sinking of the Dona Paz that killed about 4,386 people. 90 In any jurisdiction where the Rule of Law really applied, that would not be allowed to happen.

Indeed, callous, unscrupulous owners have much to answer for. Many of the human error factors that lie behind almost all of the fatal accidents are ultimately the result of the greed and negligence of such people. While the Go family’s Sulpicio Lines, of Dona Paz infamy stands out, there have been a number of other serially offending owners such as Rabaul Shipping, Townsend Thoresen/P&O Ferries, Negros Navigation, Abottiz Shipping, Al Salam Maritime Transport, Sydney Ferries, the Indonesian Government, Minoan Flying Dolphins, and many more as shown below. They should more rigorously be brought to account. 91

89 The Go family of The Philippines, owners of, among others, Sulpicio Lines Inc.
90 Appendix A, Ibid.
91 Appendix A, Ibid.
1.12.2. The World’s ten worst offending ferry owners.

<table>
<thead>
<tr>
<th>Owner</th>
<th>Deaths</th>
<th>% of total</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulpicio Lines</td>
<td>5,925</td>
<td>9.86%</td>
<td>Philippines</td>
</tr>
<tr>
<td>Makame Hasnuu</td>
<td>2,976</td>
<td>4.95%</td>
<td>Tanzania</td>
</tr>
<tr>
<td>Senegal Government</td>
<td>1,863</td>
<td>3.10%</td>
<td>Senegal</td>
</tr>
<tr>
<td>Lucky Magloire</td>
<td>1,800</td>
<td>3.00%</td>
<td>Haiti</td>
</tr>
<tr>
<td>Negros Navigation</td>
<td>1,056</td>
<td>1.76%</td>
<td>Philippines</td>
</tr>
<tr>
<td>Al Salam Maritime Transport</td>
<td>1,032</td>
<td>1.72%</td>
<td>Egypt</td>
</tr>
<tr>
<td>Tanzania Railways Corp</td>
<td>933</td>
<td>1.55%</td>
<td>Tanzania</td>
</tr>
<tr>
<td>Estline Marine Co</td>
<td>912</td>
<td>1.52%</td>
<td>Estonia</td>
</tr>
<tr>
<td>Pelayaran Nasional Indon</td>
<td>580</td>
<td>0.97%</td>
<td>Indonesia</td>
</tr>
<tr>
<td>Prima Vista</td>
<td>568</td>
<td>0.95%</td>
<td>Indonesia</td>
</tr>
</tbody>
</table>

Table 1.3. The worst offending companies by total deaths. Notably, three of the ten are government owned (BMPVA database).

<table>
<thead>
<tr>
<th>Owner</th>
<th>Incidents</th>
<th>% of total</th>
<th>Deaths</th>
<th>% of total</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnival Cruise Lines</td>
<td>23</td>
<td>3.0%</td>
<td>77</td>
<td>0.13%</td>
<td>USA</td>
</tr>
<tr>
<td>Royal Caribbean Cruise Line</td>
<td>11</td>
<td>1.5%</td>
<td>14</td>
<td>0.02%</td>
<td>USA</td>
</tr>
<tr>
<td>Sulpicio Lines</td>
<td>10</td>
<td>1.3%</td>
<td>5,925</td>
<td>9.86%</td>
<td>Philippines</td>
</tr>
<tr>
<td>BC Ferries</td>
<td>5</td>
<td>0.7%</td>
<td>7</td>
<td>0.01%</td>
<td>Canada</td>
</tr>
<tr>
<td>Norwegian Cruise Lines</td>
<td>5</td>
<td>0.7%</td>
<td>12</td>
<td>0.02%</td>
<td>USA</td>
</tr>
<tr>
<td>WG&amp;A, Superferry, Aboitiz</td>
<td>5</td>
<td>0.7%</td>
<td>423</td>
<td>0.70%</td>
<td>Philippines</td>
</tr>
<tr>
<td>Carlos A Gothong Lines</td>
<td>4</td>
<td>0.5%</td>
<td>370</td>
<td>0.62%</td>
<td>Philippines</td>
</tr>
<tr>
<td>Minoan Flying Dolphins</td>
<td>4</td>
<td>0.5%</td>
<td>112</td>
<td>0.19%</td>
<td>Greece</td>
</tr>
<tr>
<td>San Nicholas Shipping Line</td>
<td>4</td>
<td>0.5%</td>
<td>121</td>
<td>0.20%</td>
<td>Philippines</td>
</tr>
<tr>
<td>Stena Line</td>
<td>4</td>
<td>0.5%</td>
<td>6</td>
<td>0.01%</td>
<td>Sweden</td>
</tr>
</tbody>
</table>

Table 1.4. The worst offending companies by total fatal accidents. Note that Carnival, Norwegian Cruise and RCCL are very large cruise lines. Apart from the notable exception of the Carnival owned Costa Concordia with 32 fatalities, most of their fatalities have occurred in very small numbers. About 50% are suspected of being suicides. Of course, nothing is known of serial offending owners in countries like Myanmar, Bangladesh, DR Congo and Senegal as vessel owners’ names rarely appear in accident reports (BMPVA database).

The reality, though, is that in many developing countries repeat offenders are barely even censured let alone punished and prevented from operating. This can only happen when there is an almost complete absence of enforcement of whatever regulations exist there. Corruption is a major problem in many parts of the world and will be one of the most difficult problems to overcome.  

1.13.0. The aviation model.

Fortuitously, there is an excellent model that the maritime industry can easily access to guide a significant improvement in its safety consciousness and performance. First, unlike its sister organisation, IMO, the ICAO is not reluctant to involve itself in the internal affairs of sovereign member nations. It

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92 Refer to 5.2.
endeavours to encourage, educate, lead and enforce a global approach to safety as a discipline. As is explained in Chapter 4, ICAO has, through persuasion, co-operation, encouragement and enforcement, made remarkable progress, particularly over the last three decades. Apart from an obvious and disappointing absence of will, perhaps accentuated by local corruption at worst or negligent complacency at best, there is no reason why IMO could not emulate the leadership role of its aviation counterpart.

Obviously, the performances of national governments vary enormously in the rigour of their approaches to maritime safety. In many very obvious cases their approaches are much less rigorous than those they apply to their local aviation industries. IMO should and could encourage them to improve even if only on that basis.

Similarly, aviation insurers seem to take a much more rigorous approach to their customers than do their maritime counterparts.

The aviation industry and its regulators have spent substantial amounts of time and sums of money on researching ways to make flying safer. It has been an excellent investment and provides the maritime industry with a practical and encouraging guide or benchmark as to how to similarly improve.

1.14.0. Some possible solutions – What is to be done?

1.14.1. Solutions must be economical.

Given that the large majority of ferry accidents and the deaths arising from them occur in developing countries, it must be accepted that any solutions must be very economical. Developing country national governments are rarely willing or able to apply rich country levels of expenditure to poor country ferry safety problems.

Implementing and enforcing regulations and raising safety awareness need not be expensive activities. They seem likely, though, to be the most effective solutions. Richer countries’ OH&S, road safety and public health campaigns have been very effective even with comparatively little expenditure. So has the reform of the oil tanker sector. As the great majority of passenger vessel fatalities are ultimately caused by human error (as will be shown below) any improvements to be made will mostly involve behavioural modification rather than technical improvements. That will be significantly less expensive.

First, and most important, the IMO must be pushed by its richer country members into emulating the approach of its ICAO cousin even if only to protect their own tourist citizens from developing country ferry accidents. It should also be encouraged to emulate its own successful efforts in encouraging the reduction of oil spills from tankers. It is imperative that IMO makes more than just token efforts to persuade member governments to adopt rich and middle income country standards and regulations and enforce them rigorously. An analysis of the Baird Maritime Passenger Vessel
database shows conclusively that those regulations are effective provided that they are properly enforced. There is more than adequate existing national and international maritime regulation. The problem is that it is too often inadequately enforced.

1.14.2. Developing countries will not take the safety initiative.

Very little or no improvement will be achieved if the world relies on developing country governments, with the notable exception of the Philippines, to take the initiative in this regard. They must be encouraged to regulate vigorously in favour of maritime safety and to enforce those regulations very rigorously. Severe punishments must be imposed on transgressors so as to encourage the others.

1.15.0. Much can be done, practically and economically, to improve ferry safety.

As is explained in detail in Chapter 10, there is much that can be done, especially in developing countries, to improve the safety of passenger vessels; the competence and behaviour of their operators; and, the effectiveness of SAR responses. Significant technical, behavioural and psychological improvement is economically and politically achievable. Developed countries have largely achieved them as have other industries and maritime sectors. All that is required is the global will to bring such vitally needed improvements about. It is hoped that this thesis will help draw global attention to that requirement. Ferry passenger fatalities are preventable.
Chapter 2

Defining the problem

Data and reporting inadequacies make accurate definition of the dimensions of the problem very difficult

2.1.1. Defining the problem.

While anecdotal evidence general and electronic media reports abound as to the extent of the problem of fatal ferry accidents, it is difficult to obtain recent, detailed and accurate information from primary sources about most of the accidents that have occurred in the developing world. It is impossible also, for example, to learn how many ferry voyages are undertaken; how many passengers travel on each; the specifications of the vessels concerned; and, what is the duration or length of voyage. We can, therefore, only deal in absolutes. Comparative analyses are impossible because of the absence of such data. There is no statistical denominator.

Developed nations in northern Europe, North America, Australasia and Japan have much more useful statistics available. They also have a free press, functioning legal systems and a process of government inquiries into the reasons for and outcomes of serious passenger vessel accidents. Those inquiry findings are usually publicly available. Those countries, however, particularly more recently, are not where the real problems of ferry fatalities lie.

Such official inquiries are often superficial or unfocused and their published results sometimes late and misleading but, at least, they are usually open to the public and the evidence presented to them is recorded permanently and reported on. They can provide a useful, even if biased, basis for the analysis of the events that they enquire into. As Joseph Conrad described them in Lord Jim in 1900, “However, an official inquiry could not be any other thing. Its object was not the fundamental why, but the superficial how, of this affair”. 93

The „how” is usually easily determined but the „why”, which is far more important, is far more difficult. So difficult, indeed, that many inquiries do not even try to delve into it. However, so as to try to learn from the accident experience, the „why” is imperative in order to avoid it happening again in similar future circumstances.

Very importantly, though, a comparatively free press in developed countries can normally be relied upon to expose criminal behaviour or attempts by vessel operators and authorities to conceal facts.

It should be noted, however, that even a free press may be muzzled to some extent by the aggressive use of defamation laws. The author has personal experience of this, most particularly after publishing warnings of safety shortcomings in North Sea ferries shortly before the Herald of Free Enterprise capsized in 1987.\textsuperscript{94} Needless to say, that threatened defamation litigation ceased immediately following the capsize of that vessel. He also published comments on the Rabaul Queen sinking that inspired a threatening letter from the vessel's owner.\textsuperscript{95}

Two of the most informative and effective inquiry reports examined were those concerning the Marchioness\textsuperscript{96} and Estonia\textsuperscript{97} accidents both of which occurred in "developed" jurisdictions. Both revealed enormous amounts of detail and could only be described as extremely thorough. However, while the Marchioness inquiry was very thorough, it suffered from being conducted eleven years after the accident occurred in 1989. Its recommendations, though, would appear to have had some positive effect as no similarly tragic accident has happened in the United Kingdom since.

The Estonia Commission reported less than three years after the accident.\textsuperscript{98} However, the author believes that its very comprehensive and detailed report was marred by focusing too intently on technical detail at the expense of human factors. That focus did, though, lead to worthwhile improvements in the design, construction, equipping and operation of Ro-Pax ferries in northern Europe and Scandinavia at least. That has undoubtedly been generally beneficial. The Estonia report was also marred by a bias toward placing blame on participants from beyond Estonia, Finland and Sweden, the three countries behind the commission. To its credit, though, the fact of it closely following the very timely and much more searchingly effective Herald of Free Enterprise inquiry report undoubtedly increased its impact.\textsuperscript{99}

The very comprehensive and plainly transparent Rabaul Queen inquiry report showed very impressively that developing countries can conduct such inquiries effectively.\textsuperscript{100} However, such exemplary reports have been disappointingly rare.

Further fatal Ro-Pax ferry accidents have, of course, occurred but not in Northern Europe where the new Herald of Free Enterprise, Scandinavian Star and Estonia accident inspired „Stockholm Rules“ were implemented quickly.

\textsuperscript{95} See Appendix D. Letter to the editor from Captain Peter Sharp, managing director of Rabaul Shipping, to the author.
\textsuperscript{98} Laur, U. Estonia report, Ibid.
and rigorously from 1996.\textsuperscript{101} They have proved to be very effective in that region but less so in the Mediterranean and much less so in Asia and Africa as is described at length in Chapter 6.

2.1.2. Even a free press is too frequently powerless in developing countries.

Unfortunately, developing countries normally lack functional or transparent legal systems and tend to suffer from “cronyism” whereby friends or relatives of the rulers, who tend to own the vessels involved, are protected from government investigations into any misbehaviour or negligence on their part.\textsuperscript{102} These problems are widespread and generally afflict most of the countries where larger numbers of passenger vessel accidents occur.

Of those, only Bangladesh, India, the Philippines and Thailand can be said to enjoy the benefit of a largely free press to at least expose criminality or cover-up. However, even they do not have fully functioning systems of marine boards of inquiry as developed countries know them. Their court systems, similarly, could hardly be described as fair and objective in the western developed country sense.

That has led to Sulpicio Lines in the Philippines remaining unpunished until 2008 despite losing in excess of 6,000 of its paying passengers in four separate “accidents” including the obscene \textit{Dona Paz} sinking when 4,375 people lost their lives.\textsuperscript{103} Finally, following the sinking of the \textit{Princess of the Stars} in 2008, Sulpicio Lines’ operations were suspended by the Maritime Industry Authority of the Government of the Philippines (MARINA). However, phoenix like, the company simply changed its name to Philippine Span Asia Carrier Corporation and re-commenced operations.\textsuperscript{104} Effectively, it was given no more than a „slap on the wrist” by the Philippine Government. It is, then, still operating although without further known fatal accidents since then. Its punishment has in reality been little more than an inconvenience.

\textsuperscript{101} The Stockholm Rules became applicable to Scandinavian and North-West European countries from 1996 as a response to the major Ro-Pax ferry disasters of the previous decade. See \url{www.gard.no/web/updates/content/51837/ferries-ro-ropassenger/}.

\textsuperscript{102} Anon. \textit{The party winds down – Our crony capitalism index}, The Economist, London, 7 May 2016.

\textsuperscript{103} See Appendix A for details.

\textsuperscript{104} Agence France-Presse (18 August 2013), \textit{Ferry disaster is 5\textsuperscript{th} tragedy for Philippine firm}. Philippine Daily Inquirer, Manila, 2013.
Image 2.1. The sinking of the Sulpicio Lines owned Princess of the Stars in 2008 with the loss of more than 800 lives resulted in little more than a “slap on the wrist” from the Philippines Government. It was the last of a series of accidents over 18 years that led to the deaths of more than 6,000 people before the company changed its name to something less notorious (Wikipedia).

To further illustrate the extent of the arrogance engendered by the “cronyism” that is rampant in the Philippines, Sulpicio Lines petitioned the Manila Regional Trial Court with a claim that the Board of Marine Inquiry had no right to investigate the sinking of the Princess of the Stars which caused about 860 fatalities. That aggressive approach failed, however, and Sulpicio’s petition was rejected.105 Things, as noted below, are very slowly improving in that respect in that country.

Cronyism was discussed at length in a feature article in The Economist in 2016.106 It showed the malign influence enjoyed by the declared billionaire friends of rulers in a number of countries. Obviously, with their dearth of known billionaires, all African countries and Bangladesh were excluded from the Economist”s survey but The Philippines, unsurprisingly, was in third place following Russia and Malaysia. Indonesia, India, China and Thailand were all included on The Economist”s list of the twelve worst countries for crony capitalism.

105 www.tradewinds.no, 8 October 2008, Oslo.
106 The Economist, Ibid.
2.1.3. Maritime and general media provide more and better information than do developing country governments.

Much of the information about developing country ferry accidents that does exist has been revealed and recorded by the general and maritime media rather than by government authorities. Thus the Baird Maritime Passenger Vessel Accident database predominantly comprises reports sourced from newspapers, journals, books, directories, other databases, and from online news services.\(^{107}\) Most recently, in 2015, there have been brief and poor quality films of the fatal accidents involving the Pura Vida Princess in Costa Rica and the Marina Baru in Indonesia presented on YouTube.\(^{108}\) There are a further two YouTube videos presented in Appendix F that very graphically illustrate the reality of ferry accidents in Bangladesh. An interesting and useful development. In the „Western“ developed world reports of marine boards of enquiry can normally be accessed with respect to all accidents involving significant loss of life. Regrettably, this has been practically impossible elsewhere.

Globally, Lloyd“s Register of Shipping (LR), a classification society, publishes the most useful and comprehensive reports on casualties or accidents. However, its Casualty Review only lists losses of ships larger than 100 grt.\(^{109}\) That excludes many of the vessels in the developing world that are the subject of this thesis. The other useful global source is the Institute of London Underwriters (ILU). It publishes an Annual Report listing ship and aircraft accidents although it unfortunately excludes ships smaller than 500 grt except for war casualties.\(^{110}\) The IMO“s Global Integrated Shipping Information System (GISIS) is claimed to list the world“s shipping casualties and incidents and to record the findings of the resulting MBOIs.\(^{111}\) So far, regrettably, it does so partially and very inadequately and is practically devoid of developing country ferry accident data. It is disappointingly revealing to compare its content with that of the BMPVA database.

2.1.4. IMO data grossly misrepresents reality.

Even more revealing was the 2012 published International Shipping Facts and Figures – Information Resources on Trade, Safety, Security, Environment from the IMO Maritime Knowledge Centre.\(^{112}\) It showed how North Atlantic centric IMO is in that it cites a number of UK and USA based publications but not one from the Asia-Pacific, African or South American regions. Worse, it is simply and grossly wrong in its figure of lives lost in maritime accidents. While considerably more accurate than its cited source, IHS-Fairplay, it understates the true figures by more than 50 per cent.

\(^{108}\) Google. YouTube. 2015 and view Appendix F.
\(^{111}\) Global Integrated Shipping Information System, IMO London, Ongoing.
\(^{112}\) International Shipping Facts and Figures, IMO, London, 6 March 2012.
The figure published by IMO for the five year period 2006-2010 inclusive is 5,938 fatalities. The author’s BMPVA database shows 9,283 “known” fatalities for the same period. That, of course should be increased by about 50 per cent to reflect the estimated unreported fatalities. Promisingly, however, as noted in Chapter 1(1.3.1), in his speech delivered at the opening of the IMO’s 30th Assembly in November 2017, IMO Secretary-General Kitack Lim made a plea for more comprehensive and better data and statistics about marine casualties. That offers some hope that IMO is becoming aware of its information deficiencies. However, while the author offered his extensive data to IMO without charge, apart from an initial positive response, no attempt has been made by IMO to avail itself of his offer.

Considerable detailed analysis of the available accident statistics has been carried out by the International Union of Maritime Insurance (IUMI) which has been compiling data since 1993. The protection and indemnity (P&I) clubs generally have been compiling similar data but, again, on the wider subject of all vessels, particularly larger ones.

Maritime lawyer Philippe Boisson, on behalf of the French classification society Bureau Veritas (BV), has made a wide study of the safety of all kinds of vessels, not just passenger vessels. He has noted similar difficulties in sourcing information about accidents in developing countries. He states: “LRS takes account only of passengers and seamen who have died or are missing in a total loss, not the huge numbers of accidents in the perilous seas of the Third World. The ILU surveys only loss of life caused by accidents to ships of more than 500 grt, whereas certain national sources reveal that most deaths and injuries occur on board small craft…”

Further, Boisson commented: “Of course, it is also possible to turn to the reports issued by flag administrations after an accident at sea, but the information they contain usually remains inconsistent and unequal in value from one state to another”. The experience of the author is that little if anything has changed since M. Boisson’s book was published in 1999.

2.1.5. Probably 50% of fatal PV accidents go unrecorded.

These realities mean that significant numbers of fatal passenger vessel accidents must never have been reported on or recorded at all. Figure 2.1,

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113 Appendix A, Ibid.
114 IMO, GISIS, Ibid. Table 8, Ratio of lives lost… to total number of lives at risk.
115 Lim, K. T, Ibid.
117 Ibid. Page 33.
118 Boisson, P. Ibid.
below, makes that fact particularly obvious.\textsuperscript{119} However, and very importantly, the widespread adoption of the Internet around the turn of the Millennium has seen a very dramatic increase in the numbers of fatal accidents recorded. It is particularly significant that practically all of this increase has been in the developing world. This data has been of considerable value in the development of this thesis.

The Worldwide Ferry Safety Association (WFSA) has urged the adoption of mandatory reporting of ferry accidents. It “…found that only a small fraction of the world’s ferry accidents were voluntarily reported to the IMO’s Global Integrated Shipping Information System (GISIS)\textsuperscript{120}, and hypothesise that mandatory reporting would improve the frequency and quality of nations’ accident investigations, which could help prevent future accidents”.\textsuperscript{121} Indeed, as to GISIS, the author randomly sampled 20 accidents from the BMPVA database from 2001 to 2012, the cause of some 5,480 fatalities and could find only 12 of them listed on GISIS despite some of them having been very extensively publicised. Of those listed, most were described very inadequately.

On querying this deficiency, the author was advised that IMO Member States “…are regularly reminded and requested to make sure they put good and comprehensive information up there but it does sometime seem that is not always high on their priorities (sic)”.\textsuperscript{122} This is remarkable given the timely, accurate and comprehensive data that is available from the IMO’s sister organisation ICAO describing aviation accidents.\textsuperscript{123}

\textbf{2.1.6. Available data is disproportionately focused on developed countries.}

Consequently, the data recorded in the BMPVA database prior to 2000 is disproportionately focused on accidents that occurred in developed countries.\textsuperscript{124} It is similarly disproportionately focused on cruise ships because their clientele tend to be well off and, therefore, of more interest to the general media.

While it makes little or no difference to the overriding trends in the causes of such accidents, it significantly distorts the records of the particular states in which they occurred. So, because the data gathered over the period 2000-2015, is far more comprehensive, it has been used here for more detailed analysis.

\textsuperscript{119} For example, for Myanmar/Burma there is very little information available for the period 1962-2007 because the country was effectively closed to the outside world for most of that period.
\textsuperscript{120} IMO, GISIS, Ibid.
\textsuperscript{122} Email from Mr Lee Adamson, Head Public Information Services, Legal and External relations Division, IMO, to the author. 10 June 2016.
\textsuperscript{123} See, for example, the ICAO Safety Report 2016 Edition, ICAO, Montreal, 2016.
\textsuperscript{124} Appendix A, Ibid.
The Internet, also, helps to provide us with multiple sources of news that effectively confirm or, at least, further validate the data that has to be utilised in the absence of any other information. There is thus usually sufficient data available to corroborate the descriptions of almost all of the accidents listed.

Unfortunately, however, there is insufficient data available to enable a statistical denominator to be created in terms of, for example, fatalities per voyage, or fatalities per passenger mile, or per numbers of vessels in service. Such figures simply do not exist.

In other words, while much of the data that is available is not strictly empirical, it is sufficient to work with for the purpose of this thesis. Put simply, there can be very little doubt as to who is at fault or why in the event of a collision, allision or grounding or when a vessel proceeds to sea against a very definitely predicted typhoon.

2.1.7. Internet dramatically improved data availability.

![Graph showing fatal accidents reported worldwide from 1965 to 2015.](image)

*Figure 2.1. Fatal accidents reported worldwide. Note the dramatic and sustained increase around the year 2000. This coincides with the advent of widespread use of the Internet (BMPVA database).*

Despite the approximately four-fold increase in the numbers of fatal accidents per annum reported in the years since 2000, it cannot be assumed that the statistics in the BMPVA database are in any way all-encompassing. The author believes that due to under-reporting, the real figures for the number of accidents and the resulting death toll could be as much 50 per cent higher than shown.

Indeed, Philippe Boisson, commenting on the death toll arising from all maritime accidents wrote: “This shortage of internationally comparable data suggests that official figures could be multiplied by at least ten”.

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125 Appendix A, Ibid.
126 Boisson, P. *Safety at Sea...*, Ibid.
Given that as the likely situation for the period since the year 2000, it is equally likely, because of much worse under-reporting, that the true figures could be at least seven or eight times those recorded in the database for the prior 34 years from 1966 to 1999. It is distinctly possible that the reality could be even worse than that speculated figure as vessels and their equipment and, even, governance in some jurisdictions, have improved somewhat over the same period. For example, note the relative reductions in numbers of both accidents and fatalities in The Philippines shown in Figures 2.4 and 2.5 below. It may be speculated that this improvement is at least partially due to increased publicity about ferry accident fatalities leading to a demand from passengers/customers for better vessels and behaviour from ferry owners in that country. It may also be due, in part, to the improved reporting of accidents in other poorly performing countries.

As will be seen below and in Chapter 10, such a demand for improved vessels has been created and new competitors are entering the industry in the Philippines with significantly better and safer vessels.

It is acknowledged, therefore, that the following analysis is somewhat restricted by the information that is available. The author is unaware, however, of any more comprehensive source of information and has had to work with what is available. It is unlikely, therefore, that the trends presented are inaccurate in any way other than an under-reading caused by this paucity of information. In other words, the extent of the problem will generally be worse than shown here. It is very unlikely that the causes of accidents will be any different.


Given the much greater availability of reports of accidents and the data arising from them since 1 January 2000, it became obvious that, apart from the timeliness of the information, its greater quantity provided a much better sample for both causal and geographic analyses. Compared with the data presented in Chapter 1, which covers the full fifty years of the database, those covering its most recent sixteen years provide information that is undoubtedly more comprehensive and accurate globally.\textsuperscript{127}

That more recent and more voluminous information, however, largely confirms the trends indicated by the full fifty-year statistics. The major author assessed causes are generally similar in both the fifty-year and sixteen year samples despite the massive change in sample numbers. Probably unsurprisingly, the same also applies generally to the geographical analysis of accidents. Apart, notably, from the significant relative improvement of the Philippines. An improvement which, incidentally, proves that change for the better is achievable given the right approaches. Of course, the increase in the volume of reporting from Bangladesh, Myanmar and some African countries will be a major factor in this change.

\textsuperscript{127} Appendix A, Ibid.
It is possible, too, that the relative performance of the Philippines may not have been as bad as the *BMPVA database* statistics indicate. This is a result of the relatively greater under-reporting of accidents, pre-Internet, in other countries, most notably Myanmar, that do not benefit from the relatively free and virile press that is a major attribute of the Philippines. While it is impossible to empirically confirm that anomaly, it should be carefully borne in mind by anyone analysing relative safety performances between countries, particularly in the period prior to 31 December 1999.

Of course, while there has been a distinct improvement, relative to other countries, in the performance of the Philippines, in absolute numbers of fatalities, the Philippines averaged 149 per annum from 1966 to 1999 but 166 per annum for the 16 years thereafter. This may simply indicate that the Internet factor may have been relatively less important in the Philippines than in other countries such as Tanzania, Myanmar and DR Congo, for example. That appears likely to be the reality.
2.2.2. Causal analysis illustrated.

Figure 2.2. Author assessed causes of fatal passenger vessel accidents 2000-2015. By accidents, left and fatalities, right. They have changed from the full fifty-year survey (below) but not dramatically so except for the marked improvement in accidents attributable to poor lookout (BMPVA database).  

Appendix A, Ibid.
Figure 2.3. By comparison, author assessed causes of fatal passenger vessel accidents 1966-2015. By accidents, left and fatalities, right (BMPVA database). [129]

2.3.1. Geographical analysis revisited.

Figure 2.4. Geographical analysis of passenger vessel accidents and fatalities 2000-2015. By accidents, left and fatalities, right (BMPVA database). [130]

[129] Appendix A, bid.
Figure 2.5. By comparison, geographical analysis of passenger vessel accidents and fatalities 1966-2015. By accidents, left and by fatalities, right (BMPVA database).

Note that, because of an absence of data, Myanmar is not included in either of these comparisons.

2.3.2. National fatality rates have remained largely consistent.

Notably, the ten most dangerous nations for ferry travel measured both by numbers of accidents and numbers of fatalities remained the same over both the fifty and sixteen year periods studied although their rankings did change somewhat. They are: The Philippines, Bangladesh, Indonesia, Tanzania, DR Congo, China, India, the United States and Haiti. With the exception of the United States and the possible or partial exception of China, all are classed as developing countries. Of the ten, only India, the United States, Indonesia and The Philippines enjoy the benefit of a mostly free press. None, except perhaps the United States, could be described as having an independent, objective and usually corruption-free bureaucracy. This, as noted above, can be an impediment to the timely, accurate and detailed reporting of accidents of any kind.

Generally, developing countries tend to be dangerous countries. This applies to all forms of transport, except, generally, aviation, and to many other aspects of daily life. However, even the United States is home to a significant underclass of comparatively poor people, much more so than most other developed countries. Perhaps that is the reason why it is the only so-called

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130 Ibid.
131 Appendix A, Ibid.
“developed” country to appear in these statistics. It should be noted, also, that the USA has a far worse record of road accident fatalities than most other developed nations.\(^{132}\) There would appear to be a definite cultural/behavioural connection there.

An interesting and encouraging improvement that emerged over the final sixteen years of the survey is that the Philippines improved from worst place for fatalities with 18.2 per cent to fifth place with 8.4 per cent.\(^{133}\) However, more comprehensive accident reporting in other developing countries is probably the main reason for the improvement in the relative position of the Philippines. The reported number of ferry fatalities per annum there actually increased from 2000 to 2015.

The statistics from the BMPVA database illustrate that relative improvement well.\(^{134}\) Over the same period, by contrast, Tanzania saw many more and worse accidents. It is suspected, though, that this may have largely been because of more complete recording of accidents in that country since 1999. Meanwhile, Bangladesh experienced no noticeable improvement with an average of four fatal accidents per annum with an average of 379 fatalities arising from each.

Tanzania has commenced to introduce larger vessels on a number of its coastal ferry routes, particularly from Dar-es-Salam to Zanzibar. Two of them, Spice Islander and Skagit, sank with massive loss of life in 2011 and 2012 respectively. It seems that larger or even newer vessels do not always guarantee greater passenger safety.

Even brand new ferries have not engendered any notable improvement in safety consciousness in Tanzania. The tragic „nose-dive” in 2014 of the 2010 built Kiliminjaro II provided a clear illustration of that.\(^ {135}\)

### 2.3.3. Statistics are generally significantly understated.

It must again be emphasised that the figures listed above are almost certainly significantly underestimated. Indeed, in April 1988, Feliciana G. Salonga, then president of the Philippines Shipyard and Engineering Corporation, estimated that 40,000 people died in Philippine waters each year.\(^ {136}\) The Philippine Government disputed that and suggested the real figure was more like 20,000 to 30,000 per annum!\(^ {137}\)

There are, obviously, numerous small accidents that are not regarded as newsworthy.\(^ {138}\) And, if a senior officer of the Philippine Coast Guard conceded

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\(^{132}\) Refer to Figure 4.2.

\(^{133}\) Appendix A, Ibid.

\(^{134}\) Ibid

\(^{135}\) See Appendix A.

\(^{136}\) Refer to 1.3.1. Feliciana G. Salonga.

\(^{137}\) Subsequent comment to the author from Commo Guettiero dela Cruz, PCG rettd. See Personnae.

that such large numbers were correct, it can be assumed that the totality is considerably worse than the available statistics concerning the Philippines and a number of similar countries suggest.

It seems very reasonable to assume that the same realities apply in most of the other developing countries examined here and thus that the overall accident and fatality statistics presented here significantly underestimate the actual figures.

### 2.3.4. Known fatal ferry accidents.

#### The Worst Five Countries: 1 January 2000-31 December 2015

<table>
<thead>
<tr>
<th>YEAR</th>
<th>BANGLADESH</th>
<th>INDONESIA</th>
<th>TANZANIA</th>
<th>D.R.CONGO</th>
<th>PHILIPPINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>4</td>
<td>560</td>
<td>3</td>
<td>611</td>
<td>0</td>
</tr>
<tr>
<td>2001</td>
<td>1</td>
<td>100</td>
<td>3</td>
<td>41</td>
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<td>3</td>
<td>537</td>
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<tr>
<td>2003</td>
<td>8</td>
<td>1,284</td>
<td>3</td>
<td>91</td>
<td>1</td>
</tr>
<tr>
<td>2004</td>
<td>6</td>
<td>441</td>
<td>1</td>
<td>273</td>
<td>0</td>
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<td>7</td>
<td>950</td>
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<td>8</td>
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<td>1</td>
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<td>238</td>
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<td>9</td>
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<td>4</td>
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</tr>
<tr>
<td>2015</td>
<td>2</td>
<td>203</td>
<td>4</td>
<td>220</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>6,129</td>
<td>59</td>
<td>3,817</td>
<td>14</td>
</tr>
<tr>
<td>Average P/Annum</td>
<td>4</td>
<td>383</td>
<td>4</td>
<td>239</td>
<td>1</td>
</tr>
<tr>
<td>Average fatalities per accident</td>
<td>94</td>
<td>65</td>
<td>264</td>
<td>116</td>
<td>50</td>
</tr>
</tbody>
</table>

Table 2.1. A comparison of fatal accident and fatality data from the five most dangerous countries (That represent about 61% of the known total) for ferry accident fatalities - 1 January 2000 to 31 December 2015. The Philippines improved from worst to fifth worst country in terms of fatalities per annum in that period (BMPVA database). Note that Myanmar should be on this list. Data deficiencies have necessitated its exclusion.

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139 Appendix A, Ibid.
2.3.5. Data analysis inadequacies

This is why considerable caution must be exercised when analysing and interpreting the data compiled in the BMPVA database. While it is undoubtedly the best available, it is, equally undoubtedly, incomplete. Further, this data, while it is largely based on newspaper and online news service reports, has, as far as undeveloped nations are concerned, no official status such as might enhance the veracity of reports of Marine Boards of Inquiry and similar investigations in developed countries.

Given these constraints, though, there is sufficient consistency of information to enable usefully accurate conclusions to be drawn. It seems very unlikely that, even if full and detailed reports were available on all accidents, the trends on which this thesis is based would be any different. They are overwhelmingly consistent worldwide and over both the sixteen year and fifty year time spans. There is also a remarkably close correlation between the author-assessed causes of the accidents and their geographical locations.

2.3.6. Analytical methodology.

Similarly, the fact that the causes attributed to all the accidents recorded in the database are „author-assessed” irrefutably implies subjectivity. This is not disputed but the assessments have been made consistently and, while the author in no way claims to be in a position similar to that of the chairman of an MBOI, it is impossible to argue that a collision, overloading or grounding, for example, could have any cause other than human error. Judgements as to seaworthiness are more nebulous but, if a vessel disintegrates or catches fire while in service, there is very little doubt as to that reality.

In an endeavour to present as much detailed information as possible about each known accident, the data has been presented across 22 fields. They are: Day, Month, Year, Region, Country, Detailed Location, Type of Incident, Number of Deaths, Vessel Name, Flag State, Vessel Type, Hull Construction Material, Tonnage (GRT), Length (Metres), Year Built, Ship Builder, Ship Owner, Claimed Cause, Author Assessed Cause, Inquiry Adjudication, Explanatory Notes, and Information Sources. Obviously, in many cases, not all fields could be completed because of information scarcity.

This process became something of a „jig-saw puzzle” in that information often had to be extracted from a number of sources and, in many cases, interpreted to facilitate its useful presentation. Indeed, information continues to be discovered even many years after the event concerned. A significant variability exists, therefore, as to the accuracy of the data presented. The processes applied to the data gathering were consistent, however, and the author firmly believes that no more extensive or accurate data exists. The absence of significant inconsistencies in the data collected and analysed confirms that, taken across the whole database, the figures used to determine the reasons for the problem and its extent are as accurate as possible.
2.4.1. Causes of passenger vessel accidents.

While the data available was frequently sparse and somewhat nebulous, the investigatory process eventually uncovered sufficient information for the author to assess, admittedly subjectively, the most likely cause of almost every accident. In addition, an even greater number of non-fatal accidents were also examined and the causal trends were precisely consistent with the fatal accidents. The substantial quantity of data collated provides good grounds to believe that the trends that it reveals are accurate. Any resulting inaccuracies are considered, therefore, to be immaterial. The BMPVA database has been seen by many people with an interest in the subject of ferry safety. Not one has pointed out any inaccuracies.

Across the total of 750 accidents examined and assessed, practically all had been the subject of some kind of media or government report.\textsuperscript{140} While the reported details varied significantly in both quantity and quality, in almost every case enough information was available to enable the author to sensibly and objectively assess the likely cause.

Again, the consistency of the trends revealed tends to confirm the overall accuracy of the data. In the case of almost every accident examined and assessed, the facts were clear and the cause obvious. The accidents that were the subject of really nebulous reports have been classed in the „All Others“ category. They amounted to fewer than eight per cent of the accidents listed.

Indeed, the statistics for author-assessed causes as to total numbers of accidents and fatalities over both the full fifty-year period surveyed and the most recent sixteen years are practically identical. Over both periods the figure for numbers of accidents assessed to be caused by human error is identical at 88 per cent. The percentages of fatalities believed to have arisen from human error caused accidents were 99 per cent in the period 2000-2015 and 98 per cent for the fifty years from 1966 to 2015.\textsuperscript{141} It must be noted, though, as shown below, that the detailed reasons for those human errors have changed somewhat.

\textsuperscript{140} Appendix A, Ibid
\textsuperscript{141} Ibid.
2.4.2. Human error, undoubtedly, is overwhelmingly and consistently the major cause of fatal accidents.

The Worldwide Ferry Safety Association has analysed, "… 147 ferry accidents worldwide to determine what proportion of accidents are caused by human error(HE)". In summary, it determined that 61 per cent of accidents and 75 per cent of fatalities were caused by human error using a “conservative" approach. However, taking a “liberal” approach, it attributed 85 per cent of accidents and 92 per cent of fatalities to human error. Although gained from a considerably smaller sample (147 cf. 570) over a similar period (14 cf. 15 years), the results are similar to those estimated by the author who takes a more rigorous approach to seaworthiness in particular than does the WFSA.

A more recent study Statistical analysis of ship accidents and review of safety level, by Eleftheria, E. et al, looked at accidents involving all ship types above 100gt from 2000 to 2012. It concluded that: “…an overwhelming part of marine accidents (more than abt. 80%) is attributable to human factors…”.

As the author has commented elsewhere:

*Their causes are primarily unseaworthy vessels, poor lookout, overloading and downright negligence, none of which can be blamed on anything but human error.*

*Structural and mechanical failures, of which there are remarkably few, cannot be blamed for collisions, allisions, groundings and capsizes due to overloading. They can all be put down to human error. So, in other words, the main problems are predominantly behavioural and cultural rather than mechanical or structural. Our naval architects, ship builders and engine manufacturers do a pretty good job.*

Numerous other commentators have come to similar conclusions with respect to the importance of human error or human factors in maritime, particularly passenger vessel, accidents. Indeed, some have even gone so far as to suggest that it is the only cause of accidents. In a sense, perhaps an extreme one, it could be argued that such a proposition is reasonable. However, most commentators allow for the possibility that there can be some other causal factors.

A very useful, comprehensive and extensively researched government document that examines the human element in shipping was published in 2010 by the UK Maritime and Coastguard Agency. It concurs with the author’s assertion that practically 100 per cent of maritime accidents are directly or indirectly attributable to human element issues. It, “…explains the

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fundamental aspects of human behaviour and the complex interactions of human element issues in the maritime industry”. More specifically, “It shows how the human element needs to be managed simultaneously at all levels in the industry, on board ship, within companies and amongst regulators, and it provides effective, pragmatic guidance on how these issues can be addressed”.

2.4.3. Defining human error.

Human error has been well defined by Michelle Grech and colleagues as: “An inappropriate or undesirable human decision or behaviour that leads to undesirable outcomes or has significant potential for such an outcome. Accumulation of errors may result in accidents.” IMO defines human error as: “... a departure from acceptable or desirable practice on the part of an individual or group of individuals that can result in unacceptable or undesirable results”.

The United States Coast Guard (USCG) describes the related concept of „human factors” as “the study and analysis of the design of the equipment, the interaction of the equipment and the human operator, and most importantly the procedures the crew and management follow”.

Over the fifty year period examined in this thesis considerable work, analysis, study, evaluation and promotion has been directed at the specific problem of human error and, more generally, at human factors, human behaviour and safety. A considerable part of that effort has been set against a background of transportation activity of which, of course, maritime transport is a major component. That effort has resulted generally in impressive and important improvements in terms of reductions in the numbers of accidents and of their resulting fatalities.

Eleftheria et al highlight the “remarkable example” of “the improvement of safety of tanker operations after year 1990...”. Given IMO’s key role in those reforms, they offer an excellent example or model of what could be achieved if IMO were to cooperate similarly with the ferry sector.

While its performance has improved, the maritime industry, apart from the oil tanker and cruise ship sectors, has generally not enjoyed the same dramatic rate of improvement that has benefitted the aviation and road transport sectors, especially in the developed world, over that same period. The passenger vessel sub-sector has, unfortunately, been similarly slow to improve as the wider maritime sector.

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148 Boisson, Ibid.
149 Eleftheria, E, et al., Ibid.
The London based Nautical Institute (NI)\textsuperscript{150} has published an excellent handbook on this subject.\textsuperscript{151} It describes how: “A system of examinations for aviation pilots in human performance and limitation has produced great advances in safety for that sector”. It shows how those developments can be adapted to the maritime sector to effect similar improvements in human factors. As is described in chapters 1, 4 and 7, there is much to be gained by the maritime industry from emulating aviation industry practices.

\textbf{2.4.4. Considerable attention accorded to human error.}

Given their importance as contributing factors in maritime accidents, considerable attention has been accorded to human error, human factors and human behaviour by organisations such as the Nautical Institute, the classification societies, numerous national authorities and IMO. Numerous seminars and conferences on the subject have been presented and resulting reports published as can be seen in the Bibliography herewith. These events have not been wasted and considerable progress made, particularly in the field of cognitive psychology. This is discussed in Chapter 7.

Undoubtedly the single most effective initiative on the part of IMO since the imposition of the Safety of Life at Sea Convention (SOLAS)\textsuperscript{152} a century ago was its adoption of the International Safety Management Code (ISM) in 1993.\textsuperscript{153} This followed soon after the \textit{Herald of Free Enterprise} and \textit{Scandinavian Star} accidents and its implementation was hastened by the \textit{Estonia} sinking in 1994. Notably, all three of these accidents occurred in European waters and their significant loss of life over a six-year period inspired rapid reform in northern Europe at least.\textsuperscript{154}

Paragraph 1.2.2 of the ISM Code lists three main objectives for safety management. They are: to “…provide for safe practices in ship operation and a safe working environment; establish safeguards against all identified risks; and continuously improve safety management skills of personnel ashore and aboard ships, including preparing for emergencies both to safety and environmental protection".\textsuperscript{155}

Importantly, the ISM Code covers all passenger vessels with no lower gross tonnage or age limits although non-SOLAS vessels may be exempted from mandatory compliance.\textsuperscript{156} As explained in Chapter 8, however, its enforcement in poorer countries has been patchy, to say the least, with the result that safety improvements have been less impressive than in the

\begin{flushleft}
\textsuperscript{150} The Nautical Institute is a London based, international institution for master mariners that supports and encourages research into nautical operations, particularly safety.  \\
\textsuperscript{152} Safety of Life at Sea Convention, IMO, London, 1919.  \\
\textsuperscript{153} International Safety Management Code, IMO, London, 1993.  \\
\textsuperscript{154} Appendix A, Ibid  \\
\textsuperscript{156} IMO ISM Code, Ibid. 
\end{flushleft}
developed world. Poverty and its accompanying corruption make improvement much more difficult there.

The author has commented further on this factor elsewhere:

So, the blame for all this death and destruction can pretty much be sheeted home to owners, crews and regulators. They are failing dismally and mostly, but not entirely, in the poorer parts of the world. Never forget, though, the Herald of Free Enterprise, Scandinavian Star, Estonia, Express Samina, Staten Island Ferry, Sewol, and Costa Concordia, for example. You can still be killed in a passenger vessel accident in the western „developed” world but your chances of survival are much better there.157

Examining the major causes of passenger vessel fatalities, that is: overloading; inadequate seaworthiness; poor lookout; negligence; and, poor seamanship, such as sailing into hazardous weather, we find that those various forms of human error comprise 98 per cent of the causes of such fatalities over the full fifty years examined. If we look at numbers of fatal accidents, rather than fatalities, they are almost exactly 88 per cent human error induced for the same period. Despite having more comprehensive and, presumably, accurate reporting, since 2000, we have not noticed a decline in the percentage of fatal accidents caused by human error. That is not encouraging. However, in terms of fatalities, the percentage of known deaths attributable to human error has become slightly worse since 2000. That is thought provoking.

An interesting comment on the problem comes from a non-mariner source. The following was published in the 2015 edition of Lonely Planet – Philippines, a travel guide, under the heading „Ferry Safety“:

For the most part ferries are an easy, enjoyable way to hop between islands in the Philippines, but ferry accidents are not unknown. Bad weather, lax regulations and maintenance, equipment breakdowns, overcrowding and a general culture of fatalism are to blame.158

A „culture of fatalism“ or the „karma“ factor is an interesting concept that seems worth investigating and will be in Chapter 5. Suffice to say that it is probably endemic in most if not all the cultures that prevail where the majority of the world“s fatal ferry accidents occur. It may well be a significant contributor to some of the human error factors that seem to be behind so many of the accidents examined here.

There are those, though, who believe that a high percentage of human error causes is a good thing because it means that technical causes are fewer and that human errors can be eliminated. This view is, perhaps, not so perverse as it may seem at first glance. In fact it has been well argued by Captain Ed Verbeek, an Amsterdam marine pilot, in the Nautical Institute”s magazine

157 Baird, N. W. Passenger vessel accidents are preventable. Op cit.
Seaways. He commented, “… I am shocked that after thousands of years of designing, building and equipping ships, the technology is still so frail that one out of five (Vandeek’s figure) accidents has technical causes”.

Most would dispute his view but there is a certain odd logic to it. Others, again, believe that all accidents are the result of human error or human factors. Self-evidently, if you investigate far enough back, almost every technical, mechanical or structural cause must be the result of human error in design, manufacturing or maintenance if not just in operations.

This, obviously, is the key to the whole problem of maritime accidents whether they involve cargo ships, naval vessels, cruise ships or ferries. Practically every accident is ultimately caused by human error of some kind. That, at least, gives reformers something to work with. Fortunately, human behaviour can be modified and improved to a considerable extent. The aviation industry, the oil tanker sector in shipping, and the developed world’s road traffic authorities, in particular, have shown that there are many ways in which such human errors can be significantly reduced, if not eliminated entirely. That is the premise on which this thesis has very largely been based.

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2.5.1. Human errors that cause passenger vessel accidents.

These are listed and described in order of importance below:

2.5.2. Overloading.

Image 2.2. Typical examples of gross overloading of top-heavy ferries in Dhaka, Bangladesh. This is the norm in all the developing countries where most ferry accident fatalities occur (www.nigerianmonitor.com).

Overloading of ferries and the associated falsification or total absence of passenger manifests is undoubtedly the most deliberate or wilful type of human error that leads to passenger vessel accidents. Overloading has been and remains the major cause of the fatalities that arise from passenger vessel accidents. Such accidents normally happen in the form of capsizing or sinking or both. Overloading is widely practiced in developing countries and it is probably only good luck and generally benign sea or river conditions that prevent many more accidents occurring with their resulting fatalities. It is the factor that consistently leads to the greatest number of fatalities per accident.

The incidence of overloading caused accidents has remained almost constant over the full fifty years of the survey but, in the final sixteen years, the percentage of fatalities arising from overloading caused accidents has increased from the long-term figure of 34 per cent to 39 per cent. This is significant and can probably be attributed to more widespread ferry travel accompanying recently improving economic conditions in some developing countries. It is particularly disappointing given that all the efforts of IMO, inspired and goaded by INTERFERRY and the WFSA are not bearing even a
small amount of fruit.\textsuperscript{160} It is to be hoped, though, that IMO will not be so disappointed as to desist from its efforts. Better focused and directed, they will be able to make a difference.

Reductions in or elimination of the overloading problem will only come about with improvements in the training and education of crews and the introduction of practical regulations and their rigorous enforcement. Those regulations will be required to control the behaviour of owners and masters as well as local authorities as they are often corruptly complicit in such overloading. Better designed vessels such as those advocated by Stuart Ballantyne that “run out of deck space before they run out of buoyancy or stability” will also lead to significant reductions in fatalities when they are eventually brought into service.\textsuperscript{161}

Some incidents of overloading noted in the \textit{BMPVA database} could not be blamed on owners or masters.\textsuperscript{162} At least two were the result of passengers forcing masters to put to sea against their better judgement by threats or by simply untying the vessel’s mooring lines. Nevertheless, the majority of such incidents are due to greedy owners who also, on occasion, have forced reluctant masters to put to sea. In many of those cases the owners have been assisted by corrupt officials. They, at the least, have turned a „blind eye” to the overloading.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image2_3.jpg}
\caption{Overloaded ferries are nothing new. This 1649 painting of a Dutch river ferry by Salomon van Ruysdael (1600-1670) illustrates the problem well (Rijksmuseum).}
\end{figure}

\textsuperscript{160} INTERFERRY, Press release, \textit{IMO head to address INTERFERRY conference in boost for safety campaign}, London, 3 February 2016 (He eventually failed to attend the conference).
\textsuperscript{161} Ballantyne, S. Ibid.
\textsuperscript{162} Appendix A, Ibid.
Melbourne broadcaster Jon Faine and his son Jack, in their book *From Here to There – A Father and Son Road Trip from Melbourne to London*, described an Indonesian ferry voyage from Kupang on West Timor to Larantuka on Flores that took place in 2009 under the chapter heading „Scary Ferry”\(^{163}\). Commencing with their description of the need for bribery to even board the ferry, the poor condition of the ship and its gross overloading of people, cargo, vehicles and animals, the whole experience is dystopian. No-smoking signs are blatantly ignored and rubbish is continually thrown over the side. It is, indeed, a scary ferry but it is the well-described reality of ferry travel in much of the developing world.

**2.5.3. Unseaworthy vessels.**

As assessed by the author from a very careful examination of the information contained in the *BMPVA database* over the full, fifty-year, period of this study, unseaworthy vessels have been the second most important factor in that they have been blamed for 36 per cent of fatal accidents and 31 per cent of fatalities. That factor also worsened in the final sixteen-year period when the percentages increased to 40 per cent and 38 per cent respectively.\(^{164}\)

While the information in the database is often limited, it is difficult to argue that capsizes can have causes other than overloading, collisions, groundings, allisions or inadequate seaworthiness. All can only be due to human error.

Unseaworthy vessels are usually made that way by negligence and, for the purposes of this thesis, are described separately because they remain a specific form of negligence. Almost without exception, unseaworthy vessels are older vessels that have not been properly maintained or have been badly modified to increase their carrying capacity.

The exceptions, which are usually newer vessels, have invariably been poorly – read negligently – designed or constructed. Such vessels, also almost invariably, have been insufficiently carefully surveyed or examined by the appropriate government authority or a classification society if they have been surveyed at all. Further, even younger vessels can be poorly maintained. Again, this factor is closely related to negligence and frequently involves corruption of maritime authority or classification society surveyors.\(^{165}\)

Vessels can become unseaworthy as a result of structural, mechanical or equipment deficiencies often caused by corrosion or rust. Structural and mechanical deficiencies are normally the result of inadequate maintenance or of poorly designed and often illegal modifications. They are usually in the form of adding extra decks that adversely affect stability as can be seen in Image 2.5.\(^{166}\)


\(^{164}\) Appendix A, Ibid.

\(^{165}\) As described in the *Rabaul Queen* and *Sewol* inquiry reports, described in 3.24 and 3.25.

\(^{166}\) See, for example, the *Al Salam Boccaccio*, described and pictured below in Image 2.5. and in Chapter 3.
Others are inherently unseaworthy thanks to poor conception and detailed design and inadequate construction. The Filipino motor bancas, or bangcas, are examples of this problem. They have been involved in numerous fatal accidents. Bancas are essentially built around a narrow, canoe-bodied central hull that is inherently unstable without the flimsy wooden or bamboo outriggers that are, often poorly, attached for the purpose of making the vessels stable. These structures are often insufficiently strong when constructed, often held together by string or fishing line, and then are poorly maintained. This can be made worse by the, sometimes careless, operation of such vessels. So, unseaworthy vessels can be, and frequently are, made even more dangerous by poor seamanship.

Fortunately, motor bancas, as seen in Image 2.4, rarely exceed 30 metres in length so, while they are too frequently involved in fatal accidents, the number of fatalities arising is generally fewer than 100 in each case. They could easily and quite inexpensively be more substantially constructed so as to make them safer but, as with all such dangers in the Philippines, culture, tradition and poverty are the ultimate sources of such problems. There is nothing inherently wrong with the design concept, just their flimsy construction, inadequate maintenance, insufficient outrigger float buoyancy and careless operation. They could, relatively easily and inexpensively, be made significantly safer.

A major cause of accidents in many developing countries is that a high proportion of ferries, particularly in more remote areas, were never designed to carry large numbers of people. Often they are not much more than dinghies or canoes intended for purely inshore work carrying very small loads. They are unseaworthy by reason of being too small and completely unfit for purpose and are made much more so by gross overloading.

It should be noted, too, that even large, comparatively modern vessels can be inherently unseaworthy. As described at length in Chapter 6, conventional monohull Ro-Pax ferries, with their large vehicle access doors and their open, low vehicle decks, have a disproportionately poor accident record (See, for example, Image 2.5.). Some 30 per cent of the fatalities listed in the Baird Maritime Passenger Vessel accident database occurred in such vessels (Thirty-two per cent in the 2000-2015 period). 167

As mentioned in Chapter 1, it is entirely possible that an inherently unseaworthy vessel could be safely sailed around the world by a competent seaman. 168 The problem in many developing countries is that unseaworthy vessels are often combined with less than competent, or even careful, captains. Indeed, as mentioned elsewhere, even some very modern, properly designed and constructed and well-equipped vessels have come to grief because of operator errors. Costa Concordia, Kilimanjaro II and Sliepner are good examples of those. 169

167 Appendix A, Ibid.
168 See 1.1. Introduction.
169 Appendix A, Ibid.
In Bangladesh the ferries tend to be larger and more substantial than in Africa or Southeast Asia but they are often poorly modified to increase their passenger capacity by adding decks at the expense of reducing their stability.

This problem has not been confined to Bangladesh, it is simply more common there. Indeed, the author recalls travelling on Greek ferries in the Aegean Sea in the mid-1970s when he always slept and stayed on deck. This was due to his fear that the stability of those ships had been compromised by the addition of extra decks with very inadequate, if any, compensation in the form of sponsons added at the ship’s waterline. Few, if any, such ships continue to operate in the northern Mediterranean. If not yet scrapped, they are likely to be operating in Africa.

This flow of elderly vessels of declining seaworthiness from northern and richer countries to poorer southern ones has been a significant contributing factor in some of the major and most deadly accidents in Greece, parts of Africa, the Philippines and Indonesia. The Dona Paz, Le Joola, Spice Islander, Skagit, Princess of the Stars, Al Salam Boccaccio 98, Superferry 14, Filipino Princess, Princess of the Orient, Dashun, Senopati Nusantara, Express Samina, Teretai Prima, and St Thomas of Aquinas are examples of mostly conventional monohull Ro-Pax vessels listed in the BMPVA database that served safely for years in their countries of origin but, thanks to age, neglect, dangerous modifications and, often, poor seamanship, were involved in
deadly accidents in their new homes and roles.\textsuperscript{170} That phenomenon has been further commented on in chapters 3 and 6 in particular.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image2.5}
\caption{The Al Salam Boccaccio 98 was a typical example of a dangerously modified former European, in this case Italian, ferry with additional, stability robbing decks added, theoretically counterbalanced by sponsons added at the waterline. Its wide-opening, low vehicle access doors and unobstructed, full length, low vehicle deck made it particularly vulnerable. It was involved in a deadly accident resulting in 1,022 fatalities in February 2006 in the Red Sea (Wikipedia).}
\end{figure}

There was and, to some degree still is, a clear movement of elderly ferries from north to south. When ferries become obsolete, worn out or redundant in northern Europe or North America they tend to be sold to poorer countries in the Mediterranean and then on to Africa. In the case of elderly Japanese ferries, they tend to be sold to the Philippines and then on to Indonesia. With every transaction they seem to become more decrepit and more dangerously modified so as to pack in yet more passengers. Many of the vessels involved in fatal accidents in the Philippines, Korea and Indonesia had been „retired“ from Japan some years previously. The same applies to former Baltic ferries that are „handed down“ through Greece, Italy, Spain and, later, Africa and Iran.

Seaworthiness deficiencies, then, have many parents. Poor design and construction, inadequate maintenance and stability robbing modifications are

\footnote{170 Appendix A, Ibid.}
some of the more obvious ones. They are all due to human factors, mostly negligence and greed.

2.5.4. Poor lookout.

Poor lookout is the third most important cause of accidents across the whole fifty years of the survey at 22 per cent and has led to an equal percentage of fatalities. However, in the most recent sixteen-year period this reduced to 20 per cent of accidents and only nine per cent of fatalities (See Figures 2.2. and 2.3.) This is the most encouraging area of recent improvement and would tend to indicate an increase in crew training and educational standards. It is too big a discrepancy to be attributable to increases in information availability.

Collisions, allisions and groundings are all and can only be the result of the common human errors of failing to maintain a good lookout or, much more rarely, the removal of a navigation aid. They cannot be blamed on any other technical or behavioural cause. They have been a major cause of maritime accidents throughout history but the effects of such events have worsened as vessel speeds have increased, particularly over the past half-century.

While it is pleasing to note the recent declines in both the numbers of poor lookout caused accidents and, particularly, their resultant fatalities, an alarming new trend has been drawn to the author's attention. That is the mesmerising effect of modern electronic navigation instruments on, mostly younger, officers. A number of senior ship's masters and coast guard officers have complained to the author and in the maritime media of the unwillingness of junior navigating officers to „look out the bridge window“.

It seems that too many of them prefer to focus on radar and GPS plotter screens rather than to use their own eyes to achieve situational awareness. This trait has led to the increasingly widely accepted and ironically described phenomenon of „radar assisted collisions” or „GPS assisted groundings“.

Renowned master mariner and maritime journalist Michael Grey has written on the subject including recently under the heading: “The eyes have it”. There he commented on a neatly printed sign he saw in a ship's bridge. It read: “Don’t forget to look out the window”. As he added, “Generation Y officers still need to use their eyes”.

It has also led to groundings such as the January 2013 incident involving the American mine hunter USS Guardian on a coral reef in Visayas region of the Philippines. That has been blamed on an over reliance on insufficiently accurate electronic charts. Two subsequent fatal collisions between American destroyers and merchant vessels in the Pacific Ocean and South

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171 For example, Commodore Gueltiero dela Cruz, former Chief of Staff of the Philippine Coast Guard.


China Sea and a grounding off Japan in 2017 have been attributed to poor lookout and inadequate bridge management.\textsuperscript{175}

The aviation industry has noted this phenomenon of “automation overreliance” and is working vigorously to overcome it. Indeed, in January 2016, the United States Department of Transportation issued a recommendation suggesting that, “…enhanced Federal Aviation Authority oversight was needed by way of guidance to train and evaluate pilots and to develop standards to determine whether pilots received sufficient opportunities to maintain and demonstrate their manual flying skills”.\textsuperscript{176}

The problem of maintaining an adequate lookout can be the result of many behavioural deficiencies commencing with poor training and running through poor bridge discipline; fatigue; the health problems of poor eyesight and weakness due to influenza, malnutrition and similar ailments; and, the electronic distractions mentioned above.\textsuperscript{177} All such deficiencies can be reduced, if not entirely eliminated, by better management, training, discipline and leadership. The significant reduction in the percentage of fatalities due to poor lookout over the final fifteen years illustrates the benefits of such improvements quite convincingly.

Grech, Squire and others, as we shall see in Chapter 8, have analysed the problem of the fatigue that leads to poor watchkeeping and considerable work has been done by the United States Coast Guard and IMO, among others, to ameliorate it. The Nautical Institute has continued to organise conferences and publish on the human element and its relationships to maritime accidents. Its influence is both beneficial and effective. Typical of the NI’s efforts was a two-day conference held in New Delhi in 2008. It focused on the subjects of “Human Element and People” and “Human Element and Resources” under the general heading of “Modern Watchkeeping and the Human Element”.\textsuperscript{178} That kind of event does contribute to the general raising of awareness of the problem. It was helpful that it was held in Asia and, so, was closer to the epicentre of the problem.

The reduction in fatalities attributable to poor lookout, encouraging as it may be, still shows that while better crew training is certainly effective, it has only reduced the importance of poor lookout as a cause of fatalities from second most important to fourth. There is a long way to go but it is clear that improvement is possible as will be explained in Chapter 7.

\textsuperscript{175} Described in the Memorandum reporting on the collisions from the Chief of Naval Operations, United States Navy, of 23 October 2017.
\textsuperscript{176} Wheeler, J. Safety regulators right to focus on automation overreliance, The Australian, Sydney, 6 May 2016.
\textsuperscript{177} Grech, M.R. et al. Ibid.
2.5.5. General negligence.

This factor has remained almost constant in rankings of importance as a cause of accidents over the fifty-year period surveyed but has declined somewhat as a cause of fatalities.\(^{179}\) It would seem there has been a slight improvement in the provision of lifesaving and fire-fighting equipment and of its maintenance since the start of the third millennium.

Certainly, the author has noted a tightening of regulations and their enforcement in, for example, Thailand and the Philippines. In both, it has recently been made compulsory, in the case of smaller boats, not only for lifejackets to be on board but worn by all passengers.\(^{180}\)

In the Philippines, too, it has been noted on the more modern and faster ferries, at least, that aviation-like safety briefings are given and that clean new lifejackets are stowed in appropriate, well-signed and obvious places. Inflatable liferafts, that appear to be properly maintained are also accessibly fitted. This is an important and encouraging development. In contrast, the author observed two vessels recently in the United Kingdom where the inflatable liferafts were stowed so as to require a crane to launch them. How those vessels passed MCA survey is a mystery.\(^{181}\)

It is interesting, in this context, to compare the noticeable improvement over the past fifteen years in the Philippines with the continuing death toll in Bangladesh, Indonesia and Tanzania where few or no such improvements seem to have been made.\(^{182}\) (See Figures 2.4. and 2.5.). Similarly, no notable improvement has been seen in the cruise ship sector where fires, suicides and viral epidemics continue to occur at much the same rates as previously. They are all, ultimately, the result of negligence.

\(^{179}\) Appendix A, Ibid.

\(^{180}\) While the carrying of lifejackets and even wearing them is now enforced in much of the Philippines, China and Thailand, from recent observation by the author, many of those lifejackets are of poor quality and ill-fitting. Few would be acceptable in developed countries. They are, however, better than nothing.

\(^{181}\) Observed on ferries operating from Penzance to the Scilly Isles and Ilfracombe to Lundy Island in June 2013.

\(^{182}\) Indeed, in April 2008, the author chartered a small ferry in Zanzibar and had to wait an hour for the owner to search Stone Town (the capital) for sufficient life jackets for those aboard. Even those were in very poor condition.
Modern, well-designed and constructed ferries that have been built and equipped to international standards, such as this FastCat Ro-Pax are contributing to a significant improvement in the ferry safety record of the Philippines. They are not, however, immune from grounding due to poor lookout as happened in December 2016 (Archipelago Ferries).  

It is particularly disappointing that this clearly behavioural and culturally caused problem of general negligence has not even been reduced in so many developing countries. At least Thailand and the Philippines have shown what even modest reform can achieve.

Large cruise ships or „liners” are involved in fewer fatal accidents than ferries, if only because there are fewer of them. Those fatal accidents, too, have resulted in remarkably few deaths. However, they do suffer from a disproportionately high number of fires. These originate in engine rooms, galleys and sometimes passenger cabins. From 1984 to 2007 the BPVA database records 16 instances of fatal fires on cruise ships that resulted in 108 deaths. Over the whole period surveyed there were many more non-fatal fires on cruise ships.

The majority of the fires have been attributed to maintenance deficiencies. This problem also manifests itself in the frequent viral epidemics that afflict cruise ships. They are invariably due to inadequate hygiene, in reality yet another maintenance problem which leads to unsafe or unseaworthy ships.

Obviously, given their very size, large crews of culturally disparate people and large numbers of inexperienced, often elderly and poorly briefed passengers, cruise ships are very vulnerable to human errors. Their potential for creating a

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184 Appendix A, Ibid.
185 Ibid.
new passenger vessel fatality „record” is disconcerting. Some such vessels can have as many as 7,000 people on board at one time. That is a frightening scenario.

Another serious problem common to cruise ships lies with the number of apparent suicides of both passengers and crew members that occur on or from them. The psychological reasons for this bear examination given that in the case of passengers, at least, they are on holiday and assumed to be enjoying themselves on board. That, obviously, has nothing to do with seaworthiness, or probably even negligence, but it is a statistical oddity that would seem to reflect on the overall management of such ships.

Image 2.7. “Only” two died following an engine room fire on the Norwegian, Hurtigruten Line owned cruise ferry Nordlys off the Norwegian coast. That generally well-regarded line has suffered many „accidents“. Almost all of them have been blamed on human error (Wikipedia).

All aspects of vessel management, operation, equipment and maintenance are negatively affected by general negligence. Obviously, negligence is a cultural and behavioural problem that starts at the top with government regulation and company management and „trickles“ down through all levels of a ship owning company. It is probably the least costly problem to eliminate but it does require substantial attitudinal modification.
2.5.6. Poor seamanship.

Closely related to general negligence and poor lookout, poor seamanship is a separate causal category of its own. It has been author assessed as a cause of around four per cent of fatalities over both periods studied.\(^{186}\)

*Seamanship* has been defined as, “The art or skill of handling a vessel. Skill in using deck equipment, boat handling and the care and use of line and wire.”\(^{187}\) Clearly, this art or skill was absent in the cases so assessed.

Inferior or inadequate boat handling capabilities and the ignorant or untrained use of deck or lifesaving equipment has been the cause of a significant number of fatalities. It is usually the result of either or both of insufficient training or experience or inadequate procedural disciplines. In other words, of poor management.

The large majority of accidents assessed as being due to poor seamanship were the result of ships being sailed into clearly and publicly predicted dangerously bad weather, usually typhoons. A number of these were Sulpicio Lines ferries that capsized and or sank in typhoons.

By a remarkable coincidence, every ten years, in 1988, 1998 and 2008, Sulpicio Lines sent vessels to sea in the face of predicted major typhoons. That resulted, in each case, in the capsize and sinking of their ships with the loss of 1,583 lives in total. That, of course, is in addition to the even more notorious collision, fire and sinking of the *Dona Paz* that was attributed to poor lookout. That “accident” resulted in 4,386 fatalities. The total death toll at Sulpicio Lines exceeds 6,000 people.\(^{188}\)

Sulpicio Lines, sadly, has been far from the only offender in that regard as can be seen in the *BMPVA database*.\(^{189}\) There have been numerous other examples of vessels putting to sea in the face of predicted dangerous weather.

Even modern, sound and well-maintained vessels are not immune from poor seamanship. The recent example of the high speed nose-dive of the Dar-es-Salam to Zanzibar ferry *Kiliminjaro II* off Tanzania in 2014 resulted in the deaths of 25 passengers who were washed off the foredeck where they should not have been in the first place. Not only was the ferry driven far too fast for the conditions, the subsequent “recovery” operation of the passengers washed overboard was completely botched.\(^{190}\)

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\(^{186}\) Appendix A, Ibid.
\(^{188}\) Appendix A, Ibid.
\(^{189}\) Ibid.
\(^{190}\) Appendix A, Ibid.
More recently, a brand new Fastcat of Archipelago Ferries grounded near Cebu, in the Philippines, on its maiden voyage.\(^{191}\) Showing that even the most fastidious companies are not immune from the problem of poor lookout! Thankfully, their vessel was sufficiently safe as to have caused neither injuries nor fatalities.

Other examples of poor seamanship are spread through the BMPVA database. Some involved sailing too fast for the conditions. Another saw a „whale watch“ boat getting too close to a whale that bumped and capsized it. Others were when crews failed to respond to distress calls or failed to sound alarms on their own vessels. Still others involved attempts to berth vessels in dangerously strong winds and pilotage errors such as taking „short cuts“.

All can only be blamed on foolishness or stupidity that is the result of making ill-considered decisions that fly in the face of common sense. Common sense, after all, is really what good seamanship is all about.

2.6.0. Human factors are the predominant cause of passenger vessel accidents.

Despite the paucity of comprehensive, accurate, proven and objectively tested information, it has become very obvious that human factors, more specifically human errors of the various kinds described, are the cause of more than 88 per cent of passenger vessel accidents and at least 98 per cent of their resulting fatalities. The positive information arising from that fact is that structural, mechanical and other causes are comparatively insignificant. Also, while suicide and the extremely rare „freak“ accidents are probably impossible to reduce significantly, structural and mechanical causes are declining from an already low base and could, with minimal effort and expense, be reduced yet further.

It should be noted, however, that all the major, and most minor, cruise line companies appear from their records to be well managed from a safety perspective. It is clear from the statistics contained in the **BMPVA database** that the greatest risks to passengers remain with ferries operating on domestic routes in the twenty countries having the worst records for passenger safety.

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\(^{191}\) See *Vessel runs aground on maiden voyage*, Ibid.
Chapter 3

Examples of major fatal ferry accidents

*It is remarkable how many common causal factors and types of human errors continue to re-present themselves. Even more remarkable is the fact that so many serially offending ship owners remain unpunished and in business.*

3.1.0. Examples of major fatal ferry accidents.

To better illustrate and clarify how and why many of the fatal ferry accidents described briefly in the BMPVA database actually occurred, the following twenty-five more detailed case studies have been prepared to describe major accidents where enough useful facts are known to be able to provide the necessary information to do so.\(^{192}\) The selection of cases is otherwise arbitrary except for an attempt to present a geographic and historic range as well as a range, as far as possible, of vessel, location and accident types.

Some of the accidents are well known but most, less so. They range in severity from 143 to 4,386 fatalities and cover 18 national jurisdictions and the full period from 1966 to 2015. Regrettably, none describe any of the multitude of smaller accidents in smaller vessels in countries such as Myanmar, Bangladesh and DR Congo which, combined, comprise the greater part of the global fatality toll. Where the death toll is comparatively small, accidents will usually receive very little, if any, media coverage or local government interest in the form of a Marine Board of Inquiry (MBOI) or similar.

As noted in chapters 1 and 2, The BMPVA database shows us that those accidents occur frequently but mostly in relatively remote places where few reports are made or records kept. It is usually difficult in such cases to obtain many details of the vessel concerned. Normally, the best that can be expected is a newspaper or newsagency report of the accident and an estimated number of fatalities arising along with a very brief description of the circumstances such as whether it involved a collision, grounding, fire or capsize. As can be seen from the BMPVA database, this varies according to the size of the vessel and the country of occurrence. For example, in the Philippines, Indonesia, Tanzania, Egypt and even Haiti, the name and specifications of the vessel are usually known. In Bangladesh, Myanmar and DR Congo they usually are not. This offers a very stark contrast to the very comprehensive reporting of accidents that occur in developed countries.\(^{193}\)

\(^{192}\) Appendix A, Ibid.
\(^{193}\) Ibid.
The author estimates that the grounding and subsequent capsize of the Carnival Cruise Lines vessel *Costa Concordia* off Italy received more developed country media coverage than all the fatal accidents in the Philippines combined. That despite the *Costa Concordia* accident resulting in 33 deaths compared with many thousands in the Philippines including more than 4,300 in one incident. The difference between „developed“ Europe and „developing“ Asia.

Twenty-five cases, or 3.3 per cent, of a total of 750, have been drawn from the *BMPVA database*. In each case, a number of contemporary media reports and, where available, MBOI proceedings have been distilled and summarised. Of the 25 cases studied, interestingly, 15, or 60 per cent, involved conventional monohull Ro-Pax ferries. Most of those were substantial vessels. Seven of those, or 28 per cent, occurred in OECD nations. Clearly, accidents have continued to occur, even in reputedly safe developed countries, especially where Ro-Pax ferries are involved. However, there have been distinctly fewer in developed countries since 1994 when the *Estonia* sinking provided an awakening.

In fact, from 1966 to 2015, conventional monohull Ro-Pax ferries have been involved in 16.4 per cent of fatal accidents that have resulted in 31.5 per cent of total known fatalities. From 2000 to 2015 they were the vehicles for 32 per cent of fatalities. That, clearly, is because they tend to be larger vessels but it also reinforces the argument that the conventional Ro-Pax concept is fundamentally unsafe. This is due to low, wide opening vehicle access doors, usually at both ends of the vessel, combined with a long, wide, largely unobstructed vehicle deck located close to the vessel’s waterline. If significant quantities of water get on to the deck because of a sharp turn or a vehicle door malfunction, the vessel is particularly susceptible to capsize thanks to the „free surface effect“ of that water sweeping across the deck.

In developing countries they have often been poorly modified to increase their carrying capacity. They are particularly vulnerable to fires on their vehicle decks as described below. Even without dangerous modifications, they require very competent, alert and disciplined crews to ensure their safe operation. Such crews are not always available in developing countries.

As can be seen from a perusal of the database, while the cases described here are worse than average in terms of death toll, they are very typical in circumstances. They have simply been reported in more detail. That has facilitated the creation of these case studies. It should be noted, though, that none of the case studies describes fatal accidents involving multihull fast ferries. They have simply not been involved in any significant accidents.

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194 Appendix A, Ibid.
195 Ibid.
196 See details in Chapter 6 and recommendations and conclusion in Chapter 10.
197 Appendix A, Ibid.
198 Data from Appendix A, Ibid and as described in Chapter 6.
It is remarkable how many common causal factors continue to re-present themselves. It is even more remarkable how many types of human errors keep repeating themselves. Most remarkable of all is the fact that so many serially offending owners remain unpunished and continue in the ferry business.\textsuperscript{199} The accidents are listed in ascending date order commencing with December 1966. They are most definitely not comprehensive, merely, illustrative. The case studies have been compiled and summarised from numerous sources that are mostly cited in groups in the text.

It must also be emphasised that the “known” accidents recorded in the \textit{BMPVA database} unfortunately omit probably hundreds of additional accidents that have not been accorded any media coverage. Those accidents would, of course, add many thousands to the total of fatalities.

\textbf{3.2.0. Heraklion}, 231 fatalities, 8 December 1966.

\begin{center}
\includegraphics[width=0.2\textwidth]{image31.png}
\end{center}

\textit{Image 3.1. S.S. Heraklion as S.S. Leicestershire under prior ownership and before conversion to a Ro-Pax (Wikipedia).}

Causing an estimated total of about 231 fatalities, the actual number is unknown because there were allegedly far more passengers aboard than the 219 who held tickets, the single screw steam ship \textit{Heraklion} was an accident waiting to happen. Although built by the reputable Fairfields Shipbuilding \& Engineering Company of Glasgow, she was 17 years old and inadequately maintained following a poor conversion to Ro-Pax by its second owner the Greek company Aegean Steam Navigation Typaldos (ASNT).\textsuperscript{200}

The 8,922 grt, 152 m LOA steel passenger/cargo ship had been owned by ASNT for two years during which she had been cheaply and poorly converted to a Ro-Pax ferry by the simple expedient of cutting holes in its side to enable vehicle access to its holds directly from the quay.

After loading delays, she put to sea from the southern island of Crete heading for the Athenian port of Pireaus in a Force 9 gale. Some hours later she capsized and sank in the Aegean Sea off the islet of Falkonera in “enormous seas”. Survivors reported that a poorly secured truck, that had caused the loading delay, came adrift and smashed open the newly cut and badly sealed vehicle loading door in the side of the ship. This allowed the sea to pour in causing the ship to capsize in fewer than twenty minutes.

\textsuperscript{199} Refer also to 1.12.2.
The Hellenic Coast Guard was slow to respond and, due to radio frequency inadequacies, was unable to communicate with a number of British and American warships that were exercising in the area and which could have assisted. While chaotic, the rescue operation still managed to save about 50 people.

The subsequent MBOI listed clear cases of poor seamanship and management as well as negligence. Obviously, the ship should have been seeking shelter rather than putting to sea in such a gale. The inquiry discovered that the owner did not mandate abandon ship drills and that the ship’s distress call was delayed.²⁰¹

The inquiry inspired rule changes in Greece such that ships were prevented from departing in Force 9 or greater wind strengths and the HCG’s procedures were reformed. ASNT’s fleet was inspected and 12 of its 15 vessels were found to be unseaworthy and required to be scrapped.

The owner, Haralambos Typaldos, and his general manager were imprisoned for manslaughter. Significantly, a near sister ship to the Heraklion, the Wahine, which had been converted to a Ro-Pax-Train ferry, grounded and sank near Wellington, New Zealand, 16 months later with the loss of 51 lives.²⁰² Yet another case of bad seamanship and an unseaworthy ship made worse by a poor modification and the gross negligence of the owner. All human factors.

3.2.1. Hongxing 240 and Hongxing 245, 432 fatalities, 4 August 1975.

The Hongxing 240 and Hongxing 245 both belonged to the same Chinese Government owned ferry line that carried passengers between Hong Kong and Guangzhou via the Pearl, Zhuyiang and Xi rivers. They were substantial triple deck steel ferries of unknown size and travelled overnight.

The two ferries collided and sank during a “heavy storm” on the night of 4 August 1975 on the Zhuyiang River between Guangzhou and Zaoqi. A reported 432 of the approximately 800 people on board the two ferries were lost.²⁰³ Another clear case of poor lookout and, probably, inadequate seaworthiness and search and rescue facilities.

Due to the strict media controls and news management prevailing at the time under the People’s Republic of China Government, no other information is available nor has any MBOI report ever been released.

²⁰¹ Described in Economic Outlook magazine, Athens, October 2000.
²⁰² Appendix A, Ibid.
²⁰³ Ibid.
3.2.2. **Don Juan**, 1,000 plus fatalities, 22 April 1980.

![Image 3.2. Don Juan (Wikipedia).](image)

The Ro-Pax ferry *Don Juan*, was built in Japan in 1971 by Niigata Engineering, a reputable and prolific shipyard. She was a fast and, by contemporary Philippine standards, luxurious ship of 2,311 grt and 96 m LOA.

In Tablas Strait, north of Mindoro Island en route from Manila to Bacolod City, Negros Island, on a clear, calm, moonlit night *Don Juan* collided with the small tanker *MT Tacloban City*. They were in one of the Philippines’ busiest sea routes. The masters of both vessels blamed each other for the collision. The tanker had right-of-way but, in reality, to conform with COLREGS, both vessels should have stopped to avoid colliding. These “blame games” are seemingly standard procedure in the Philippines with the objective of confusing the already cursory PCG Marine Boards of Inquiry.  

The ferry sank in about fifteen minutes during which time a distress signal was transmitted and some lifejackets handed out while Carley floats, but no lifeboats, were launched. The tanker stood by and reportedly rescued many survivors as did another nearby tanker, the *Laoag City* that was owned by the same company as the *Tacloban City*.

While it is estimated that there were more than 1,000 fatalities, the exact number is unknown. The owners of *Don Juan*, Negros Navigation Co, claimed there were 890 passengers and 110 crew aboard, a total of 1,000 people, but 896 were rescued and 121 bodies recovered, a total of 1,017. They admitted, however, that many latecomers and small children “may” have been omitted from the passenger manifest. Later reports from relatives of the missing tend to support the local media’s estimate of more than 1,000 fatalities.

Significantly, the *Don Juan* sank less than 40 nautical miles from the site of the later collision and sinking of the Sulpicio Lines owned ship *Dona Paz* from which there were 4,386 fatalities in similar circumstances involving a collision with a small tanker. The masters of both ships „stood on” in that they maintained their course and speed despite the possibility of a collision.

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204 Described in Reyes, G. *Don Juan Tragedy…*, below.
showed a complete disregard for the International Collision Regulations (COLREGS).  

Negros Navigation Co has since merged and changed its name to 2GO Travel. On 16 August 2013 another vessel of that new company’s fleet, *St Thomas Aquinas*, collided with a cargo ship and sank in Cebu Strait off the port of Cebu with the loss of 205 lives.

In both cases, as seems to be becoming a common theme, the vessel was overloaded, seamanship was bad, lookout poor, COLREGS ignored, and passenger manifests, safety equipment and rescue responses all inadequate. It seems amazing that after 33 years such lessons continue to be ignored.


*Image 3.3. The Indonesian Government owned ferry *Tamponas II* on fire shortly before sinking. Rescue vessels could have safely approached much closer than they did ([www.lautanindonesia.com](http://www.lautanindonesia.com)).*

The official death toll in this accident was 431 but contemporary local media reports, based on interviews with families of missing passengers, indicate about 580 fatalities. Fire broke out on the Indonesian conventional monohull Ro-Pax ferry *Tamponas II* at night and in heavy rain while the ship was off the southern coast of Kalimantan (Borneo) en route from Jakarta to Ujung Pandang on Sulawesi Island in Indonesia.

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206 [www.bbc.com](http://www.bbc.com) and [www.gcaptain.com](http://www.gcaptain.com).
Tamponas II was only ten years old, having been built in 1971 by the reputable Japanese shipyard Mitsubishi Heavy Industries as a conventional steel Ro-Pax ferry for a Japanese owner. A substantial vessel of 6,139 grt, she was 129 metres long. She was purchased in 1980 by Peleyaran Nasional Indonesia, an Indonesian Government owned company, for USD 8.5 million and was then believed to have been in good, seaworthy condition.

The ship’s manifest claimed it was carrying a crew of 82, 1,054 ticketed passengers, 190 cars, 390 motor-cycles and cargo including mail. The subsequent MBOI accepted there were 1,184 people on board but it seems probable that there were in excess of 1,300. Many passengers were reported to have boarded without tickets. That happens, apparently, even on military aircraft in Indonesia.\(^\text{207}\) In any event, the ship was considered to have been badly overloaded. Interestingly 70 of the ship’s crew of 82 survived the sinking but the master apparently went down with his ship.

The officially accepted cause of the accident was that a discarded cigarette butt ignited spilt fuel on the vehicle deck. That conflagration quickly spread through the vehicles carried there causing numerous explosions and a major fire that eventually sank the ship.\(^\text{208}\)

The rescue operations were not well co-ordinated or effectively carried out. Numerous other vessels were in the vicinity but would not move in close enough to the flaming and exploding, but still floating, ship to pick up the mainly non-swimming victims. Many passengers reportedly panicked and jumped into the sea despite being non-swimmers and not wearing life jackets. Despite the heavy monsoonal storms in the area, a number of survivors were rescued up to five days later.\(^\text{209}\)

Obviously, fire safety regulations were not taken seriously in 1981 and, nearly thirty years later, in 2009, Jon Faine noted, as mentioned in Chapter 2, that they were still being ignored on Indonesian ferries.\(^\text{210}\) Equally obviously, the ship carried insufficient life-jackets or other life-saving devices such as life rafts, Carley floats or life boats. Furthermore, secondary as well as primary fire-prevention and control systems were inadequate.

Effectively Tamponas II was a victim of a combination of most of the causes of maritime accidents including, negligence, overloading, an unseaworthy vessel, insufficient life saving and fire-fighting equipment and poor seamanship as well as a chaotic and inadequate rescue effort.

Tellingly, the ship presented as yet another example of a conventional monohull Ro-Pax ferry “sold south” from a developed country to a developing

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\(^\text{208}\) See a vivid description of such behaviour in Faine, J. & J. Scary ferry Chapter 7 in From Here to There, Harper Collins Publishers, Sydney, 2010.


\(^\text{210}\) Faine, J & J. Ibid.
one where maintenance, business and crewing standards were inadequate to maintain and operate it safely. Further, it was government owned and suffered from the wholly inadequate enforcement of the regulations of that same government.

3.2.4. **Herald of Free Enterprise**, 197 fatalities, 6 March 1987.

![Image 3.4. The Herald of Free Enterprise, aground and capsized with bow doors still open, one nautical mile outside Zeebrugge Harbour (www.bbc.news.com).](image-url)

While the death toll was comparatively modest at 193, all British citizens, the fact that *Herald of Free Enterprise* was sailing between Zeebrugge in Belgium and Dover in England and was owned by the well known and then still British P&O Group meant that its sinking made headlines globally.

A seven year old ship, the *Herald* was built by the reputable German shipyard Schichau Unterweser as a 7,951 grt conventional monohull Ro-Pax ferry of 132 m LOA. So was the also Townsend Thoresen owned *European Gateway* which capsized in similar circumstances off Felixstowe five years earlier with the loss of six lives. *Herald* was owned by Townsend Thoresen Ferry Co which had been taken over by the P&O Group three weeks before the accident. She was fully compliant with the, now obviously inadequate, international and European standards for Ro-Pax ships that applied at the time.

The ferry departed Zeebrugge on a cold, calm day with 500 passengers, 80 crew members, 84 cars and 42 trucks aboard. The bow doors remained open and, as the ship turned into the open North Sea, water flooded through the door onto the unobstructed vehicle deck. The „free surface“ effect of that capsized the ship in about 60 seconds. Fortunately, she capsized in shallow
water and so did not completely sink. This undoubtedly prevented even more fatalities. Her lifeboats, notably, could not be launched.

The rescue response was faster and more effective than usual with a combination of small craft and helicopters from Belgium, The Netherlands and Britain all contributing to a remarkably small death toll in the circumstances. The surviving crew of the ship were praised for their efforts in assisting passenger survival.

Townsend Thoresen (P&O Ferries), however, was held responsible for the accident by the subsequent MBOI.\textsuperscript{211} Indeed, had the subsequently implemented British law on Corporate Manslaughter been in force at the time, the company’s directors would, it seems, have been charged accordingly. Many operational safety deficiencies, some of which the company and its competitors had been warned against in a series of articles published shortly before the accident in \textit{Work Boat World},\textsuperscript{212} were criticised in the inquiry.\textsuperscript{213}

The inquiry findings, combined with those involving the earlier European Gateway and later Scandinavian Star and Estonia accidents, led to worthwhile improvements in operational, construction and design safety in Ro-Pax ferries especially in Northern Europe. The United Kingdom Corporate Manslaughter law was implemented soon after.

Inspired or driven by the sinkings of the Herald of Free Enterprise, Scandinavian Star and Estonia, among other conventional monohull Ro-Pax ferries, a number of north European nations co-operated to introduce the so-called “Stockholm Rules” to improve the safety of Ro-Pax ferries in the Baltic and North seas and in the English Channel.\textsuperscript{214} Those rules eventually proved to be effective but, notably, only in Northern Europe. The Mediterranean Sea and beyond were specifically excluded.

However, the Herald capsize itself was yet another testament to poor seamanship, an unseaworthy ship, cronyism and owner negligence and arrogance. Notably, the expressed fears of a number of the company’s senior sea-going officers were ignored by its management. All are human errors.


![Image 3.5. The collision, fire and sinking of the Dona Paz made it the world's worst peacetime maritime tragedy (www.maritimedanmark.dk).](image)

The world’s worst ever peacetime maritime tragedy, the collision, fire and sinking of the Philippines cargo ferry *Dona Paz*, resulted in 4,386 fatalities. The 24 year old ship, previously known as *Don Sulpicio*, had already been gutted by fire, re-conditioned, re-named and returned to service. That fire, which occurred when the ship was carrying 1,100 passengers, happened in June 1979. It was allegedly caused by a lit cigarette butt thrown into a cargo hold. All passengers and crew were rescued on that occasion.

Originally built by Onomichi Zosen of Japan, *Dona Paz* was 2,324 grt and 93 m LOA and certified to carry 1,518 passengers. She was owned by Sulpicio Lines of Cebu which, in turn, was owned by the notorious Go family. They have a uniquely appalling record in that over a period of 21 years from 1987 their ships have been involved in at least eight fatal accidents that have resulted in more than 6,000 fatalities in total. The company’s ships experienced numerous accidents prior to 1987 including another involving a previous *Dona Paz* which capsized and sank in 1977 killing at least 30 people.

At 10 pm on the moonless night of 20 December 1987 *Dona Paz* was en route from Tacloban City on Leyte Island to Manila via Catbalogan on Samar Island. In Tablas Strait, the busiest sea route in the Philippines, off Dumali Point on eastern Mindoro Island, she collided with the small (629 grt) parcel tanker *Vector*, which was loaded with 8,800 barrels of “petroleum products”. There was a violent explosion and fireballs passed between the two ships and then ignited the spilt fuel covering the surface of the sea surrounding both.

Both ships were consumed by the fire and eventually sank in 530 metres of water. The *Dona Paz* at midnight and the *Vector* two hours later. Of the estimated 4,412 people aboard both ships, only 26 were rescued and most of them were badly burnt.

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215 See also 1.12.2.
The nearby ship *Don Claudia* saw the flames and approached to assist and stood by at a distance because of the flames. Her master transmitted a distress signal – the *Dona Paz* did not as, apparently, it had no operating radio. The response from the PCG and MARINA was reportedly, “Later”. As it happened, later, meant eight hours later as that was how long it took the authorities to respond. By then there was not a sign of the disaster. U.S. Navy helicopters flying over the scene next morning could see nothing.

It is alleged that the final death toll may have been as high as 5,000. No one really knows but the best estimate of the subsequent MBOI was 4,386. At least 1,000 of those were young children. The passenger manifest indicated 1,493 victims but it was regarded as meaningless. MARINA stated that 1,586 passengers were manifested and 2,755 were un-manifested plus 58 crew, a total of 4,399 on a ship limited to 1,518 passengers.

The inevitable „blame game“ followed the accident and into the MBOI. The two vessel owning companies blamed each other. Surviving crewmen from the *Vector* claimed that the *Dona Paz* had rammed it. A surviving passenger said that the *Dona Paz* captain was watching videos in his cabin while the two mates were dinking beer. A young, inexperienced rating or cadet was allegedly on watch. Caltex, the charterer of the *Vector* was not finally cleared of blame until 2000. Meanwhile, the *Vector*’s owner was ordered to “indemnify the families”.

The inquiry blamed *Vector* but also blamed Sulpicio for many deficiencies involving bad management, overloading, inadequate and locked life saving equipment and more. Both vessels were clearly in breach of COLREGS. A number of senior and junior PCG officials were deemed to have been complicit in the gross overloading and were dismissed or „re-assigned‟.

The total cost to Sulpicio’s insurers was less than USD 10 million. The ship was „in class‟ and had passed survey so the classification society and surveyors could also be accused of complicity in the disaster. Some years later Philippine ship survey standards were reviewed by insurers, as were the nation‟s maritime safety standards.217

Little, however, seems to have been learned from this sad tale of human error, collusion, corruption, poor lookout, bad seamanship, poor seaworthiness, bad management, and inadequate rescue efforts. Nine months later another Sulpicio Lines vessel, the *Dona Marilyn* sailed into the path of Typhoon Ruby and capsized and sank with the loss of at least 418 people.


Almost no details are known about this the world’s thirtieth worst passenger vessel disaster in the twentieth century. It seems that the *Baccha Singh* was a wooden ferry operating upstream on India’s famed and “sacred” Ganges River. The vessel hit a sandbar and capsized near Manihari Ghat near Bihar. There were 438 fatalities. The river may have been dirty but it could not have been deep. An orderly evacuation would have saved many more.²¹⁸

This was yet another case of poor seamanship, poor lookout and an unseaworthy vessel. All made worse by inadequate life saving equipment and a poor rescue response. Indeed, all the usual elements of human error.

3.2.7. **Scandinavian Star**, 159 fatalities, 7 April 1990.

*Image 3.6. The Scandinavian Star was a substantial, nineteen year old, conventional Ro-Pax vessel running on a busy route between two highly developed countries, Denmark and Norway. She was struck by a very dedicated arsonist who succeeded in practically destroying the ship’s accommodation along with 160 of its complement on his second attempt (Wikipedia).*

The 10,513 grt conventional monohull Ro-Pax ferry was built in 1971 by Dubigeon-Normandie SA in Nantes, France. The ship had three previous owners and names before being chartered to the Da-No Line at the time of the disaster. It had suffered a serious engine room fire in March 1988.

While en route from Frederikshaven to Oslo, in the Skagerrak, 30 nautical miles from the mouth of the Oslo Fjord, the arsonist’s second attempt was successful and, despite the assistance of several passing ships, the vessel

was extensively damaged and at least 159 passengers and crew perished. The exact number is unknown as the passenger manifests and crew lists were destroyed in the fire.

Despite being operated in two of the world’s most safety-conscious jurisdictions, the vessel’s safety equipment and procedures were found wanting. There were major language and communication difficulties that led to panic. The ship’s sprinkler system was ineffective and most lifeboats could not be launched even though seas were calm at the time. Apparently, no one knew how to launch them. Nor had there been any fire drills. The bulkheads and walls were covered with an inflammable plastic that gave off poisonous gases when burning. The ship continued to burn for four days. The ship’s owner and his wife were among the dead.

The two subsequent inquiries, when combined with those following the Herald of Free Enterprise (3.6.) and Estonia (3.13) disasters, among others, led to the implementation of the Stockholm Rules on passenger vessel safety in 1996. Since then there have been no further major ferry accidents in Northern Europe/Scandinavia.

While, as a conventional Ro-Pax ferry, the Scandinavian Star was particularly vulnerable to mishap, the ship’s owner and officers were obviously unusually negligent as were its flag state, classification society and the two port states concerned. The ship was poorly equipped and its crew inadequately trained and led. The Danish and Norwegian maritime authorities must bear some of the responsibility as should the classification society Lloyd’s Register. Notably, the ship had been issued with a passenger safety certificate by its flag state, the Bahamas, and had passed inspection by the U.S. Coast Guard only four months prior to the accident.

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219 Well described in Ferries – Ro-Ro/Passenger vessels – Improved safety concept for Ro-Ro passenger vessels, www.gard.no/web/updates/content/ferries-ro-ropassenger/.
220 From Appendix A, Ibid.
3.2.8. **Moby Prince**, 143 fatalities, 10 April 1991.

**Image 3.7. The Italian Ro-Pax ferry Moby Prince after the collision and fire (www.humansatsea.com).**

En route from the Port of Leghorn, on the west coast of mainland Italy to Olbia, on the east coast of Sardinia, the *Moby Prince* had not even departed the Livorno Roads, three miles outside the port, when it collided with the anchored 186,506 dwt, 286 metre tanker *Agip Abruzzo*. Formerly the *Koningin Juliana*, the 23 year old, Cammell Laird built *Moby Prince* was a 6,187 grt, 131 metre LOA, conventional monohull Ro-Pax ferry.

Sailing at 18 or 19 knots and without radar, despite thick patches of fog, the ferry drove into the starboard bow of the tanker and breached one of its crude oil cargo compartments. Oil poured into the sea and ignited all around the ferry so that it quickly caught fire. All 36 crew members on the tanker were rescued unhurt by harbour launches but only one of the 144 people aboard the ferry survived the conflagration. That passenger described the situation on board, which he endured for two hours, as chaotic.

It took seven days for the fire on the tanker to be controlled. By that time the ferry was completely and irreparably gutted, having had its fire extinguished within 24 hours. Thick oil fouled the nearby Tuscan beaches that were closed for some time. Both ships were declared to be constructive total losses although 90 per cent of tanker’s cargo was salvaged.

An Italian Ministerial Commission declared in January 1993 that the Navigazione Arcipelago Maddalenino owned ferry was principally at fault due
to its excessive speed and failure to use radar. Fog was also cited as a cause as was the failure of the tanker to display correct lighting in fog. Some negligence among duty officers in the Port of Leghorn was referred to.\textsuperscript{223}

Again, quite clearly, the main factors were human errors involving bad seamanship, poor lookout and inadequate safety procedures and equipment.


\begin{center}
\textit{Image 3.8. Salem Express submerged in deeper water having slid off the reef and sunk in the Red Sea outside Safaga Harbour (www.holidaycheck.pl).}
\end{center}

The Haj pilgrimage ferry \textit{Salem Express} was returning across the Red Sea from Jeddah in Saudi Arabia to Safaga and then Suez in Egypt with 644, mainly Egyptian, people on board when she struck a coral reef, was holed, then slid off and sank in deeper water.

The 25 year old, 4,771 grt and 115 metres LOA conventional monohull Ro-Pax ferry was less than six nautical miles from Safaga Harbour when it grounded in stormy weather. There were 470 fatalities according to official Egyptian Government figures. It is alleged, though, that the correct figure may be considerably higher. Insurance claims amounted to less than USD 20 million.\textsuperscript{224}

\textsuperscript{224} Hooke, N. Op cit, p.533.
From photographs the ship appeared to be in good condition under the Egyptian owners, Samatour Shipping Co, however, under previous ownership, the vessel allegedly appeared very dilapidated.

No further details are known of the circumstances of the sinking although, obviously, the ferry was significantly off course due to a navigational error and, probably, a poor lookout. Equally obviously, safety equipment and life boats/rafts were inadequate as were the evacuation and rescue efforts.  


Sadly and ironically, the 39 year old Haitian wooden, 256 grt, 45 metre LOA, triple-deck, motor cargo ferry *Neptune* was owned by a company called “Lucky Magloire”!

Licensed to carry only 250 passengers plus 10 crew members, she was alleged to have been carrying more than 2,000 people when she capsized and sank in a “sudden squall” off the west coast of Haiti, near Miragoane, during an overnight voyage from the port of Jeremie and the capital, Port au Prince. It was neither the first nor the last fatal ferry accident off Haiti, merely the deadliest. It is estimated that more than 1,700 people died and that there were 285 survivors. There are no official figures.

Allegedly “officially” there were only 820 ticketed passengers aboard a ferry licensed to carry 250. There were no passenger manifests or crew lists. The ferry sailed on a regular 150 nautical mile voyage that normally took about 12 hours.

The captain, who swam safely ashore, blamed passengers for the capsize. He said they rushed to one side of the ship to shelter from torrential rain. That destabilised the ship and caused it to capsize and, eventually, sink. As well as passengers, the ferry carried livestock and bagged charcoal. Fortunately so because the dead animals and bags of charcoal were buoyant and provided refuge for most of the survivors.

There were no life jackets, life boats or life rafts, nor was there a radio. Allegedly, the crew failed completely to assist with the evacuation. Indeed, it took 36 hours for authorities in Port au Prince, only 60 nautical miles from the accident, to respond and despatch two naval launches to assist. It was the sixth significant fatal ferry accident to occur in Haiti in five years. There have been numerous similar events since including one involving the *La Fierte Gonavienne* that capsized and sank in 1997 killing about 300 passengers.  

Yet another example of poverty induced human error involving a grossly overloaded, unseaworthy ferry with no life saving or communications

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226 Described in detail in Freed, K. *Nearly 2,000 Die as Ferry Sinks off Coast of Haiti*, Los Angeles Times, 19 February 1993; and, Hooke, N. Op cit, p. 435.
equipment. The vessel, obviously, was manned and owned by negligent incompetents.

3.2.11. Estonia, 912 fatalities, 28 September 1994

Image 3.9. The Estonia photographed shortly before her sinking and clearly showing the controversial bow door and visor (www.estoniaferrydisaster.net).

The largest, in terms of number of fatalities, and one of the most controversial passenger vessel catastrophes involving developed countries since World War II, the causes and targets for blame as to the capsize and sinking of the Estonia are ongoing. Numerous books, magazine articles, conference papers, additional regulations and academic papers in learned journals have been inspired by it. Ironically, by motivating responses, it has probably contributed more to improvements in ferry safety than any other accident.

Although there were considerably fewer fatalities than in any number of accidents in Asia, Africa and the Caribbean, this ferry, sailing as it was between north European and Scandinavian cities was far more newsworthy. The Clapham omnibus syndrome, mentioned in Chapter 1, seems to prevail. As does its mention in the Oxford Encyclopedia of Maritime History. Its importance must, then, be kept in proportion.

During the night of 28 September 1994, the 21,794 grt, 157 metre LOA conventional monohull Ro-Pax/Cargo ferry Estonia capsized and sank in the Baltic Sea off Turku, Finland, during a voyage from Tallin, Estonia, to Stockholm, Sweden. A total of 1,049 crew members and ticketed passengers were aboard the ship that was licensed to carry 2,000. Only 137 survived the

227 Refer to 1.5.2.
sinking, so 912 died. Only 93 bodies were recovered and it is assumed, therefore, given that there are few, if any, predators in the Baltic Sea, that 819 were entombed in the ship. However, those figures remain somewhat moot.

Although only fourteen years old and apparently in good condition, the ferry which was built by the reputable German ship builder, Jos. L. Meyer of Papenburg, had three previous but also reputable owners. At the time of the accident the ship had been owned for two years by the Estonian company Estline Marine Co. It was fully compliant with all the then prevailing port and flag state regulations and standards related to Ro-Pax ferries.

The night was dark, stormy and cold. Seas were estimated at nine metres and the water temperature was eight degrees Celsius. On such a night you would think and expect that mariners would be cautious. Not so on the Estonia. It proceeded at its standard operating speed into the big seas and gale of wind.

The Estonian, Finnish and Swedish governments established a Joint Accident Investigation Commission (JAIC) to examine the circumstances of the sinking. Its preliminary findings were very controversial when released three years later.  This was particularly because they seemed to unfairly apportion much of the blame to the builder/designer. Others, most particularly this author, believe the owner and, especially, the master should have been accorded much more responsibility for the tragedy.

While there is no doubt that the ferry’s bow door failed, it can well be argued that the vessel was being pushed much too hard in the conditions. The master, it seems, took little or no notice of reports from inspectors prior to departure that there were leaks around the bow door. Nor did he slow down when his own engineers reported bigger leaks an hour after departure. Further, his distress signal transmission was tardy and he failed to warn passengers of the impending abandonment. Few were able to reach or board the lifeboats or don the plentiful life jackets. Some of the lifeboats floated free but many of them capsized, others sank with the ship. The ship was equipped with EPIRBs but apparently no one on board thought to activate them.

Further, the rescue response by the authorities of the three countries concerned was slow and inadequate. Radio communications among vessels and helicopters was poor to non-existent and some of the helicopters were so laden with press photographers that they could not rescue anyone.

The findings of the JAIC certainly appeared strongly prejudiced against the German shipbuilder and the French classification society (Bureau Veritas) and in favour of the deceased master and local inspection and rescue authorities.

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Many experts, other than the carefully chosen expert witnesses who testified before the inquiry, still hold very strong opposing views.\(^{231}\)

This author is firmly of the view that there were many other causal factors than just the allegedly badly designed and constructed bow door and visor. They, incidentally, fully complied with the prevailing regulations when built, passed survey and numerous subsequent inspections. The whole conventional monohull Ro-Pax concept could equally be blamed.

Despite its many failings, the JAIC did make some useful and thoughtful recommendations as to the future design, construction and operation of Ro-Pax ferries. It certainly led to the rapid implementation of IMO’s ISM Code and to the implementation of the Stockholm Agreement into European Ferry Stability Regulation.\(^{232}\)

The sinking, its circumstances and its aftermath remain controversial. A Google search reveals numerous further reports and commentaries as well as books published on the subject. Even IMO has published a twenty-page bibliography of material published on the subject.\(^{233}\) Something of a contrast with the coverage it accorded to far more deadly accidents that have occurred in developing countries.

The insurance cost of the *Estonia* disaster was USD 135 million. The accident was a stark illustration of human error involving a chain of design, construction, regulatory, management, seamanship, seaworthiness, search and rescue and investigatory factors. It was hardly a good example of the maritime superiority of the developed world.


\(^{232}\) Refer to Anon. Ferries Ro-Ro/Passenger vessels – Improved safety concept for Ro-Ro/passenger vessels, Gard, Oslo, 1996, www.gard.no/web/updates/.

3.2.12. **Bukoba**, 1,000 plus fatalities, 21 May 1996.

*Image 3.10. Bukoba capsized just before sinking off the Tanzanian shore of Lake Victoria. Some passengers, trapped inside, were still alive and tapping on the hull at that stage (www.dailynews.co.tz).*

_Bukoba_ was an 800 grt steel cargo ferry of 60 metres LOA and a maximum passenger capacity of 430. Prefabricated by Belgian Shipbuilders Fulton in Belgium and re-constructed beside Lake Victoria in 1979 she was, at 17 years, not very old by African lake ship standards.

Owned by the Tanzanian Government’s Tanzanian Railways Corporation (TRC Marine Division), the ferry was on a regular overnight voyage of 110 nautical miles from Bukoba to Mwanza along the Tanzanian shore of Lake Victoria, the world’s second largest freshwater lake. Departing Bukoba at 10 pm, in smooth conditions, the vessel called at an intermediate port where many more passengers rushed aboard. There was no ticketing or control and the clearly overloaded vessel was very obviously listing as it left the port. Some time afterwards it reportedly hit a rock and capsized some 30 nautical miles from Mwanza.

No distress call was transmitted and, by the time any rescue vessels arrived, the ship was nearly submerged. An attempt at rescue/salvage was botched and, when a hole was cut in the still floating hull to evacuate passengers who were still alive and tapping on the hull at the time, the remaining buoyancy was lost and the ship sank completely.

The official death toll was 894 but local media reports indicate it was at least 1,000. That was more than double the ferry’s licensed capacity. The manifest showed 433 first and second-class passengers but there was no manifest for third class. Only first and second-class passengers were issued with
lifejackets and there appears to have been no other life saving equipment aboard.

The master and nine TRC Marine Division officials were arrested and charged with murder but soon released. The Tanzanian Government appointed a Commission of Inquiry but there is no public record of its findings apart from a press release blaming gross overloading.

Contemporary local press reports indicate that all Lake Victoria ferries at the time were in deplorable condition, badly manned, inadequately equipped and with little or no loading controls. Their owners and crews ignored regulations and maintenance was hopelessly inadequate. Inspections were non-existent as were crew qualifications and rescue services. Bureaucrats were allegedly ignorant, corrupt and incompetent.234

Judging from recent events on the Tanzanian coast, little has changed in the intervening twenty years. (See reports on the Spice Islander, Skagit, Kilimanjaro II et al in the BMPVA database and below).235

There have been numerous fatal accidents involving ferries on the large central African lakes including Lake Victoria, Lake Tanganyika, Lake Albert and Lake Nyasa. Ugandan, Tanzanian, Rwandan, Kenyan and DR Congolese vessels have been involved. The causes are invariably similar and all involve most of the usual forms of human error with overloading, unseaworthy vessels, poor seamanship and general negligence being the main culprits.236

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235 Appendix A, Ibid.
236 For details see Appendix A, Ibid.

![Image 3.11. Bimas Raya (left) in Merauke in 1996. Apparently she was even more dilapidated when she sank in 1999 (www.rosencranz-shipphotos.de).](image)

The tiny steel coastal cargo ferry *Bimas Raya II*, which appeared to be a converted fishing boat, caught fire, capsized and sank off the south coast of Indonesia’s Irian Jaya province near the town of Merauke, just west of the Papua New Guinea border. It is in a low-lying, swampy, crocodile and malarial mosquito infested region.

Owned by Merauke based Bimas Raya Lines PT, the 196 grt, 1991 built vessel was constructed in Indonesia by Bina Bahtera to Biro Klasifikasi class. When pictured in 1996 and only five years old, the vessel already appeared dilapidated and poorly maintained.

Details, as usual, are sparse but it appears that the ship, which, had a licensed carrying capacity of 125 passengers, was grossly overloaded with in excess of 300 people on board. It suffered an engine room fire that spread and caused the vessel to capsize and sink. There were only 26 survivors so there were somewhere between 275 and 361 fatalities. No one really knows how many.

Apparently, no distress signal was transmitted and a search only commenced when the vessel became overdue. One of the owner’s other ships along with a workboat from the Port of Merauke and some local fishing boats conducted a search with little success.  

Obviously, the fire fighting equipment was inadequate as were the communications and lifesaving equipment. The ship was overloaded by at least 200 per cent. As in so many cases, the causes of the *Bimas Raya II* sinking were an unseaworthy vessel, incompetent crew, poor seamanship, gross overloading and managerial neglect. All human errors.

Unsurprisingly, Bimas Raya Lines was still operating as at the end of 2017. It appears to have suffered no penalty or restrictions as a result of this appalling accident.

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Image 3.12. The wreckage of Salahuddin II being salvaged a few days after her sinking. Large numbers of bodies were found trapped inside (Tribune India).

Salahuddin II was a typical triple decked, steel hulled Bangladeshi river ferry of indeterminate provenance and ownership. It was about 60 metres LOA and of unknown age. Large numbers of similar vessels operate from the Dhaka Launch Terminal serving the riverine areas of southern central Bangladesh.

The ferry collided with another vessel, capsized and sank in a "sudden storm" at the mouth of the wide and often "turbulent" Meghna River, near Shalna, about 85 nautical miles south-east of Dhaka, the capital of Bangladesh. The accident occurred just before midnight on 3 May 2002, not an unusual time for such a disaster.

Newspaper and Internet reports indicate that there were in excess of 500 passengers on board and only 100 survived the accident. There were, of course, no passenger manifests. The estimated fatalities range from 370 to at least 450. The vessel was clearly badly overloaded as is the norm in Bangladesh. Also, as normal, there was little or no safety equipment and the crew unskilled, un-trained and, probably, malnourished and fatalistic.

Shortly after the accident the Bangladeshi Government promised to set up two inquiries into both that particular accident and the wider problem of Bangladeshi ferry safety. The Salahuddin II accident was blamed on "technical inadequacy" and the Government ordered a tightening of safety standards.238

Inevitably, there were at least two further fatal ferry accidents in Bangladesh in 2002. They lifted the death toll there for that year beyond 537. From then

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until the end of 2015 there have been a further 56 accidents and 4,868 fatalities.239

3.2.15. Le Joola, 1,863 fatalities, 26 September 2002.

Image 3.13. Le Joola shortly before her sinking, one of the worst ferry disasters in history. Her overloading exploits were notorious. This image shows why (www.grijalvo.com).

The 2,087 grt and 80 metres LOA conventional monohull Ro-Pax ferry Le Joola was designed, built and licensed to carry 536 passengers, 44 crew members and 35 cars. On the night of 26 September 2002 when the ferry capsized and, ultimately, sank, the ferry was carrying at least 2,000 people, of whom, 1,034 were ticketed. Of those, at least 1,863 died including many who were trapped in the hull and still alive when it sank about fifteen hours after the capsize. Some 551 bodies were eventually recovered.

Until September 2011, when it was surpassed by the Tanzanian monohull Ro-Pax ship Spice Islander, this was Africa’s worst peacetime shipping disaster and the world’s second worst.240

Apparently well built in Germany in 1990 by Schiffswerft Germersheim, the ship was reportedly well-equipped with safety gear but was allegedly very poorly maintained. It had just returned to service after a year of major repairs including the replacement of the port engine. The ship was owned by the Senegalese Government, through its Ministere de l’Equipement, and operated by the Armed Forces of Senegal. It plied a regular route from the capital Dakar in the northern sector of the country to Casamance in the south but, allegedly, made unscheduled and irregular stops to serve unmanifested passengers as a matter of course.

239 Appendix A, Ibid.
240 Ibid.
On 26 September 2002 *Le Joola* sailed from Zuiginchor, the regional capital of southern Senegal, bound for Dakar, the capital of the West African nation. Departing around 9 pm, the ship transmitted a radio signal saying it was sailing in calm seas at 10 pm. Reports vary but it was claimed by the owning department that the ship sailed into a storm about 11 pm. The subsequent inquiry disputed that claim but, in any case, the ship capsized about 11.05 pm. It was then well out to sea off the mouth of the Gambia River which flows through the nation of The Gambia which effectively bisects Senegal. It actually sank inside the Exclusive Economic Zone of The Gambia.

*Le Joola* was badly overloaded as was normal practice. It is believed that too many of the excess passengers were on the upper deck trying to escape the heat and their movement capsized the vessel. Apparently, many of them survived the sinking only to drown while awaiting rescue.

While small fishing boats arrived a few hours after the capsize and rescued a few people, government vessels did not arrive until many hours after the capsize. The ship remained capsized but still afloat until 3 pm on 27 September 2002. Tapping was heard from inside the ship until then.


The Senegalese Government commissioned a Marine Board of Inquiry as did France because there were French citizens on board. The President of Senegal dismissed the Prime Minister and most of her cabinet shortly after the event for miss-handling the rescue. Some other officials were also dismissed. However, despite accusations of negligence, poor maintenance, sailing beyond the ship’s limits, and gross overloading during the 12 month inquiry, no one was prosecuted and there was no trial.\(^{241}\)

Again, a grossly overloaded, poorly maintained ship being operated in a badly unseamanlike manner capsized and sank taking almost 2,000 people with it. Although the sinking technically occurred in international waters, on an international voyage, actually within the EEZ of a second country (The Gambia), the IMO was disinclined to act or, indeed, even to comment.  

3.2.16. *Nasreen/Nazren/Nasrin*, 400 plus fatalities, 8 July 2003.

![Image 3.15. The main reason there are so many fatalities associated with Bangladeshi ferry accidents is the gross overloading that is normal there. Here the families of passengers await confirmation of their fate. (www.devastatingdisasters.com).](image)

Claimed to be the worst of a large number of Bangladeshi ferry disasters, the capsize and sinking of the *Nasreen/Nazren/Nasrin* was a typical example of the accidents that happen so frequently in that now rapidly developing but still poor country.

The *Nasreen*, a typical Bangladeshi triple decked steel passenger ferry, operated from the Dhaka Launch Station on voyages along the Meghna River to Lalmohan and Barisal, about 90 nautical miles south, south-east of Dhaka. At the common disaster hour of around 11pm, the ferry reportedly nose dived, capsized and sank in what has been variously reported as „turbulent waters“, a „whirlpool“, and a „confluence of monsoon swollen rivers“. The sinking occurred on the Meghna River near Chandphur close to where the *Salahuddin II* sank 14 months previously.

Licensed to carry 300 passengers, *Nasreen* was allegedly carrying well over 600 at the time of her sinking. It is claimed that 200 swam to safety or were rescued by fishing boats so that 400 plus were missing. The figures do not


242 *www.imo.org* The IMO GISIS database was searched but no mention of *Le Joola* found.
compute but between 400 and 600 are believed to have died. The vessel sank only 600 metres from the Chandphur launch terminal. It capsized quickly and passengers inside the ferry had no means of escape.

Allegedly illegally carrying 35 tonnes of cargo, the ferry had no life saving equipment and an untrained, unqualified crew and master. The master and owner both died in the accident or, perhaps, went missing subsequently.

The subsequent MBOI blamed overcrowding or incompetence. Two marine surveyors were deemed responsible for failing to properly check the vessel. They were fined less than USD 200 each.\textsuperscript{243}

Once more, a dangerously unseaworthy ship, manned by incompetents and allowed to be grossly overloaded by a negligent owner and complicit authorities, sank with massive loss of life. For a very stark illustration of the realities of these problems readers are referred to Appendix F where two YouTube videos of recent Bangladeshi ferry accidents may be seen. The complete failure of lookout; response to an impending collision; and, attempts to rescue survivors of the capsized vessel, despite the availability of life buoys, is distressing but illuminating.

3.2.17. **Al Salam Boccaccio 98**, 1,026 fatalities, 3 February 2006.

*Image 3.16.* Al Salam Boccaccio 98, an Italian built, Egyptian owned, conventional monohull Ro-Pax ferry looking decidedly unstable and unseaworthy with her four obviously additional decks and vehicle access door cut in the starboard side forward. The sponsons added at the waterline were a feeble attempt to improve the ship’s stability (www.shipspotting.com).

Originally built in 1970 for Italy’s Tirrenia Lines by Italcantieri’s Monfalcone shipyard which, several bankruptcies and government “bail outs” later, is known as Fincantieri, the 131 metre LOA, conventional Ro-Pax ferry **Al Salam Boccaccio 98** was later considerably enlarged from 6,450 grt to 11,779 grt. This was mainly by the expedient of adding four accommodation decks and waterline sponsons to then stabilise the ship.

The ship was allegedly sold from Italy to Egypt because it failed to meet the Stockholm Rule requirements introduced following the sinking of the *Herald of Free Enterprise*, *Scandinavian Star* and *Estonia*. It was legally prevented from operating in European waters – quite correctly as things turned out.

Owned by Egypt’s Al Salam Transport, **Al Salam Boccaccio 98** (ASB98) operated as a Ro-Pax ferry carrying vehicles and passengers, mainly Haj pilgrims and Egyptian workers between Egypt and Saudi Arabia. She was one of a number of vessels engaged in that trade.

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244 Refer to 2.1.1, 2.4.4, 2.5.3, and 6.2.1.
The ship was not the first of the Red Sea ferries to sink. In December 1991 the Salem Express (See 3.11.) grounded and sank with 470 fatalities. Only four months prior to the ASB98 sinking, another vessel owned by Al Salam Transport sank following a collision in the Red Sea. There were two fatalities. Also, in June 2002 another Al Salam Transport owned Ro-Pax ferry Al Salam 90 caught fire soon after departing Dhuba. A crewman died.\footnote{245}

ASB98 was en route across the Red Sea from Dhuba, Saudi Arabia, to Safada in Egypt with about 1,410 people, mostly returning Haj pilgrims and Egyptian workers, as well as 220 vehicles on board. Contact was lost and it is believed there was a fire about 60 nautical miles and four hours from Dhuba at 10 pm. It is believed the ship sank at 11.33 pm. No distress signal was transmitted but an EPIRB was activated at 11.58 pm. Conditions were windy - around 24 knots wind speed – but the sea was slight.

There was more than adequate life saving equipment with ten lifeboats and 90 life rafts capable of supporting more than 3,000 survivors. Five of the lifeboats and an unknown number of liferafts were launched. It is believed that about 1,026 people perished but the numbers are still being debated. Even the number of survivors is not definite.

Equally debateable is what actually happened and why. Both the Egyptian (Port state) and Panamanian (Flag state) authorities held inquiries. The Voyage Data Recorder (VDR) was recovered and provided further contradictory information. The ship was not fully laden and the fire burnt for four hours. It started on the vehicle deck and has been blamed by some, because of water used to extinguish the fire, for having caused the already top-heavy ship to capsize. Some blamed blocked scuppers and some alleged sabotage.

The Egyptian MBOI blamed a „wicked conspiracy“ and imprisoned the owner Mandouh Ismail for seven years. Two of his employees were sentenced to three years in prison. Ismail was accused of ordering the captain to proceed despite his doubts being expressed per radio.\footnote{246}

The indisputable facts are that the ship was unseaworthy in the first place, having been banned from Southern European waters some years before. Even to a casual observer, the ship appeared dangerously top heavy (the author observed it in Genoa before the accident). Seamanship was obviously poor without even a distress signal being transmitted even though the fire had been burning for more than four hours before the ship sank. The only signal sent was via a float free EPIRB which transmitted after the ship sank. Despite the recovery of the VDR, we are unlikely to ever learn the whole story.

\footnote{245} All recorded in Appendix A, Ibid.
3.2.18. **Senopati Nusantara**, 560 fatalities, 30 December 2006.

*Image 3.17. The inter-island conventional monohull Ro-Pax ferry Senopati Nusantara was 31 years old when it sank in a “violent storm” in the Java Sea (Wikipedia).*

The bluff bowed, landing barge like, conventional Ro-Pax ferry *Senopati Nusantara* capsized and sank in a storm while en route from Kumai in Kalimantan (Borneo) to Tanjung Emas in Semarang, East Java. Fatalities are difficult to ascertain as reports vary from 46 to 600. Local newspaper reports indicate the likely figure is between 400 and 600, most probably around 560.

Similarly, the age of the vessel is in some doubt with estimates ranging from 16 to 37 years. The 77 metre LOA, 2,718 grt, steel vessel was built in Japan and owned by local company Prima Vista PT. It operated scheduled voyages on the Kumai to Tanjung Emas route and had been doing so for some years until sinking in a “violent storm” 25 nautical miles off Mandalika Island in the Java Sea.

Licensed to carry 850 passengers, it is estimated there were between 628 and 800 on board as well as 29 buses and trucks and the usual mass of motor-cycles. There were 219 known survivors, some of whom were found 250 nautical miles and seven days from the wreck.

Immediately following the accident, the Indonesian Minister of Transport claimed the vessel was seaworthy, carried sufficient lifesaving equipment and was “not old”. There was a wide-ranging aerial search as well as efforts by local fishing boats and six ships of the Indonesian Navy.

Survivors, however, reported bad seamanship, chaos and fights for lifejackets. Following the subsequent MBOI, the master was convicted of navigating improperly and “careless manouvering” as well as ignoring the
weather. Found guilty in the Semarang Court, he was imprisoned for two years and four months. The court praised the owner for promptly compensating the victims.247

With great respect to the court, it would appear that its verdicts were neither fair nor objective. The owner would seem to be just as culpable as the master. The ship was obviously neither seaworthy nor properly equipped with accessible life saving equipment. The master, equally obviously, did sail into a storm but it is very likely he was ordered to do so by the owner.


![Image 3.18. Princess of the Stars at the Manila ferry terminal (www.wakanatsu.com).](image)

The Sulpicio Lines owned conventional monohull Ro-Pax “cruise” ferry **Princess of the Stars**, ignoring frequent, adamant and obvious warnings, sailed into the face of Typhoon Fengshen (Frank). Midway through her voyage from Manila to Cebu City she lost power, grounded, capsized and sank off San Fernando Island in Roblon Province near Mindoro Island in the Visayas in the central Philippines. She had sailed directly into the eye of the typhoon. An estimated 870 passengers and crew died as a result.

The death toll, added to those from several previous accidents, amounted to more than 6,000 "known" fatalities arising from accidents involving ships owned by Cebu based Sulpicio Lines over a period of twenty years. Undoubtedly a world record for one company!\textsuperscript{248}

The steel Ro-Pax ferry was the largest in the Sulpicio fleet and in the Philippines. It was 23,842 grt and 193 metres LOA. Built by the highly regarded Ishikawajima-Harima shipbuilding company of Aloi in Japan in 1984, it was purchased by Sulpicio in 2001 and converted from a pure cargo vessel to a Ro-Pax ferry. Its regular route was Manila to Cebu City and return.

As usual with developing world ferry disasters the ship capacity and final fatality figures are nebulous and often deliberately obscured. In this case, passenger capacity has been variously described as 1,992 and 2,876 with up to an incredible 978 crew! The crew list and passenger manifest are just as vague. The owners claimed there were 862 people on board but there were almost certainly many more. The official death toll was 862. However, there were 56 survivors, 67 bodies were found and 747 listed as missing, a total of 870. The first in a long list of arithmetic discrepancies.

The Philippines MBOI found that passengers were ordered to don life jackets at 11.30 am. The abandon ship order was given at 11.45, a distress signal transmitted at noon and contact lost at 12.30 pm. Some passengers managed to get into liferafts but survivors accused the crew of being more interested in saving themselves. The sinking ship capsized at 6 pm.

Interestingly, another Sulpicio Lines ship put to sea through Manila Bay shortly before the \textit{Princess of the Stars} departed. Noting the conditions, the master turned around before leaving the entrance to the bay. He was roundly and loudly abused by many of his passengers for doing so, especially as the \textit{Princess} passed them. However, upon berthing back in Manila and learning of the fate of the \textit{Princess}, he was suddenly regarded as a hero.\textsuperscript{249}

The Philippines Navy tried but gave up rescue attempts in the face of "enormous waves". The first rescue ship arrived more than 24 hours after contact was lost. MARINA "grounded" all Sulpicio Lines" vessels and the government established "Task Force Princess Stars" to handle the accident. Even the normally supine President Gloria Macapagal Arroya roundly criticised Sulpicio.

In turn, Sulpicio blamed the Philippines Coast Guard and Bureau of Meteorology for the inadequacy of their warnings even though most other ships in the Philippines, including a number of Sulpicio vessels, had cancelled voyages or taken shelter because of the impending typhoon.\textsuperscript{250} Sulpicio offered bereaved families compensation of about USD 4,500 each.

\textsuperscript{248} See 1.12.2.
\textsuperscript{249} Described in Appendix C in a letter to the author from Commodore Gualterio Dela Cruz, PCG (Retd).
\textsuperscript{250} See Appendix C, Ibid.
The Philippines MBOI reported promptly on August 25. It found Sulpicio Lines and its deceased captain jointly liable and recommended that Sulpicio’s licence be suspended. It blamed human error, particularly by the captain. Sulpicio was found to be negligent. Sulpicio blamed an „Act of God” and again blamed the weather forecasters, accusing them of negligence.

The company appealed and threatened that because it carried more than 40 per cent of the country’s internal cargo, it would cause major national economic damage if its operating licence were to be suspended. Sulpicio’s owners, the Go family are very powerful both economically and politically in Cebu, the country’s second city.

Seven years later, the Manila trial court awarded USD 6.6 million (About USD 7,000 each) to be paid by Sulpicio in compensation to the victims’ families. At least it was more than the original Sulpicio offer. In January 2015 MARINA revoked the Certificate of Convenience of Philippine Span Asia Corp, formerly known as Sulpicio Lines, for its failure to comply with the ISM Code.

While Sulpicio Lines is without any doubt the world’s worst behaved shipowner, its repeated deadly performances simply illustrate most of the usual human errors comprising negligence, poor seamanship, an unseaworthy ship and general incompetence. They also illustrate the power of such companies in developing countries and the inability of regulators to withstand such power. Sulpicio Lines continues to operate as Philippine Span Asia Corp! Remarkably, perhaps, it does not present a web site.

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252 See Google/Philippine Span Asia Corp.
3.2.20. Teratai Prima Dua, 255 fatalities, 11 January 2009.


Owned by PT Nur Budi, the 1999 built steel conventional monohull Ro-Pax cargo ferry Teratai Prima Dua was a typical example of a locally and rather roughly built inter-island vessel in the intra-Indonesian fleet. She was of 700 grt and plied a regular scheduled route across Makassar Strait from Pare Pare on the south-west corner of Sulawesi Island to the major town of Samarinda on Kalimantan (Borneo).

At 4 am on the morning of 11 January 2009 the ferry was reportedly hit by two large waves which caused it to heel about 30 degrees. Then a wave hit from another direction and that capsized and soon sank the vessel. It is believed that 255 of the passengers and crew perished as a result.

The passenger manifest that, like most such documents in Indonesia, was probably inaccurate, listed 250 passengers. The crew list stated 17. There were probably more since there were 42 survivors and the subsequent MBOI recorded 255 fatalities. As usual, the figures do not compute.

The small number of survivors confirms their evidence before the MBOI that “high waves flipped the ferry” quickly. The Indonesian Navy and Coast Guard conducted a search the following day but it was still rough and the search was not successful.

The master was accused of ignoring the weather warnings, of overloading his vessel and of having inadequate lifesaving equipment available. He was convicted and imprisoned for nine years. There was no news of any penalty.
being applied to the owner who appears to have been equally culpable in every respect.  

The usual human errors were evident.

3.2.21. **Spice Islander**, 2,764 fatalities, 10 September 2011.

*Image 3.20.* Spice Islander was, as this picture shows, in appalling condition before she set out on her fatal voyage. It was badly "hogged" showing that its back was broken, among other deficiencies. It should never have sailed at all, let alone carried large numbers of passengers (www.shipsnostalgia.com).

Thanks, largely, to the Internet, more news about Tanzania’s dreadful ferry safety record has begun to be published since 2000. This has seen the East African country decline from being barely noticed to third worst country in the world for ferry fatalities in the ten years from 2005 to 2015.

To date, its worst accident involved the **Spice Islander** an ancient, steel landing barge style monohull Ro-Pax ferry of 60 metres LOA and 836 grt. Already forty years old when she arrived in Tanzania from Greece in 2007, the badly battered ferry capsized and sank around 1.00 am on September 2011. Depending on which report is the most accurate, there were between 1,573 and 2,976 fatalities as a result. Most reports tend to favour the latter figure.

On a short voyage from Stone Town on Unguja, the main island of the Zanzibar group, to the northern island of Temba, the grossly overloaded vessel lost power, capsized and sank. There was very little lifesaving

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equipment and the crew were of virtually no assistance to the panicking passengers.

The ship was in disgraceful condition. It was battered, rusty and, worst of all, badly hogged in that effectively its back was broken. It appeared that little or no maintenance had been done on the vessel for many years. It in fact broke down off Somalia on its delivery voyage due to contaminated fuel. It should never have been allowed to go to sea. It was, however, probably a very profitable ship for its owner, Makame Hasnuu. It would have cost practically nothing to buy and very little, if anything, had been spent on maintenance.

Apparently licensed to carry 645 passengers and 45 crew, which seems excessive anyway, the ferry was believed to be carrying 3,586 people when it sank. It was so overloaded that a number of passengers were concerned enough to disembark in Stone Town to avoid the onward voyage to Pemba.

The Tanzanian Government convened a MBOI shortly after the sinking. There was, of course, much contradictory evidence presented. The numbers of passengers and fatalities were disputed but the Government confirmed in October 2011 that the vessel had been carrying 3,586 of whom 2,764 were unaccounted for. Some 620 people had been rescued and 203 bodies recovered. The survivors were rescued by other ferries.

The MBOI adjudication was one of negligence and murder. The ferry had been badly overloaded. The master, owner and ten of the crew were charged with murder. It is not known whether they were ever convicted or punished.

Clearly, whatever penalties were imposed failed to act as a deterrent to other local operators. Only eight months later, the much newer, American sourced Skagit capsized and sank between Dar es Salam and Stone Town causing 293 fatalities. Interestingly, the travel advisory website www.tripadvisor.com.au did not mention the safety record of Tanzanian ferries in its advice on the reliability of ferries on the Dar es Salam to Zanzibar route as of July 2016. That is grossly irresponsible.

Yet another case of a grossly overloaded, unseaworthy, badly maintained ferry managed by a negligent owner and crewed and commanded by incompetents sinking with massive loss of life. Human error indeed.

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3.2.22. *Rabaul Queen*, 252 fatalities, 2 February 2012.


The small, 259 grt, 30 year old cargo ferry *Rabaul Queen* sailed into a forecast strong gale in Papua New Guinea’s Bismark Sea on 1 February 2012. She capsized and sank causing the deaths of as many as 300 passengers and crew.

The 47 metre LOA ship was launched in Japan in 1982 by Kawamoto Shipbuilding. It was designed and built to operate in the benign conditions of Japan’s northern Inland Sea. It was purchased in 1998 by Captain Peter Sharp’s Rabaul Shipping to operate in the considerably more boisterous waters of the Bismarck Sea around northern PNG.

The vessel’s normal route was from Kimbe, the capital of West New Britain province, to Lae, on the north side of the mainland of PNG, a 280 nautical mile voyage. For voyages of such duration the vessel was licensed to carry 295 passengers and 16 crewmembers. Technically, it was in survey.

On the afternoon of 1 February 2012 the ferry proceeded to sea in spite of gale warnings predicting winds up to 48 knots from the north-west and very rough seas. As the gale built, passengers began to get wet and started to move to one side for shelter. This caused the ship to heel, acquiring a list of about five degrees to port. About 6.15 am on 2 February the ship was hit by some very large waves and capsized so quickly no distress signal could be transmitted. A float free EPIRB, however, was activated as the ship sank about 6.30 am. The first rescue ship *MOL Summer* arrived around 9.40 am and recovered 116 survivors. Other vessels later recovered 130 more.

From this accident we have the benefit of undoubtedly the best, simplest and clearest report of a BMOI yet seen by the author, the Commission of Inquiry.
into the sinking of *Rabaul Queen*.\(^{255}\) It is a credit to the PNG Government, its Marine Advisor, Captain Nurur Rahman, and its Commissioner, Judge Warwick Andrew.

The COI found numerous deficiencies in the ship, its owner, its crew and their operations. Essentially, it was grossly overloaded, unseaworthy, badly maintained, unstable, unsafe and manned by poorly trained incompetents.

The ship was unfit to go to sea in the forecast and actual conditions. It did not carry enough lifejackets and the crew were untrained in the use of what safety equipment was fitted. The master was negligent in many respects and the owner, Captain Peter Sharp, even more so. The COI found that between 142 and 161 people perished in the sinking. Local media claim many more fatalities.

The COI found that Captain Sharp had behaved negligently for many years. As far back as 1993 he had sent a ferry *Kris* to sea when it was obviously unsafe. That vessel sank with the loss of five lives. It found him arrogant and that he had no regard for the safety of passengers. Another of his vessels *Kimbe Queen* had run aground on coral reefs twice including once only days after the *Rabaul Queen* disaster.

The COI also found the National Maritime Safety Authority (NMSA) to have been incompetent and ineffective and in need of drastic reform. It deemed the search and rescue operation to have been competently conducted by the Maritime rescue Coordination Centre in Port Moresby (MRCC POM) in cooperation with the Australian Maritime Safety Authority”s (AMSA) Rescue Coordination Centre in Canberra (RCC Australia).

Arising from the COI”s report, a number of charges, mostly of manslaughter, were laid against Sharp, the vessel’s master and mate and another employee of Rabaul Shipping. Also, a maritime safety officer has been charged with negligence. The manslaughter charges were dismissed on 31 July 2017 but charges of sending or taking an unseaworthy vessel to sea were yet to be heard as at 6 December 2017.\(^{256}\)\(^{257}\)

The COI into the sinking of the *Rabaul Queen* inspired a devastating report which highlights many of the similar deficiencies that afflict so many of the vessels, owners and operators that have been described in this chapter. All the usual ingredients of negligence, incompetence, an unseaworthy vessel, absence of seamanship, lack of maintenance, overloading, corruption and panic were there.

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\(^{256}\) Appendix D. Letter from Captain Peter Sharp, managing director of Rabaul Shipping to the editor of Work Boat World magazine, Baird Publications, Melbourne, 3 February 2015.

3.2.23. **Sewol**, 304 fatalities, 16 April 2014

*Image 3.22. Sewol showing the additional accommodation decks at the stern that contributed to its instability (www.abc.net.au).*

Although it resulted in „only” 304 fatalities, the capsize and sinking of the South Korean conventional monohull Ro-Pax cargo ferry *Sewol* has probably received more international media coverage than any other Asian passenger vessel accident. This is likely due to the fact that most of the victims were teenaged school students as well as the political machinations and legal drama that followed the accident and that South Korea is generally regarded as a „developed“ country.

The *Sewol* was yet another „accident waiting to happen“. All the ingredients were there: corrupt, negligent officials; a corrupting, negligent owner; incompetent and cowardly officers and crew; insensitive politicians; an unseaworthy ship; subsequent suicides; overloading; inadequate lifesaving equipment; and, a slow and not particularly competent rescue effort. It provided the South Korean Government, the Korean Register of Shipping and the South Korean Coast Guard with a very nasty awakening.

Built in 1994 in Japan by Hayashikane Shipbuilding and Engineering, the 6,825 grt vessel was 146 metres long. The owner, Chonghaejujin Marine Company, in turn owned by Yoo Byung-eun, purchased it in 2012 and immediately added additional superstructure, thus reducing the ship"s stability. It operated on three round trips weekly from Incheon, the port of Seoul, to Jeju on Korea’s south coast. The ship was reported to have been dilapidated when purchased. It was classed by and in survey to the Korean Register of Shipping and passed a South Korean Coast Guard inspection in early 2014.

On 16 April the ship was outward bound from Incheon when it heeled over and sank during a sharp turn 0.9 of a nautical mile off Dourggeochado near the
south-west corner of South Korea. The ship was carrying 476 people, mostly teenage high school students, 124 cars, 56 trucks and 1,157 tonnes of cargo. Nearly twice its legal limit.

The subsequent MBOI, conducted by the South Korean Board of Audit and Inspection was sensational in its findings and devastating in its recommendations. It found the KRS license was based on falsified documents. It revealed the ship’s previous master had resigned following threats of dismissal after informing the owner his ship was unstable and unsafe.

The helmsman was inexperienced and, while the master was off the bridge, made the fatal sharp turn. The master ordered passengers to remain in their cabins as the ship sank. The master was one of the first to abandon ship. The ship’s modifications were illegal. There was a “questionable relationship” between the operator and regulator. The owner had been issued with warnings as to the seaworthiness of his ship. The rescue operation was slow and inadequate. Many passengers were still alive when trapped inside as the ship sank. The master fled after abandoning ship. Finally, two divers were killed during the rescue effort.

Following the inquiry, the 69 year old master was imprisoned for 36 years for negligence; the chief engineer for 30 years; a corrupt SKCG official for four years; and, the president of the owning company for seven years for homicide by wilful negligence. The owner’s body was found later after committing suicide. The vice-principal of the school who had organised the trip for his students also, tragically, suicided.258

Again, all the usual ingredients were involved: greed, corruption, negligence, incompetence, illegal and dangerous modifications, overloading, an unseaworthy ship and appalling seamanship. It must be highlighted that this “accident” occurred in a so-called developed country in 2014. The political “cover-up” that followed simply made the whole disgraceful incident even harder to accept by the families of the passengers who perished.259

259 The callous response of President Park Geun-hye was cited in the ultimately successful impeachment trial which led to her dismissal and subsequent imprisonment on 10 March 2017. See Murray, L, South Korean president impeached, Australian Financial Review, Fairfax Media, Sydney, 11-12 March, 2017.

Image 3.23. Dongfang Zhi Xing capsized in the Yangtze River. Passengers were still alive and trapped in the hull when this image was taken (www.wunderground.com).

Forty years on from the similarly storm caused collision and sinking of the *Hongxing 240 & 245*, China experienced another river cruise ferry disaster resulting in a similar number of fatalities. The 1975 accident occurred near Guangzhou on a tributary of the Pearl River and resulted in about 432 fatalities. The Chinese government was better able to suppress the news in those days. Despite its best efforts, much has been revealed about the *Oriental Star* capsize and sinking that saw ten more people killed than in the previous event.

The *Dong Fang Zhi Xing* or *Eastern* or *Oriental Star* was one of a number of four deck steel cruise ferries that take tourists along the Yangtze River from Nanjing to Chongqing via the Three Gorges. At 3,900 grt and 77 metres LOA and with accommodation for about 450 tourists, she was typical of the breed. Built in 1994 by the Chongqing Chandong Shipbuilding Corp, she was owned by the Oriental Shipping Co and operated by Xihe Travel.

On the night of 2 June 2015, while most of its elderly Chinese passengers were asleep, the ship capsized and sank near Jianii in Hubei province. There were 442 fatalities and only 12 survivors including the master and chief engineer. The authorities were not notified of the capsize until two and a half hours later by survivors who had swum ashore.
It is notable that the ship was lengthened by 11 metres in 1997. In 2013 the Nanjing Maritime Bureau found that six of ten Yangtze cruise ships had safety problems among which was a significant difficulty in recruiting trained crews.

At the subsequent inquiry, the master and engineer claimed the ship had been hit by a tornado. That was proved to be untrue although it was found there had been a severe thunderstorm with strong downbursts. Ships had earlier been warned of severe weather.

The rescue effort was unimpressive and it was noted that many passengers were tapping on the hull when salvage commenced. However, they were all dead by the time the ship was righted.

On 30 December 2015 the Chinese Government released the report arising from its inquiry. It found that the owner and local authorities had “flaws in their daily management” and suggested that 43 people be punished.260

Yet another poorly enlarged, unseaworthy ship crewed by incompetents and managed and regulated negligently caused the deaths of more than 400 innocent passengers.

3.3.0. Similarities abound in these case studies.

These case studies are replete with similar stories. The reasons for the accidents are remarkably similar and were each caused by some form of human error. It is significant that fifteen (60%) occurred at night. That, undoubtedly, increased the likelihood of greater fatalities as it made evacuation and rescue more difficult.

They confirm that practically all the accidents have essentially human error causes and that little seems to have been learnt over the past fifty years with the notable exception of in Northern Europe. The same causes continue to reappear. They also illustrate that, while more fatal accidents (76%) occur in developing countries, they still do happen in developed ones (24%) albeit with less catastrophic results in terms of numbers of fatalities per accident.

While human errors are the major cause of fatal passenger vessel accidents, there is no doubt that certain types of vessels suffer from vulnerabilities that exacerbate the problem and make accidents more likely to be fatal. Obviously, conventional Ro-Pax ferries, motor bancas and modified vessels that are so made less stable can worsen the effects of human error.261 Sixty per cent of the 25 vessels in the cases studied here were conventional monohull Ro-Pax ferries.262

261 No motor bancas are included among these case studies because they are too small to have carried sufficient passengers to have caused more than 150 fatalities in one accident.
262 All percentages derived from a statistical analysis of Appendix A, Ibid.
There is much that can be learnt from such accidents. The problem lies in applying that knowledge to the task of reforming the behaviour of the people employed in the ferry industry to significantly reduce, if not eliminate, the risks involved in their operations. Reform can be achieved, however, even in developing countries, as the aviation industry and oil tanker sector have shown.

Despite an increased international focus on training and education and ever more stringent safety requirements, fatal accidents continue to occur. Unlike the airline and oil tanker industries, there has been no significant reduction in the overall annual numbers of ferry fatalities since 2000. Indeed, although the data is nebulous, nothing seems to have changed – except in Northern Europe – over the past half century.

Astonishingly, a number of repeat offenders (24%) among owners have been revealed in this chapter. The major causal factors, despite much encouragement by governments, the maritime media and IMO, continue to be: negligence (100%), overloading (72%), poor lookout (24%), badly modified vessels (24%), unseaworthy vessels (76%), incompetent crews (100%), regulatory corruption, collusion between owners and survey officials and classification societies, poor seamanship (unknown percentages but common), insufficient lifesaving and fire-fighting equipment (72%), inadequate maintenance (unknown percentage but probably most), and late and inadequate rescue responses (56%); of the cases studied here.263

263 All statistics derived and analysed from Appendix A, Ibid.
Chapter 4

Comparisons with other transport modes

*Improvements in aviation, oil tanker and road accident and fatality numbers provide a basis for optimism*

4.1.0. Comparisons

4.1.1. Comparisons with other modes of transport.

To determine how ferry travel compares with other modes in terms of accidents and fatalities it is necessary to examine the risks associated with those other modes. This has the important additional benefit of providing valuable lessons as to how other modes, particularly road vehicles, oil tankers and aviation, have been able to very significantly reduce their incidence of both accidents and their accompanying fatalities. In the case of car travel that has mostly been in developed countries but with aviation it has been almost worldwide as have oil tankers. Fortunately, all have been well documented and recorded.

Other modes, again, including both rail and bus were reviewed but rejected for the purposes of this study. Rail travel is obviously quite different from water, road and air, if only because trains, running on rails, cannot divert from the very precise direction laid out for them. Practically all railway accidents are the result of external causes rather than errors on the part of the actual train operator or driver.

Rail fatality statistics incorporate large numbers of suicides and the carelessness of significant numbers of car, bus and truck drivers and pedestrians who misjudge their ability to cross tracks in front of oncoming trains.\(^{264}\) As these are not usually defined separately in most available statistics it makes it nearly impossible to calculate which fatalities have been the direct result of rail travel in the sense of passenger and crew deaths. Errors on the part of train drivers and their controllers and overloaded trains have undoubtedly caused fatalities but they have been rare and, so, are not comparable with aviation, car, oil tanker and ferry accidents.

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\(^{264}\) For a detailed study of this phenomenon, in the Australian context, refer to *Rail accident costs in Australia*, Bureau of Transport and Regional Economics, Canberra, 2002. The conclusions contained in that document undoubtedly have international relevance.
4.1.2. Inconsistent railway statistics.

In addition the statistics available from developing countries are inconsistent, vague and uninformative in the extreme. For example, India has large numbers of fatal railway accidents but obtaining anything more than sketchy press reports about them is practically impossible. The likely fatality reality is considered by the author to be very much higher than the official statistics that are published. Even in developed countries such as the United States, where there are comparatively large numbers of fatal railway accidents, it is very difficult to distinguish between victims who were actually on a train and those who were run over by one.

![Image 4.1](image.png)

*Image 4.1. Despite the obvious risks associated with this kind of overloading seen in India, train travel, for ticketed train passengers at least, is comparatively safe ([www.therewillbeasia.com](http://www.therewillbeasia.com)).*

Nevertheless, the vast majority of rail accident fatalities involve pedestrians being run down by trains, often as suicides, or road vehicles colliding with trains due entirely to driver incompetence or panic. Very occasionally a major accident occurs but they are very rare and usually result in fewer than 100 fatalities. They are simply not comparable in either their frequency or their fatality severity with ferry accidents. The worst ever train accident occurred in India, killing nearly 800 people in 1981.

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265 *Rail accident costs in Australia*, Ibid.
266 A spectacular example was of a train derailment near Lucknow in India in November 2016 killing an estimated 146 passengers. See *Scores die after train runs off the tracks in India*, The Australian (AP), Sydney, 21 November 2016, P. 9.
267 Ibid.
4.1.3. Bus accident data are scarcer and more nebulous.

Bus travel is even more difficult to evaluate. Many bus accidents in developing countries are accorded no publicity and are not even recorded by the appropriate authorities. The same, generally, applies to travel by car or motorcycle. Many buses operate illegally in developing countries in a kind of grey market similar to many ferry operations in the same kinds of countries. Even if an accident results in more than 100 fatalities, as some do, it is not considered newsworthy. However, as with car accidents, the incidence of bus accidents and fatalities has been falling significantly in developed countries for the past forty years. This is almost certainly due to stricter controls on overloading, road-worthiness, drink driving and the wearing of seatbelts.

![Image 4.2. The problem with buses. A typical grossly overloaded bus in a developing country, in this case, India. The statistics on fatal accidents involving such vehicles are very hard to come by (Wikipedia).](image)

The author has observed the aftermath of bus accidents in India, Bangladesh, Egypt and Indonesia. When a heavily overloaded bus, with passengers on the roof and hanging on to the sides and rear, rolls over an embankment, the number of fatalities can be very high. As they occur so

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268 The author has observed the aftermath of bus accidents in India, Bangladesh, Egypt and Indonesia that must have resulted in many tens of fatalities each. They were not recorded in the local media.
frequently, the response from the general public, the local media and local authorities is unlikely to be much more than a shrug of the shoulders.\footnote{Personal observation by the author. In Bangladesh there were numerous examples. During a two hour drive through the countryside outside Dhaka in late 1978 at least six wrecked buses were observed.}

The death rate arising from bus accidents is also considered likely to be significantly higher than from ferry accidents but official global statistics as collated by Numberwatch, in Figure 1.4. in Chapter 1, do not show that.\footnote{Numberwatch, Op cit.} Those statistics tend not to distinguish between buses, trucks and cars.


Indeed, that table shows that rail and bus travel are considerably safer than travel by ferry or even by aircraft. In the case of bus travel that seems most unlikely and, from his own observation, the author strongly refutes those figures.

There are, self-evidently, many more buses than ferries in the world and they suffer from many of the same problems. They are: unroadworthy vehicles; poor lookout; overloading; general negligence; poor accident recovery responses; and, poor driving skills. These accord precisely with the main causes of ferry fatalities. While it is impossible to accurately estimate the numbers of either passenger vessels or buses operating globally, the author estimates from personal observation that there would be at least three times as many buses as ferries. Therefore the Numberwatch figures seem very unlikely to be accurate.

Bus travel in the developing world is not for the faint hearted. It is a Hobbesian activity in which life is likely to be “… nasty, brutish and short”.\footnote{Hobbes, T. \textit{Leviathan}, J. M. Dent & Sons, London, 1973.}

4.1.5. Comparisons restricted to car, oil tanker and aviation sectors.

So, for the purposes of this study, comparisons and benchmarking have been restricted to the car, oil tanker and aviation sectors where the statistics appear to be far more accurate and useful. They also, especially in the developed world, show the distinctly improving trends of the past forty years. The tried and proven techniques that led to those improving trends appear to mostly be quite readily and economically adapted to the ferry industry. For the purposes of this work, then, the statistics covering road travel will generally be restricted to car travel in the developed world. They remain useful, however, because they illustrate how various behavioural and technological improvements have contributed to a marked decline in road fatalities in most developed countries.

For aviation the very useful and complete statistics provided by the International Civil Aviation Organisation, Boeing Corporation and...
www.aviation-safety.net have been extensively referred to.\textsuperscript{272} The ICAO has shown conclusively that a global approach where “no country is left behind” can be very effective.\textsuperscript{273} A process of encouragement, assistance, benchmarking, propaganda and, when necessary, enforcement by banning, has led to significant world-wide improvements in civil aviation safety.

ICAO, however, is not afraid to „name and shame“ individual countries or even airlines when it believes their safety procedures are unsatisfactory. For example, Thailand was “red-flagged” in 2015 and took ICAO’s criticisms very seriously. The Thai Government took strong, effective and immediate action to rectify the problems pointed out by ICAO. It would presumably do likewise if IMO were to publicly shame it about its unsafe ferries and tourist boats.

Other, more permanent, defaulters have been Angola, Botswana, DR Congo, Djibouti, Eritrea, Georgia, Haiti, Indonesia, Kazakhstan, Lebanon, Malawi, Nepal, Sierra Leone and Uruguay. They have all required extensive ongoing attention from ICAO.\textsuperscript{274} Notably, three of them also have very poor ferry safety records. Aviation is still far from perfect, particularly in much of Africa and the former Soviet Union, but it has shown very significant improvement over the past three decades. It is now the safest transport mode by a considerable margin.

IMO, impressively, worked very effectively in conjunction with INTERTANKO, the oil tanker industry equivalent of INTERFERRY, to dramatically reduce the number and consequences of oil tanker accidents.\textsuperscript{275} That development was largely inspired by the marine pollution that followed the groundings of the Torrey Canyon in 1967 and the Exxon Valdez in 1989. It is notable that IMO appeared to be more interested in the problems of oil pollution that followed tanker accidents than in their human consequences or, indeed, in the fatalities arising from ferry accidents. However, the co-operation between IMO and INTERTANKO showed the potential for significant safety improvement that could be achieved with similar co-operation between ferry owners and IMO with the ferry industry.

An interesting commentary on the paucity of useful statistics on the safety of various modes of travel and the difficulty in comparing the safety or risks inherent in each mode was published on the blog www.artchester.net by Arthur Chester.\textsuperscript{276} Mr Chester asserts that:

\begin{quote}
Data on travel fatalities are noteworthy for their lack of completeness. He says that, In the U.S. and other industrialized countries, aircraft accidents are
\end{quote}

\begin{footnotes}
272\footnote{Aviation Safety Network presents some very clear and up-to-date data on its website. www.aviation-safety.net.}
273\footnote{International Civil Aviation Authority, in www.icao.int/about-icao, Montreal, 2015. It provides excellent, detailed, timely and very extensive data.}
276\footnote{Chester, A. Travel Fatalities by Car, Air & Ship, in www.artchester.net, USA, 6 September 2015.}
\end{footnotes}
thoroughly investigated and documented, and motor vehicle accidents are almost as well reported. However, many countries are inconsistent about collecting and reporting their data. Foreign air travel fatalities in particular are often under-reported. A similar situation holds for cruise ships, with the additional complication that almost all cruise ships are registered in countries that rely primarily on voluntary reporting by the cruise lines.277

This was discussed at length in Chapter 2, but, allowing for those statistical deficiencies, there is sufficient information available about global aviation, oil tanker and developed country car accidents to enable worthwhile comparisons to be made with the risks associated with ferry travel. Despite Mr Chester’s comments, the author has found that cruise ship accidents are comparatively well recorded. They do, after all, mainly affect developed country passengers. The less accurate, and more limited, information about fatal ferry accidents that is available is far more useful than no information. It does facilitate the illustration of quite clear trends that enable lessons to be drawn from successful improvement initiatives that have been made in those other modes and which are adaptable to ferry travel.

4.2.1. Aviation presents a particularly relevant and useful model.

The aviation industry, particularly, presents a useful, and undoubtedly the best documented, model for improvement of ferry industry safety. Apart from organic internal industry improvement, there has been considerable internationally driven improvement thanks to the encouragement of ICAO. Its contribution, influence and performance have put those of IMO to shame. Many national authorities, working in conjunction with ICAO, particularly in Western Europe, North America, Japan, Australia, New Zealand, Hong Kong, Singapore, and the UAE have also made significant contributions to improvements in aviation safety both domestically and to poorer neighbouring countries in their wider regions.278 ICAO clearly appears to deliberately play an assisting, cooperative and supportive leadership role with its member nations. That role seems to have generally eluded IMO despite their largely similar mandates and mission statements.

Indeed, ICAO states in its mission statement, as published on its website, that its mission is: “To serve as the global forum of States for international civil aviation. ICAO develops policies and standards, undertakes compliance audits, performs studies and analyses, provides assistance and builds aviation capacity through many other activities and the cooperation of its Member States and stakeholders” (note the final seven words in bold).279

277 In other words, they are registered in tax havens and under “flags of convenience” such as Panama, Liberia, the Bahamas, Cayman Islands and Marshall Islands, among others.
278 For details of the worst ten aviation accidents, refer to www.telegraph.co.uk/travel/travel-truths/the-deadliest-aviation-plane-crashes-disasters-in-history/.
279 Refer to www.icao.int/about-icao/Pages/vision-and-mission/.
IMO, however, surrounds its mission statement with more legalistic „escape“ words. It states that its mission: “…is to promote safe, secure, environmentally sound, efficient and sustainable shipping through cooperation. This will be accomplished by adopting the highest practicable standards of maritime safety and security, efficiency of navigation and prevention and control of pollution from ships, as well as through consideration of the related legal matters and effective implementation of IMO’s instruments with a view to their universal and uniform application”.280

Both organisations are mandated to improve safety on an international basis. Neither body, as international subsidiary organisations of the United Nations, has a mandate to interfere with domestic matters. However, while ICAO seems to interpret its mission as it being required to work globally „with“ its member nations to assist and support them to improve safety on both international and domestic flights, IMO interprets its mandated role quite differently and more literally. IMO, in its rigid adherence to its „non-interference in domestic matters“ policy, evinces no apparent interest in adopting the same kind of leadership role that ICAO carries out so effectively. It largely restricts its mission to international voyages although even those tend be ignored by IMO if, for example, they occur in Africa as in the case of Le Joola.281 The difference between the two bodies, then, is clearly one of interpretation and approach.

Annual numbers of passenger aircraft accidents, too, are rather more comparable with ferry accidents although the latter tend to have much greater numbers of fatalities per accident, as can be seen in Table 4.1, below. The world’s worst ever aviation accident, for example, involved a collision between two Boeing 747 aircraft at Tenerife airport on 27 March 1977.282 That resulted in 583 fatalities. Indeed, even the combined total of fatalities from the world’s ten worst aviation accidents at 3,561 is far fewer than the 4,386 deaths arising from the one ferry collision involving the Dona Paz in the Philippines Sibuyan Sea in 1987.283

Most importantly, annual fatal airliner accidents have reduced from 100 in 1949 to 18 in 2015 in a steady progression.284 In 2017 there were no fatal jet airliner accidents.285 This has been achieved against the background of a dramatic increase in the number of flights over the same period.286

280 Refer to www.imo.org/en/About/HistoryofIMO/Pages/Default/.
281 Refer to 3.17.
283 See 3.8. for case study.
284 See Fatal Airliner Accidents Per Year 1946 -2016 at www.aviationsafety.net/graphics/infographics/
286 See Airliner Accidents Per 1 Million Flights 1977-2016, Aviation Safety Net, Ibid.
4.2.2. ICAO accident database is an excellent guide.

The author has been unable to find any comprehensive list of accidents and fatalities kept by IMO, even though its GISIS (Global Integrated Shipping Information System) database is claimed to perform that function, that is comparable with that of Aviation Safety Net. Nor has he been able to find a „naming and shaming“ list comparable with that published by ICAO. It is incomprehensible that IMO has not even been able to achieve either of those despite its spurious, negligent and unimpressive claim to be, “…unable to interfere in the internal affairs of our sovereign Member States”.

Those Member State governments and IMO should start to emulate ICAO and its member states and learn how to effectively “Regulate, educate, encourage and enforce” better behaviour. Establishing a comprehensive database recording accidents would provide a useful foundation for such action.

Image 4.3. Aviation accidents, while very rare, tend to result in large numbers of fatalities because, obviously, of the speeds at which they usually occur. They also attract considerable publicity. This was the crash of an Air Asia Boeing 777 at San Francisco airport. It actually resulted in very few fatalities and was attributed to pilot error (www.incolors.club.com).

IMO did promulgate its Casualty Investigation Code (Code of International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident) on 1 January 2010. This became mandatory from 1 January 2016. However, to date, more than seven years later, the author has been unable to find any evidence of the CIC Code being followed except in western developed countries where it was happening anyway. The only known exception is the excellent Rabaul Queen inquiry conducted for the Government of Papua New Guinea which is described in Chapter 3.

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287 Examine and compare GISIS at www.imo.org.
290 Detailed in IMO Member State Audit Scheme (IMSAS), www.imo.org/en/OurWork/MSAS/.
Regrettably, IMO has failed to publish an annual report for its Maritime Safety Committee (MSC) since 1996.\textsuperscript{291} This compares with ICAO which published its 2016 ICAO Safety Report during 2016. It incorporates data current to the end of 2015.\textsuperscript{292}

4.3.1. Aviation safety statistics.

Aviation accidents by their comparative rarity and spectacular nature tend to attract considerable public interest and, inevitably therefore, media coverage. Hence, apart, perhaps, from in the Soviet Union and China of more than two decades ago, the vast majority of aviation accidents have been recorded and generally well reported. ICAO has published extensive and detailed statistics on the subject and maintains a useful database of accidents with details of their causes and lessons to be learnt from them.\textsuperscript{293}

ICAO divides the world into six regions: Africa, Asia, Europe, Latin America and the Caribbean, North America and, Oceania. It presents accident statistics in the fields of: Traffic, Number of accidents, Rate or number of accidents per million departures and, number of fatal accidents. Interestingly, in ICAO’s 2011 edition of its State of Global Aviation Safety report, Asia was the region with the lowest rate of accidents per million departures.\textsuperscript{294} Africa was more than five times as bad.

ICAO also, usefully, compares accidents with traffic distribution and, here, Africa also performs worst. As always with regional comparisons, there are peculiarities that should be noted and allowed for. For example, Oceania includes New Zealand, Australia, Papua New Guinea and Irian Jaya. Of those New Zealand and Australia have excellent safety records which are distorted by the appalling records of PNG and Indonesian Irian Jaya.\textsuperscript{295}

4.3.2. ICAO actively encourages safety intelligence gathering. IMO, regrettably, does not.

ICAO has been encouragingly proactive in promoting and initiating safety intelligence and in 2010 “...initiated a risk-assessment approach to enhance aviation safety based on safety intelligence”.\textsuperscript{296} It explains that it “…accomplishes its objectives in this regard through identification and analysis of heterogeneous data sources, such as:

* Accident statistics.
* USOAP Audit results.
* Economic indicators.
* Traffic volume and traffic growth.

\textsuperscript{291} From IMO website, IMO Maritime Safety Committee(MSC). As of 26 March 2017, the most recent MSC Final Report presented was dated 1996.
\textsuperscript{293} Available at www.icao.int/Safety/Stars/Pages/Accident-Statistics.aspx.
\textsuperscript{295} See note 23, above.
\textsuperscript{296} ICAO Safety Report, Ibid. Page 17.
Traffic distribution factors, including the proportion of flights flown by a State’s Air Operator’s Certificate (AOC) holders vs foreign operators. Very importantly, and in strong contrast with IMO’s lack of initiative, it says: “This Safety Intelligence enables the Organization to cultivate a holistic understanding of safety issues and opportunities to assist Member States and regional and sub-regional organizations”.

Further, ICAO has established and maintains the Integrated Safety Trend Analysis and Reporting System (iSTARS) which is described as “… a web based utility which combines different safety-related datasets and allows for effective and integrated safety analysis”. It also, in partnership with EUROCONTROL, maintains SKYbrary, an electronic repository of safety information which is made available to users world-wide and includes information sourced from across the wider aviation industry. It even incorporates information on operational issues and individual aircraft airworthiness.\textsuperscript{297}

Obviously, intelligence is imperative. It would be difficult, if not impossible to make substantial safety improvements if you don’t know the extent of the problem and where, how and why it occurs. ICAO has and makes generally available to the interested public vast amounts of information on the subject of aviation safety. It conducts and encourages and assists other authorities to conduct thorough and searching inquiries into aviation accidents as a very important component of its accident prevention effort.

There are a number of other sources of aviation accident statistics such as the Flight Safety Foundation,\textsuperscript{298} the European Aviation Safety Agency (EASA),\textsuperscript{299} the NLR Air Transport Safety Institute,\textsuperscript{300} AirSafe.com, Planecrashinfo.com, the Australian Transport Safety Bureau (ATSB)\textsuperscript{301} and the Australian Bureau of Air Safety Investigation (BASI).\textsuperscript{302} All operate in developed countries or in regions of developed countries.

Their roles are similar but subsidiary to that of ICAO and they contribute statistics to ICAO’s global accumulations. They are interesting to examine in the context of this study because they all work slightly differently and take slightly different approaches to reach similar objectives.

Thus, the statistical reports of all the organisations have been studied in addition to the voluminous and very informative material published by ICAO. They make for very interesting and illuminating comparisons with the scarce statistics available about passenger vessel accidents.

\textsuperscript{297} ICAO Safety Report, Ibid. Page 17.
\textsuperscript{298} Flight Safety Foundation. www.flightsafety.org
\textsuperscript{299} European Aviation Safety Agency. www.easa.europa.eu
\textsuperscript{300} NLR Air Transport Safety Institute. www.nlr-atsi.nl
\textsuperscript{301} Australian Transport Safety Bureau. www.atsb.gov.au
\textsuperscript{302} Bureau of Air Safety Investigation. www.basi.gov.au

<table>
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<td>Average fatalities per accident</td>
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Table 4.1. A comparison of fatal accidents involving passenger aircraft and passenger vessels from 1 January 2000 to 31 December 2015. The aviation figures were obtained from the Flight Safety Foundation303 and the passenger vessels from the BMPVA database.304 The author contends that the real passenger vessel fatality numbers are about 50% higher than shown here.

Very importantly, the aviation accident and fatality statistics show a significant downtrend over the past sixteen years by both measures. This, generally, continues the improving trend that has been evident over more than three decades. The current risk of dying in a commercial jet airliner accident in almost all parts of the world is now so small as to be practically non-existent.

In theory, because ships travel at about four per cent of the speed of aircraft and operate in two dimensions, rather than three, ferry and tourist boat travel should be even less risky. The fact that it is not so reflects very badly on IMO, the national and regional governments involved as well as the owners and operators of the vessels concerned.

303 Flight Safety Foundation, Ibid.
304 Appendix A, Ibid.
The comparison above is obviously somewhat general but it has been made in a very deliberate effort to compare “apples with apples” as far as possible. All involved fare paying passengers and extraneous factors such as hijackings, terrorism and people smuggling activities have been excluded. As with so many of the statistics associated with fatal ferry accidents, it is emphasised that the figures, while incomplete, are most likely to be very conservative. In reality, the ferry fatalities are estimated to be as much as 50 per cent higher than shown here (See Chapter 2). Given the source of the aviation accident figures and some cross-checking against other databases mentioned above, it is believed that the aviation figures are distinctly more accurate.

Aviation fatalities are in continuous downtrend but ferries, while varying from year to year, have remained near constant when averaged over the whole sixteen-year period since the widespread adoption of the Internet from about 1 January 2000. Of course, because of significant data deficiencies, it is impossible to know accurately the trends in ferry fatalities.

4.4.2. Continually improving aviation safety performance.

Nevertheless, for all its deficiencies, the comparison quite clearly illustrates important trends both in the outright comparison between passenger aircraft and passenger vessel safety and in the continuing improvement in the safety performance of the commercial aviation industry. Obviously and fundamentally, thus far in the Third Millennium, it is considerably more dangerous to travel by ferry than by commercial passenger aircraft.

305 Compare Figure 4.2. with Table 4.1. and Figure 1.2.
This reality raises an interesting conundrum. If it is so much more dangerous to travel by ferry than by airliner, why has so much more research effort and statistical and behavioural analysis been directed at airliner accidents rather than at their ferry counterparts? Could it simply be because wealthier people tend to travel by air and poorer ones by sea? Could it be because, unlike aircraft manufacturers, many, but not all, ship and boat builders take very little interest in their products after they have been delivered to their first owners and even less when they have passed to second and third owners? Is it because many, but again, not all, ship and boat builders tend to construct „one-off“ vessels and have little or no brand or reputation to protect? Or, is it simply because, outside the more developed countries, no one really cares?

Whatever the answer, all the research effort and money directed at the study of aviation safety provides the researcher into maritime safety with much in the way of both ideas and “benchmarking” opportunities. It offers almost endless ideas as to how passenger vessel safety could be improved as well as almost innumerable proven examples as to how to do so. The large numbers of both small and major safety improvements made by the aviation industry and its global, regional and national regulators provide many of the keys to making passenger vessel travel very much safer.

Despite what Mr Chester wrote above, the information gathering and analysis undertaken globally by the aviation industry is incomparably better and more useful in efforts to improve safety than that of any other transport sector. That intelligence gathering effort is enhanced by the competition that exists between the various government and commercial organisations that are involved with it. Above all, the record of ICAO highlights what could be achieved by IMO if it were to follow ICAO’s example. An abundance of data makes achieving reforms much more likely than where such data is scarce.

Even if IMO possesses similar information related to maritime safety, which is very doubtful, it certainly fails to make it widely available. ICAO is proactive and positive in its intelligence gathering and dissemination. Unfortunately, IMO is not. This is one of a number of related reasons why the safety record of aviation has improved significantly since 1980 while that of ferries, generally, has not.

4.5.1. IMO's inadequate ferry safety intelligence data.

The author has examined IMO’s GISIS database and found it lacking in useful information. He has corresponded with Mr Lee Adamson, Head – Public Information Services of IMO, to question that information deficiency and to offer assistance in providing more. Mr Adamson’s response was: “…the problem with that idea is that it is the Member states’ own database; we just host it for them, We don’t have any authority from them to add data from any other source”.

306 Email correspondence between the author and Lee Adamson, Head – Public Information Services, IMO, London, June 2016.
Again, we return to the problem of IMO being unwilling, uninterested in or unable to interfere in the internal affairs of sovereign member states. Are those states trying to conceal something? This also tends to confirm the fact that the Baird Maritime Passenger Vessel Accident database is the most comprehensive and accurate available. 307

In its Secretary-General's Report on Oceans and the Law of the Sea, 2008, IMO defined its mandate thus, under the heading, Maritime Safety and Security – Functions and current Activities of IMO:

MANDATE OF IMO

Since 1959, the International Maritime Organization (“IMO”), as the sole United Nation’s specialized agency exclusively devoted to maritime affairs, has been providing a forum for co-operation among Governments in the field of governmental regulations and practices relating to all kinds of shipping engaged in international trade, facilitating the adoption of comprehensive multilateral treaties for a wide range of technical measures and, in particular, the adoption of the highest practicable standards, designed to enhance safety, security and efficiency in shipping engaged in international trade. 308

That very lengthy sentence encapsulates the problematic nature of IMO”s involvement with ferry safety. The key words are “engaged in international trade”. The problem is that practically all (at least 93%) fatal ferry accidents have occurred on domestic rather than international voyages. 309 Of the 681 fatal ferry accidents recorded in the BMPVA database, only 47 or fewer than seven per cent occurred on international voyages. 310

So, while IMO may well have, as it claims, 167 sovereign states as members, it is doing very little to inform itself of the extent of the domestic ferry fatality problem in developing countries. Nor is it doing anything constructive to reduce or eliminate that problem. Its reluctance to collect or even evince interest in the statistical data describing the extent and causes of developing country domestic ferry accidents is symptomatic of a very regrettable malaise. That, combined with a similar reluctance on the part of the national governments of the most dangerous countries for ferry travel represents a very significant component of the total problem.

4.5.2. Impressive, well-documented improvements in oil tanker safety.

Distinctly contrasting with IMO”s apparent lack of interest in domestic ferry safety problems has been its serious, constructive and continuing efforts aimed at improving the safety of oil tankers. Those efforts have largely been

307 Appendix A, Ibid.
309 Refer to Appendix A, Ibid for details.
310 Appendix A, Ibid.
made in conjunction and co-operation with INTERTANKO, the international tanker owners association as well as flag and port states. Given the heading of its background paper on Maritime safety/Oil Tankers, *Tanker safety – preventing accidental pollution*, it could well be asked if IMO’s focus is more on oil pollution prevention than on ferry fatality prevention, on pollution rather than people?\(^ {311}\)

The measures described in that document are thorough, detailed and have been very widely and effectively implemented in co-operation with industry, flag and port states. They have led to a remarkable reduction in both tanker accidents and their resulting pollution since the early 1980s.\(^ {312}\) Despite the numbers of oil tankers more than doubling from 1970 until 2007, the number of oil spills annually reduced from 120 at their peak in 1974 to fewer than ten in 2007, a 93% reduction.\(^ {313}\)

![Figure 4.2. Reduction in numbers of marine oil spills from tankers compared with the number of tankers in service (from www.worldoceanreview.com/ITOPF/Fernresearch).](image)

This was achieved through a concerted campaign of awareness, education, training, vessel design and construction improvement, procedural improvement, regulation and rigorous enforcement and punishment. It was obviously very effective and provides another proven template for the kinds of measures that would significantly improve ferry safety.\(^ {314}\)

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\(^ {311}\) For a summary of IMO’s substantial and constructive work on tanker safety, refer to *Tanker safety – preventing accidental pollution*, www.imo.org/en/Ourwork/Safety/.


\(^ {313}\) See Figure 4.2. from www.worldoceanreview.com/en/wor-1/pollution/oil/.

\(^ {314}\) Details of effective techniques may be obtained from, IMO, *Tanker safety*, Ibid; and, Unknown, *A summary of tanker safety improvements already announced since 2012,*
A useful comment on this success was made in an article *Statistical analysis of ship accidents and review of safety level.* The authors stated: “A remarkable example in this respect is the improvement of safety of tanker operations after year 1990… the introduction of new regulations and guidelines, of safety codes and improved crew training schemes which all contributed to a drastic reduction of accident frequencies thereafter…” This was very well illustrated using a graph showing a “Timeline of navigational accident rates vs. Introduced international maritime regulations, safety guidelines and codes”.

Ironically, perhaps, but tellingly, IMO’s GISIS database contains considerably more comprehensive data on oil tanker spills than on ferry accidents. INTERTANKO also has a very comprehensive database on the subject that has been used very effectively in the promotion of tanker accident reduction. It must be asked, then, that if IMO has been so successful in its campaign to prevent pollution from oil tankers, why it has been so dilatory in its efforts to improve ferry safety?

### 4.6.1. Useful road safety statistics in the developed world.

Obviously, road safety statistics must be kept in perspective. There are hundreds of millions more road vehicles in existence than there are aircraft or commercial vessels, particularly ferries. The exact numbers are impossible to calculate, except in the case of aircraft, but the relativities are common knowledge. So, it is only possible, practically, for the purpose of this thesis, to use the road accident figures from developed countries. In most less developed countries such figures are not compiled comprehensively if they are kept at all.

Ironically, however, Ralph Nader in his seminal *Unsafe at Any Speed*, published in 1965 complained of the paucity of road accident statistics available at that time. His very timely and influential work strongly criticised the approach to safety of the American car industry and its regulators. It undoubtedly led to very significant improvements in road safety that commenced with the compiling of significantly more comprehensive, focused and useful data in the developed countries at least.

The developed country statistics, then, especially the trends that they reveal, are useful. Mostly that is because they highlight the successes and failures of the various international, national and regional road safety enhancement campaigns that have been attempted over the past half-century. In most developed countries those campaigns have been notably successful overall.

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316 Refer to GISIS at [www.imo.org](http://www.imo.org).

317 There are a number of significant parallels between cars then and ferries fifty years later. See Nader, R. *Unsafe at Any Speed*, PB Special, New York, 1965.
Despite rapidly and significantly increasing numbers of vehicles, the absolute numbers of accidents, injuries and fatalities have declined and continue to decline substantially.

The Organisation for Economic Cooperation and Development (OECD), World Health Organisation (WHO) and many national governments produce excellent statistics recording what has happened in developed countries. Less developed countries are less forthcoming but a useful global comparison utilising WHO statistics is shown in Appendix B.318

4.6.2. Data shows effectiveness of „carrot and stick“ approach.

Those successes provide us, in addition to those achieved by the aviation industry and oil tanker sector, with proven techniques and accurate benchmarks that can be applied directly to the passenger vessel industry. They have incorporated both “carrot and stick” approaches in that vehicle drivers, tanker captains and air pilots are encouraged through educational and propaganda programmes to behave sensibly. On the other hand, a system of penalties for bad behaviour, usually in the form of fines, loss of licence or even imprisonment, has been applied to remind such people of their responsibilities.

For vehicle drivers, for example, the improvements have started with better driver education and stricter licensing requirements. Stringent drink and drug driving regulations are applied with frequent spot checks carried out. Speed limits are rigorously enforced as are rules banning the use of mobile telephones while driving. Vehicles above specified ages are checked for roadworthiness. Drivers and passengers are required to wear seatbelts at all times.

The comparable aviation regulations are even more stringent and more rigorously applied. Pilots are required to be regularly checked for health and fitness, as are the aircraft they command checked carefully for airworthiness.319 Much the same, as described in the above mentioned IMO publication *Tanker safety*, applies to oil tankers and their captains.320

At the same time, the structural, operational, fire and evacuation safety of aircraft and road vehicles has been improved significantly. Seat belts were required to be fitted to vehicles in most countries during the 1960s and 1970s. Predicted crumple rate structures were introduced soon after. Then came much-improved tyres, brakes and suspensions to the point that during the 1980s and beyond, vehicle safety became a major selling point. Vehicle manufacturers started to compete on the safety of their products more even than on their appearance or performance. In the 1990s air-bags, then multiple

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319 In all jurisdictions.
320 IMO, *Tanker safety*, Ibid.
air-bags, became compulsory as did anti-skid braking systems and much more.\textsuperscript{321}

Another important contributor to improved road safety in developed countries has been the significant improvements in the roads themselves in terms of width, surfaces, curvature and banking. Road infrastructure such as lighting, signage and safety barriers has also been substantially improved. Similarly, air traffic control technology and procedures are continually being improved.\textsuperscript{322} It could also be fairly claimed that marine weather forecasting has become impressively accurate and timely.

These kinds of structural, equipment, infrastructural and operational improvements and requirements obviously still have a long way to go in the ferry industry, particularly in developing countries, but at least the aviation, oil tanker and road sectors have set an obvious course for it to follow. They have all contributed to a very significant reduction in the road accident and fatality rates in more developed countries as the statistics presented below clearly show.

The psychology profession has devoted considerable study to these aspects of human behaviour that could, presumably, be adapted to ferry operations. Its analysis and approaches to primary, secondary and tertiary aspects of safety are well described in \textit{The Oxford Handbook of Prevention in Counselling Psychology}.\textsuperscript{323}

The road safety equivalent of ICAO is IRTAD, the International Traffic Safety Data and Analysis Group. It is a permanent working group of the Joint Transport Research Centre of the OECD and the International Transport Forum. Its influence clearly illustrates the imperative of having high quality data and statistics as the basis of any campaign or movement to change human behaviour. There is an obvious need for an IRTAD for the global passenger vessel industry.

The IRTAD/International Transport Forum “Road Safety Annual Report 2015” offers considerable encouragement to this thesis.\textsuperscript{324} The first paragraph of its Executive Summary states: “The number of road fatalities declined by 42% overall between 2000 and 2013 in the 32 countries in the International Road Traffic and Accident Database (IRTAD) for which data are consistently available”\textsuperscript{325}

It continued: “The IRTAD countries with the lowest road mortality rates are located in Europe: Sweden and the United Kingdom recorded fewer than three fatalities per 100,000 inhabitants in 2013”. However, it noted, more

\textsuperscript{321} Described in \url{www.who.int/violence_injury_prevention/road_traffic/strategies/en/}.
\textsuperscript{322} Details in ICAO, \textit{2011 State of Global Aviation Safety}, Ibid.
\textsuperscript{325} Ibid. P. 11.
depressingly, that: “Also, road crash fatalities in IRTAD countries only represent a small share (6%) of the 1.3 million global road deaths. A full 90% of casualties occur in low and middle-income countries”. A very similar situation to that prevailing with ferries except, of course, that there are about 400 times as many road crash fatalities as ferry fatalities. Indeed, traffic accidents kill more people each day than do passenger vessel accidents in a year.

As shown earlier in this presentation with passenger vessels, however, IRTAD is well aware that reporting rates in various countries are not equal. Indeed, it went to considerable trouble to try to understand the extent of that problem in a study conducted in 2007. The findings of that study were published in an IRTAD Special Report, *Underreporting of Road Traffic Casualties* that was released by the OECD in June 2007. It is a most interesting report that recognises and offers some solutions to the problems of data collection described in Chapter 2.

As mentioned above, the WHO has compiled an illuminating list of countries by traffic-related death rate which compares the road traffic accident fatality statistics for all the UN member states. Too long to reproduce here, it is incorporated as Appendix B. It compares road fatalities per 100,000 inhabitants per year; road fatalities per 100,000 motor vehicles; road fatalities per 1 billion vehicle-km; and, total fatalities latest year.

It shows some interesting disparities. For example: Only one per cent of the world’s registered cars produce 16% of the world’s road traffic deaths. A quarter of the world’s road traffic deaths occur among motorcyclists (23%), pedestrians (22%) and cyclists (5%) with 31% among car occupants and the remaining 19% unspecified.

The risk of dying as a result of a road traffic injury is highest in the African region (An increasing annual rate of 26.6 per 100,000 population), and lowest in the European region (A decreasing annual rate of 9.3 per 100,000 population). Such figures coincide remarkably with the geographic analysis of passenger vessel fatalities in Chapter 2.

The Australian Government Department of Infrastructure and Regional Development has presented the OECD statistics in a useful format. It compares the annual road deaths per 100,000 population of OECD nations and Australian states and territories and illustrates the disparities that exist within even a relatively homogenous and wealthy federation, albeit with a wide geographical, cultural and climatic spread and varying road regulations and enforcement efforts (See Graph 4.1. below).

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327 Appendix B, Ibid.
The OECD median number of road deaths per 100,000 population per annum is five (See Graph 4.1 below) but the comparable figures for Bangladesh are 13.6, D.R. Congo is 33.2, Indonesia is 15.3, Philippines is 10.5, and Tanzania is 32.9.\textsuperscript{329} Obviously, those developing countries have far fewer vehicles per head of population than do OECD member countries. So, let us compare those countries on the basis of fatalities per 100,000 motor vehicles. Australia is roughly in the middle of the OECD range in terms of annual road fatalities per 100,000 motor vehicles. Its figure on that measure is 7.3. Comparing Australia with our five developing countries that are most dangerous for ferry travel, we have figures of 1,020.6 for Bangladesh, 6,405.4 for D.R. Congo, 36.7 for Indonesia, 135 for The Philippines, and 1,073.7 for Tanzania.\textsuperscript{330}

These figures, particularly for the African countries and Bangladesh are frightening and serve to highlight the cultural and resulting behavioural differences between such developing countries and the developed member countries of the OECD. Their road fatality records, while much higher, are roughly proportional to their passenger vessel fatalities as compared with developed countries. Their approaches to road safety culture and maritime safety culture are distressingly similar.

As can be seen below, most of the OECD nations have achieved impressive success in reducing their road tolls. They have developed many proven techniques that enable them to do so. Many of those are not necessarily costly. Why then, if so many people in developing countries can afford to buy and operate vehicles, is their safety record so appalling?\textsuperscript{331} Why can they not apply those same simple, low cost techniques to reducing the horrifying fatality rates in their countries?

The same question can well be asked of ferry and tourist boat owners in those same countries. This dichotomy between rich and poor countries exposes a cultural or attitudinal problem that appears to be more significant than simply the rather more obvious problem of poverty and its resultant malnutrition. It will be considered in more detail in Chapter 5.

Such data, combined with the WHO statistics in Appendix B, confirm the problem of traffic accident fatalities in poorer countries that essentially parallel those of ferry accidents in the same countries. More encouraging figures come, again from the OECD, which show the strong but steady decline in road accident fatalities in a selection of nine developed nations.\textsuperscript{332}

\textsuperscript{329} Appendix B, Ibid.
\textsuperscript{330} Ibid.
\textsuperscript{331} Refer also to Appendix B to compare OECD with non-OECD statistics.
4.6.3. Road Deaths per 100,000 population 2013 OECD nations and Australian states/territories.

Graph 4.1. Road deaths per 100,000 population – OECD nations and Australian states and territories 2013 (OECD/Australian Government Department of Infrastructure and Regional Development).
4.6.4. Decline in Road Accident Fatalities 1970-2014
Selected OECD Member Nations.

Graphs 4.2. Steady reduction in road accident fatalities per million inhabitants from 1970 to 2014 in nine developed OECD member nations (OECD).

Clearly, these nine developed countries have made impressive improvements over the 45 year period shown. They show what a relentlessly applied effort can achieve. Most have seen their road accident fatality numbers decline by around 80 per cent over that period. Between 2004 and 2013, for example, the OECD median rate fell by 51.6 per cent. The rates and degree of improvement are similar although the starting points were quite different. While it has certainly improved, the United States stands out as being far worse than its developed country peers. Its road accident fatalities per million inhabitants rate is almost exactly double that of France, for example. The reasons for that will be examined in Chapter 5 where cultural factors are described.

4.7. Aviation, oil tanker and road safety successes provide grounds for optimism.

Overall, though, and despite one or two exceptions, the declining trends in road accident fatality numbers in developed countries are very encouraging. They provide a basis for optimism such that if similar techniques and approaches were to be applied to domestic ferry operations in developing countries, worthwhile reductions in the numbers of both accidents and fatalities could be achieved.

333 OECD – Road accident deaths, Ibid.
So, too, do the very significant reductions in oil tanker pollution incidents globally which, encouragingly, have involved a significant IMO contribution.

Aviation safety successes provide even greater grounds for optimism because they have been achieved on a practically global basis. They are also more similar to ferries in an operational sense than are private car or taxi travel, if only because each aircraft or ferry tends to carry many more passengers than a car.
Chapter 5

Behavioural, cultural, economic, educational and geographic factors

*It is clear that poverty and its resulting malnutrition are the most significant over-riding contributing factors in domestic ferry accidents and the fatalities that arise from them*

5.1.0. Economic considerations.

5.1.1. Poverty, the over-riding factor.

It is clear that poverty and its resultant malnutrition are the most significant contributing factors in ferry accidents and the fatalities that arise from them. The five nations with the highest fatality rates are all comparatively poor and have performed consistently badly from 1966 to 2015 with 60 per cent of the world’s known fatalities. They have shown a very slight relative improvement in the most recent sixteen-year period when they produced 59 per cent of the known fatalities.\(^3\)

Obviously, none of those five countries: Bangladesh, DR Congo, Indonesia, Philippines and Tanzania, could be considered “developed” but, nor are they at the absolute bottom of the World Bank’s gross domestic product (GDP) per capita rankings. Indeed, with GDP per capita figures in 2015 of USD 3,347 and USD 2,900 respectively, Indonesia and the Philippines must be classed as “developing” rather than “undeveloped” or “least developed” countries where the per capita GDP was less than USD 955 in 2015.\(^4\) That compares with a GDP per capita of USD 35,783 in the 35 developed nations that are members of the OECD.\(^5\)

Of course, by the same ranking, Bangladesh, DR Congo and Tanzania are considerably poorer at USD 1,212, 456, and 865, respectively. DR Congo is very much in the World Bank’s “Low Income” bracket and Tanzania can only be classed as a “least developed country”. While Bangladesh’s per capita income is rising rapidly at 5.3 per cent per annum, it is a country that is developing from a very low base.\(^6\)

There are other nations with similarly lamentable records of ferry accident fatalities. China, Egypt, Haiti, Senegal and Myanmar (formerly Burma) have been responsible for a further 15 per cent of the world’s known ferry fatalities in the fifty years to December 2015. The worst ten countries, therefore, have been responsible for more than 76 per cent, probably 80 per cent, of the world’s ferry fatalities over that period.\(^7\) The worst twenty countries have been responsible for 90 per cent of

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\(^3\) See Figures 1.3 and 1.4 in Chapter 1, above.
\(^5\) www.data.worldbank.org/indicator/NY.GDP
\(^6\) www.oecd.org/about
\(^7\) World Bank, Ibid.
\(^8\) Appendix A, Ibid.
fatalities over that period. Generally, their problems are quite similar in that they are fundamentally economic, cultural, geographic, educational and behavioural. Poverty and its almost inevitably resultant malnutrition, corruption and fatalism are at its root. All are also unusually dependent on ferry transport for geographic reasons.

The Economist described the causal connection well in an April 2012 article: Social status and health - Misery index. It summarised it that “Low social status is bad for your health. Biologists are starting to understand why”.

Ironically, of the ten worst countries for ferry fatalities, two of them, China and the Philippines are among the world’s four leading shipbuilding nations in terms of construction gross tons. Bangladesh, too, has a rapidly developing shipbuilding sector. They should be capable of designing and building safer ferries.

Myanmar has more recently become known as a very dangerous country for ferry travel. As the nation was essentially closed under a military dictatorship for five decades until 2011, very little information about ferry or other accidents was forthcoming from 1962 until 2007. We do know that ferry accidents in Myanmar have been responsible for 2.1 per cent of the world’s total accidents and at least 2.6 per cent of all ferry fatalities. However, extrapolating from the final nine years for which we do have data, it seems likely that Myanmar would have been the scene of at least six per cent of the world’s ferry fatalities over the past half century. That would make the total percentage of fatalities occurring in the ten worst countries closer to 80 than the 76 per cent mentioned above.

Myanmar is a neighbour of and is economically, geographically and climatically, if not culturally, similar to Bangladesh so it could be expected to have similar ferry safety problems. It should be included in any table of the worst countries for ferry travel despite the absence of data because of strict media controls, which prevented the publication of „bad news“ for most of the period studied.

It is inconceivable that there could only have been three fatal accidents in Burma/Myanmar from 1966 until 2007. This is especially so given that the same source reveals 12 „known“ fatal ferry accidents producing 584 fatalities in the eight years from 2007-2015. That is an average of 1.5 accidents per annum and an average of 49 fatalities per accident.

Adding Myanmar, allowing for the absence of news until about 2007, to the previous worst ten countries makes it highly likely that at least 80 per cent of ferry fatalities occurred in the ten worst performing countries. It is notable, and probably not coincidental, that all ten of those countries spent at least some time under colonial

339 Ibid.
343 Appendix A, Ibid.
345 Appendix A, Ibid.
rule. They have many other economic, cultural, social, geographic and climatic similarities.

5.1.2. The ten worst countries for ferry fatalities.

Map 5.1. The world’s worst ten countries for ferry fatalities. They have consistently been the location of at least 80 per cent of the ferry fatalities over the past half century. Their main common factors are poverty and archipelagic, lakeland or riverine geography (Appendix A, BMPVA database).\(^{346}\)

\(^{346}\) Appendix A, Ibid.
5.1.3. Fatal ferry accidents by country.

Table 5.1. Known Fatal Ferry Accidents by country from 1966-2015. Total 675. It is estimated that, because of the paucity of data and even press reports prior to 2000, these figures probably represent fewer than 66 per cent of the actual total. Since 2000 reporting has improved but with Myanmar, for example, the available statistics from between 1966 and 2008 are neither logical nor comprehensive. Much the same applies to China prior to about 1992. It must therefore be emphasised that the data presented here relates only to „known” accidents and fatalities. It is strongly believed that there have been a considerable number of „unknown as in un-reported or un-recorded accidents (Appendix A, Baird Maritime Passenger Vessel Accident database).\(^{347}\)

\(^{347}\) Appendix A, Ibid.
5.1.4. Ferry fatalities by country.

<table>
<thead>
<tr>
<th>Country</th>
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Table 5.2. Known Total Ferry Fatalities by Country 1966-2015. Total 58,764. Note: It is estimated that because of the paucity of available data these figures represent probably only about 66 per cent of the real total. The country proportions, though, except for Myanmar, are considered to be considerably more accurate (Appendix A, Baird Maritime Passenger Vessel Accident database).

Considerable care is required when analysing these figures. For example, Estonia is highlighted in fourteenth place as the result of just one accident with the capsize and sinking of the conventional monohull Ro-Pax ferry Estonia in 1994. By contrast, Senegal appears to have experienced only one major accident with the capsize and sinking of the conventional Ro-Pax ferry Le Joola in 2002. There is no evidence of any other significant ferry accidents in Estonia but considerable anecdotal evidence of numerous fatal accidents in Senegal.

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348 Appendix A, Ibid.
349 Refer to 5.13.
5.1.5. Fewer fatalities arise from each developed country accident.

Poverty probably should not, of itself, always be accompanied by malnutrition, fatalism, corruption, low educational standards, poor regulation and inadequate enforcement. However, the correlation is consistently and remarkably close as Table 5.3 clearly shows. Accidents do happen in richer countries and on better maintained and operated vessels but they happen far less frequently and their consequences are usually far less deadly than in poor countries. As described in Chapter 7, evacuation facilities, lifesaving equipment, SAR services and, even loading and crowd disciplines are generally considerably superior in developed countries.

Nor are richer countries immune from corruption. The Sewol inquiry clearly describes instances of that.\textsuperscript{350} Indeed, the BMPVA database shows that from 1966 to 2015, 24.6 per cent of fatal ferry accidents occurred in the 35 OECD member countries but they accounted for only six per cent of the total fatalities over the same period.\textsuperscript{351} Thus, developing countries require far more urgent reform and will benefit most from that reform. Thus, it is obvious that those countries are where the ferry accident prevention process should commence and where international support is required and where it will be likely to have the best results.

5.1.6. Domestic voyages are much more dangerous.

In its Safety and Shipping Review 2016, Allianz Global Corporate & Specialty, an insurer, commented thus on passenger ship safety: “Significant concerns remain, particularly around non-international voyages. Some Asian routes are many years behind recognised international standards as evidenced by a number of recent ferry losses in South East Asian waters. Frequent sailings and profit pressures mean scheduling necessary maintenance can prove challenging”.\textsuperscript{352} The BMPVA database confirms that. It shows that 93 per cent of ferry fatalities have occurred on domestic voyages.\textsuperscript{353}

Travel advisories published by the governments of western developed countries such as Australia, Canada, the United Kingdom and New Zealand give similar advice to their citizens who are travelling abroad.\textsuperscript{354} For each of the five most dangerous countries, that varies from: “Exercise a high degree of caution” for Indonesia, the Philippines and Tanzania; to “Reconsider your need to travel” for Bangladesh and DR Congo. In addition to the threats of crime, terrorism, kidnapping, traffic accidents, disease and political violence, all warn strongly against travel by boat or ferry. They all urge considerable caution on those who must travel on boats or ferries.

Some travel advisory websites and guide books also recommend that tourists take great care when travelling by ferry in certain countries, most particularly the Philippines and DR Congo. The Silent Gardens website, for example, mentions that: “There are ferries in very good conditions (sic) and there are ships where only the

\textsuperscript{350} Refer to 3.24.
\textsuperscript{351} Appendix A, Ibid.
\textsuperscript{353} Appendix A, Ibid.
\textsuperscript{354} For example, www.smartraveller.gov.au and www.travel.gc.ca
paint prevents the rust from breaking apart”. The website also strongly urges its readers to study the weather before travelling on Filipino ferries.

Obviously, those dangers are just as real for local citizens as for foreign tourists. Indeed, they are probably more so as tourists can usually afford superior and safer travel vehicles or vessels, if they are available, than can locals.

5.1.7. Despite poverty, potential for reform exists.

All the five worst countries are dangerous for ferry travellers, mostly for similar reasons. However, probably apart from DR Congo, all have considerable potential for reform. Notably, though, two of the worst five countries for ferry fatalities, DR Congo and Tanzania, are also on the World Health Organisation’s ranking of the worst six countries for road traffic fatalities. Indeed, the DR Congo is the worst. Their citizens seemingly can afford large numbers of cars to the point of considerable congestion in their major cities.

It would seem reasonable to assume that if the national economy has developed to the point that many citizens can afford cars, then the country should also be able to afford to upgrade its ferries. Such upgrading is being achieved to a limited and mildly encouraging degree in Indonesia, the Philippines, Tanzania and, even, Bangladesh, but there is a long way to go to ensure all vessels in those countries are relatively safe.

Of the sixth to tenth worst countries for ferry fatalities: China, Egypt, Haiti, Senegal and Myanmar, only four can be considered to be really poor. China, obviously, should be capable of significant and rapid domestic organic improvement. Its railway and aviation sectors are now very safe. It is, however, still constrained mainly by the poor country problems of corruption and cronyism as has been shown following the recent major accident involving the Eastern/Oriental Star.

Again, as can be seen in Table 5.3, below, all of those countries, with the obvious exception of Haiti, are enjoying impressive rates of GDP per capita growth. They should, therefore, be capable of self-funding worthwhile domestic reform programs were they to be encouraged and supported rather than largely ignored by IMO.

It is suggested that if IMO were to concentrate on assisting, encouraging and supporting the eight worst performing countries with the greatest potential for reform, that rapid life-saving improvements could be quickly achieved. It would probably be impractical to invest in reforms in DR Congo and Haiti until after worthwhile improvements, such as those suggested in Chapter 10, have been achieved in the other eight countries.

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356 Appendix A, Ibid.
357 www.statista.com/chart4394/the-worst-countries-for-road-traffic-fatalities
358 Refer to 5.25.
5.2.0. Economic, educational, political and cultural comparison.

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<th>Corruption Ranking</th>
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Table 5.3. An economic, political, educational and cultural comparison of the ten worst performing countries with the OECD countries and selected others. Note that about 80% of the ferry fatalities occurred in just ten countries (WorldBank,\textsuperscript{359} OECD,\textsuperscript{360} Transparency International,\textsuperscript{361} United Nations Development Programme,\textsuperscript{362} World Audit.\textsuperscript{363}). * Extrapolated from the figures from the final nine years. **HDI = Human Development Index.

The focus, then, should be on Bangladesh, China, Egypt, Indonesia, Myanmar, The Philippines, Senegal and Tanzania. Even a fifty per cent reduction in fatalities in those eight countries would reduce the annual global death toll by about forty per cent. And, of course, of those, China is wealthy enough to reform itself. Its airlines and railways have very largely managed to do so over the past two decades.

\textsuperscript{359} From https://www.data.worldbank.org/indicators/.

\textsuperscript{360} From https://www.oecd.org/about/.

\textsuperscript{361} From https://www.transparency.org/countries/cpi2015/.


\textsuperscript{363} From https://www.worldaudit.org/corruption/.
5.3.0. **Geographic considerations.**

As to geographic reasons why the ten worst countries perform so badly in comparisons of passenger vessel safety. There are many other developing countries, some with per capita GDPs that are even lower than those of the most dangerous ten. That is where geography is a vital factor.

Examining the maps and brief descriptions of the ten countries described below, it is obvious that they are unusually dependent on water transport. The Philippines and Indonesia are archipelagic to an extreme with a claimed 25,000 islands between them.\(^{364}\) Bangladesh is largely overlain by a massive river delta while the DR Congo is a riverine and lakeland nation, with very few and very bad roads. Tanzania is half surrounded by vast lakes, not to mention big rivers, as well as having major population centres on nearby islands off its Indian Ocean coast.

Indonesia, Bangladesh, Myanmar and the Philippines are prone to natural disasters. Indonesia and the Philippines are located on the Pacific „Ring of Fire“.\(^{365}\) They are in an area of considerable seismic activity with frequent volcanic eruptions, earthquakes and tsunamis.\(^{366}\) The coasts of Bangladesh, Myanmar, Tanzania and the Philippines are subject to severe tropical revolving storms, cyclones or typhoons.\(^{367}\) Numerous ferry accidents have occurred during such extreme weather events although, with reasonable skill, care and modern weather forecasting, mariners can avoid the worst effects of typhoons or cyclones.\(^{368}\) Tsunamis, however, are very unpredictable but they have not yet been blamed for a fatal ferry accident, despite the high probability of some having been caused by the Aceh, or Indian Ocean, tsunami of 2004.\(^{369}\)

The five remaining countries are similarly largely dependent on ferry travel. China has significant large river and canal systems as well as a lengthy coastline and numerous islands. Haiti comprises half an island. Egypt sends large numbers of its citizens across the Red Sea to work in Saudi Arabia and on the Haj pilgrimage and has considerable ferry traffic on the River Nile and Lake Nasser. Senegal is a riverine nation that is bisected by The Gambia, thus necessitating significant amounts of sea and riverine travel. Myanmar has many similarities, except for religion, with Bangladesh.

With roads and railways either impractical or essentially non-existent and air travel generally too expensive for the greater part of their populations, ferries and other boats have become the only economically feasible means of travel in such countries for medium to long distances.

\(^{364}\) World Atlas, [www.worldatlas.com](http://www.worldatlas.com) states that Indonesia comprises 18,000+ islands and The Philippines, 7,100. These figures are supported by [www.travel.nationalgeographic.com](http://www.travel.nationalgeographic.com) and [www.britannica.com/place/Philippines/](http://www.britannica.com/place/Philippines/).


\(^{367}\) [www.jma.go.jp>home>Weather](http://www.jma.go.jp>home>Weather) and earthquakes.

\(^{368}\) Appendix A, Ibid.

\(^{369}\) Ibid.
5.4.0. Cultural and behavioural considerations.

5.4.1. Poverty and corruption are closely related.

Poverty, it seems, is usually accompanied by an absence of democracy. That, in turn, usually leads to commensurately high levels of corruption. All of our ten subject countries score poorly on both measures. World Audit compares 150 nations by measures of corruption and democracy. Indonesia appears at number 77 for corruption and 60 for democracy. The Philippines is 83rd and 55th. Tanzania 103rd and 67th. Bangladesh 122nd and 99th, and DR Congo 139th and 109th. China is 136th and 83rd while Myanmar is 114th and 147th. Senegal, at 51st and 52nd is the best regarded of the ten most dangerous countries for ferry travel. Their rankings are similar, if 10 to 20 places further down the scale, in the table published by Transparency International. It ranks 167 nations. Table 5.3 is revealing.

Those rankings are obviously both subjective and very debateable. Even Transparency International, which is the most forthright of the two organisations, only claims its index to be a “Corruption Perception Index”. The perceptions, though, generally accord with those of the author who has travelled and conducted business in all the countries except Senegal and the DR Congo where his son worked for six months and reported, colourfully, back. They give a useful indication of attitudes to public safety, regulation and enforcement.

In a recent article posted on Linkedin, maritime commentator Patrik (sic) Wheater referred to what he complained of as a “numbers racket”. He described the expensive problem of Port State Control corruption that affects so many internationally operating cargo ship owners, particularly when operating in Asia and Africa. It seems that “…it is not uncommon for a fee to be extorted at some ports "to help avoid problems". Complaints by ship owners, apparently result only in buck passing. Offering a solution, Wheater suggests, “…we need uniformity and harmonisation. We need an internationally agreed ship inspection and detention regime…” Much the same situation, obviously, also applies to ferry safety inspections.

A blatant example of this was described in an October 2016 report in The Australian newspaper: “Indonesia promised a complete overhaul in the bureaucracy after five transportation ministry officials were arrested on suspicion that they systematically extorted sailors and shipping companies in exchange for ship and sailing permits”. This situation has many similarities with that pertaining to ferry safety regulation and enforcement in all the countries described here. Again, IMO shows a similarly unhelpful reluctance to become involved.

Another cultural problem that is rife in all the ten worst countries is that of “crony capitalism” which is usually legal but which The Economist magazine describes as happening where industries: “…involve a lot of interaction with the state, or are

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licensed by it…” That is obviously a factor with ferry operations in most of the countries discussed here. The magazine publishes “The cronyc-capitalism index” on which four of the ferry industry’s ten worst countries are listed among the worst twenty nations.374

5.4.2. So, too, are poverty and malnutrition and inadequate education.

As described at length in Chapter 1 (1.8.1.), malnutrition is a direct result and close relative of poverty. It has been shown to retard brain development and reduce the capability for cognitive thinking.375 It is widely regarded as a direct cause of the insidious fatalism that is so widespread in developing countries. These are obviously significant factors in the more widespread inability to avoid accidents in such places. It also handicaps the ability of those so involved to recover from accidents.376

So, too, is the generally low standard of education that is endemic in such countries. It contributes to the inability to avoid accidents and is obviously a close relative of retarded cognitive thinking development. Without at least elementary education, it is very difficult to implement even the most basic of safety training.

While there is little evidence to show improvements in brain development and cognitive thinking in the ferry sector in Bangladesh, for example, the dramatic improvement in life expectancy in that country, described in 5.5.7., offers grounds for some optimism there in the longer term.

5.4.3. Effects of religion and its also resulting fatalism.

In terms of religion: Bangladesh, Egypt, Indonesia, Senegal and Tanzania are predominantly Muslim with some animist, Hindu and Christian influences; the Philippines, Haiti, and DR Congo are predominantly Christian with some Muslim and/or animist influences.377 Myanmar is predominantly Buddhist with some Muslim and animist minorities. A mixed group culturally. While the main religions differ, in all the countries, except for China, the dominant religion appears to be practiced assiduously. All, when combined with actual or relative poverty, and its resulting malnutrition, seem to lead to a severe form of fatalism. The New Oxford English Dictionary defines that as: “Belief in fatality; the doctrine that all events are predetermined by fate”.378 In other words, as God or Allah wills or Karma. It seems that fatalism is an inevitable outgrowth of poverty combined with strong religious beliefs.379

That fatalism would appear to provide little incentive to such people to try to reduce their potential for disaster, disease or other types of tragedy. In the Philippines and

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375 See www.who.int/features/ga/malnutrition/ et al, Ibid.
376 Ibid.
Indonesia, in particular, the author has frequently seen people praying before or soon after boarding ferries. They would arguably be better protected in spending that time learning the location and operating instructions for the exits and the whereabouts of any items of lifesaving equipment fitted to the vessel.

Fatalism manifests itself in a general lack of interest or lassitude that is obvious from the collisions and groundings that so regularly occur in developing countries. Quite simply, very few people seem to care. The videos in Appendix F illustrate this very starkly.\textsuperscript{380} This can also be clearly seen by the general ignorance or absence of care about the waste, filth and “fouling of their own nests” that is practically universal in such countries. The author has visited all countries discussed except for DR Congo, Haiti and Senegal and noticed the enormous and ugly amounts of garbage that fouls the waterways in each. This is symptomatic of the prevailing fatalism and its resulting lassitude. In reality, however, it seems the only effective cure for fatalism is the elimination of poverty and its resultant malnutrition.\textsuperscript{381} That, obviously, will take time.

5.4.4. Irrational passenger behaviour.

Similarly, there is a tendency in many developing countries to abnormal panic or thoughtless mob movement in the event of an emergency. This has frequently led to vessels capsizing and has caused major evacuation problems.\textsuperscript{382} It is not helped by the negligence and “save themselves first” approach exhibited by some vessel officers and crews as in the cases of \textit{Sewol} and \textit{Costa Concordia}.\textsuperscript{383} Both of those accidents, it should be remembered, occurred in developed countries.

Further, passengers can sometimes urge vessel operators to act against their better judgement and against the passengers’ own best interests. The \textit{BMPVA database} records instances in China and Indonesia where passengers have themselves let go mooring lines in an effort to get ferries to depart. In the cases recorded, that action has turned out to be suicidal.\textsuperscript{384}

Passengers have also been known to abuse captains and demand that they not turn back to port in the face of obvious danger. The captain of a sister ship to the \textit{Princess of the Orient}, which sank off the Philippines in September 1998 with massive loss of life, was roundly abused by many of his passengers when he turned back to port in Manila in the face of the storm that contributed significantly to the sinking of the \textit{Princess}. Needless to say, those passengers rapidly changed their attitude when they learned of the sinking.\textsuperscript{385}

\textsuperscript{380} See videos in Appendix F.
\textsuperscript{381} Smith, K. B. & Stone, L. H. Ibid.
\textsuperscript{382} Appendix A, Ibid.
\textsuperscript{383} Ibid.
\textsuperscript{385} Appendix C, Personal email from Commodore Gualterio Dela Cruz, former Chief of the Philippine Coast Guard to the author, 7 October 2016.
5.4.5. Serially offending shipowners.

Another problem is that some ferry owning companies such as Sulpicio Lines, in the Philippines; Rabaul Shipping, in Papua New Guinea; and Al Salam Transport in Egypt, have been serial offenders.\(^{386}\) This, obviously, is a problem of inadequate regulation or enforcement. It is, it seems, a problem in most of the countries considered.\(^{387}\) A 2013 article on the Philippine news website [www.thediplomat.com](http://www.thediplomat.com) described the situation in Malaysia and the Philippines with respect to both ferry and bus travel.\(^{388}\)

Lax enforcement ensures that many companies flaunt any regulations and continue to operate unchecked even after major fatal accidents. Even trials of offenders have been abandoned due to an absence of funding for prosecutions. It seems that may have happened in August 2017 in the case of the manslaughter trial following the *Rabaul Queen* inquiry.\(^{389}\) The BMPVA database is replete with examples of little or no legal action following even very serious accidents.\(^{390}\)

The ten nations discussed are not the worst in the world for poverty, disease, inadequate education, absence of democracy, corruption, excessive faith in deities, or extensive reliance on water transport, but all these factors are common to all except for China. That makes them both somewhat unusual and vulnerable to passenger vessel, particularly ferry, accidents. That combination of factors is undoubtedly why those ten countries have been responsible for about 80 per cent of the world’s recorded passenger vessel fatalities over the past half century.

5.4.6. Human factors far more important than technical ones.

That combination of factors also reinforces the view that passenger vessel accidents are far more the result of economic, educational, cultural and behavioural causes than structural or mechanical ones. The two latter factors are discussed in detail in Chapter 6.

A closer examination of each of the countries concerned shows how those factors are common to each of them and much more so than in any other known country. It also leads to the conclusion that, probably apart from the DR Congo and Haiti, each of the ten most dangerous countries is achieving some improvements in ferry safety, albeit disappointingly slowly. They do, however, show real potential for such improvement if they can be encouraged and supported by external organisations such as a re-invigorated IMO, INTERFERRY, the Worldwide Ferry Safety Association, wealthier neighbouring nations and the classification societies.

Such external encouragement and support, while expensive, can make for remarkable and very beneficial change. The Australian led Regional Assistance...
Mission to Solomon Islands was an excellent example of what can be achieved when wealthy and benevolent neighbouring nations such as Australia and New Zealand make a determined effort to revive a so-called ‚failed state”. That 14 year and USD 2.25 billion project was impressively successful.\textsuperscript{391} It offers an encouraging and useful model of what could be done, on a much smaller scale, to improve ferry safety in hitherto dangerous developing countries.

5.5.0. Bangladesh.

Map 5.2. Bangladesh showing that a large proportion of the country is overlain on a major river delta. Its Bay of Bengal coast is frequently battered by significant tropical cyclones (University of Texas).

5.5.1. Geography necessitates extensive ferry travel

The major Himalayan sourced rivers, the Padma, Meghna, Brahmaputtra, Ganges, Dharla, Teesta and Jamuna, among others, flow through much of the very fertile alluvial plains of Bangladesh as they empty, via a convoluted, island strewn, delta, into the Bay of Bengal. They make road and railway building difficult and expensive but they facilitate cheap “sheltered waters” ferry travel. Thus the country is a major centre of ferry operations, probably the world’s busiest. It has been estimated that about 2,500 registered and the same number of unregistered ferries operate in the
country\textsuperscript{392}. Other estimates suggest there are as many as 12,000\textsuperscript{393} or even 21,000\textsuperscript{394} “motorised” vessels working on the country’s rivers.

Indeed, in 2004, the Bangladesh government estimated that “…the traffic density of the country’s inland waterway network generates about 1.57 million passenger-kilometres per route kilometre of waterway…”\textsuperscript{395} Not coincidentally, it has been one of the world’s two worst countries for “known” ferry fatalities over the past half century.

5.5.2. Scarce official ferry accident data.

Regrettably, official data describing Bangladeshi ferry accidents is scarce to the point of being practically non-existent. Indeed, a 2007 published paper on passenger ferry accidents in Bangladesh claimed that: “No relevant organisation, indeed, maintains a database of all these accidents”\textsuperscript{396} The real situation is likely to be considerably worse than shown in the BMPVA database\textsuperscript{397}.

Other papers by some of the same authors refer to “thorough analysis of past accident data” which shows that, “…the main causes of intact stability failures have been determined: adverse weather conditions and overloading, likely resulting in crowding to one side.”\textsuperscript{398} This supports comments made in Chapters 2 and 3, above. However, this author, while agreeing with the conclusions drawn, doubts the rigour of such analysis because of the scarcity of useful data.

5.5.3. An improving economy.

Despite its considerable actual and potential agricultural, seafood and mineral wealth, the nation of 161 million, predominantly Muslim, inhabitants is comparatively poor with a 2015 per capita income estimated by the World Bank at USD 1,212. While it is generally regarded as enjoying a form of democracy, it is also perceived to be one of the world’s more corrupt societies at positions 99 and 122 respectively on the Corruption Perceptions Index of democracy and corruption published by Transparency International\textsuperscript{399}. It is constitutionally secular but 83 per cent of the population identify as Muslim with 16 per cent being Hindu\textsuperscript{400}. Malnutrition has been a considerable problem until recently.

\textsuperscript{393} Islam, F. Challenge to Establish a Comprehensive, Effective and Sustainable Water Transport Ship Registration, Survey and Inspection Regime, Abstract of paper presented at Interferry Conference, Manila, 2016.
\textsuperscript{396} Ibid, Accident Data Analysis.
\textsuperscript{397} Appendix A, Ibid.
\textsuperscript{399} Ibid, Ibid.
\textsuperscript{400} www.infoplease.com/ipa/. Ibid.
5.5.4. Violent and dangerous but improving.

Bangladesh continues to suffer from religious and political violence as well as high crime levels and a bad record of industrial and road accidents. Diseases such as malaria, cholera, tuberculosis and typhoid were once rife but have been significantly reduced. Occupational health and safety, it seems, is a little known concept. Workplace accidents, particularly fires, are frequent and can be very deadly. The coast and near coastal rivers have frequently been affected and damaged by seasonal tropical cyclones. A number of fatal ferry accidents have been blamed on the effects of such weather events. The Bangladesh coast was also affected by the tsunami caused by the Aceh earthquake of December 2004 although only two people were known to have died as a result of it.

The water in the country’s rivers and along the coast is, from the author’s observation and independent reports, dangerously polluted. That is a further danger for anyone falling into the water following a ferry accident. Despite the pollution, large numbers of sharks and crocodiles are known to inhabit the estuaries and coast.

Since gaining independence from the United Kingdom in 1947 and separating from India and, later, Pakistan, Bangladesh has suffered significant political instability often accompanied by violence. This has not, however, prevented its energetic and ambitious people from steadily improving their standard of living. Indeed, in the 33 years from 1980 until 2012, the life expectancy of the average Bangladeshi improved remarkably from 49 years to 70.

While commencing from a very low base, the country’s GDP has grown at a rate of 5.3% from 1961 to 2015. The country is rapidly industrialising, starting with ship demolition and moving through textile and clothing manufacture, electronics and now ship building. Until recently a major source of national income has been remittances from Bangladeshi workers in the Middle East, Malaysia and Singapore. The recent fall in oil prices has reduced that somewhat.

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401 For details, see WHO, [www.who.int/bulletin/volumes/90/2/](http://www.who.int/bulletin/volumes/90/2/).
403 Appendix A, ibid
404 A good overall description was published ten years after the event on [www.abc.net.au/news/2014-12-24/boxing-day-tsunami-how-the-disaster-unfolded/](http://www.abc.net.au/news/2014-12-24/boxing-day-tsunami-how-the-disaster-unfolded/).
405 WHO, Ibid.
407 Anon. How Bangladesh achieved its “amazing” health statistics, Ibid.
408 World Bank, Ibid.
5.5.5. Export vessels are world class, local craft much less so.

![Image](image.jpg)

*Image 5.1. Ironically, Bangladeshi shipbuilder Western Marine Shipyard has built a number of fine vessels for export. In this case, a substantial looking littoral Ro-Pax ferry to Denmark (WMS pic).*

Rather ironically, given the deplorable safety record of its domestic ferries, Bangladesh has exported a number of very high quality Ro-Pax ferries to Denmark and elsewhere.\(^{410}\) This shows that Bangladesh, or at least some of its shipyards, are building world-class vessels. The shipbuilding industry is expanding and the fact that it is capable of building for export must be encouraging for the local market in the long term.

The country has more than four thousand nautical miles of navigable waterways although even that statistic is rarely cited consistently. That is about three times as long as its railway system. Most of the local ferries can be observed to be elderly, badly modified, poorly equipped and inadequately maintained. Many are unstable as a result of illegal and unwise modifications. Worse, they are routinely very badly overloaded.\(^{411}\) As described in Chapter 3, paragraph 5.5.2, above, and in the BMPVA database any extant maritime regulations are routinely ignored and properly qualified or even alert crew members are rare.\(^{412}\)

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\(^{410}\) [www.wms.com.bd](http://www.wms.com.bd)

\(^{411}\) Iqbal, K. S. *et al.* Op cit.

\(^{412}\) Appendix A, Ibid.
5.5.6. Few investigations, few trials, rare punishments.

When accidents do occur, there is usually little or no response from government. No investigation. No trial. No punishments. While safety regulations do exist, they are rarely, if ever, enforced as the information sources cited in the BMPVA database so remorselessly record. Any punishments that are imposed are normally little more than a „slap on the wrist“. Search and rescue services are haphazard at best.

The Bangladesh Government is well aware of its problem with ferry safety. It facilitates bureaucratic inquiries into the problem and makes strong statements condemning the activities of the perpetrators. Yet, seemingly, few, if any, reforms are ever achieved. Major and minor accidents continue to occur with obscene frequency.

Unsurprisingly, Bangladesh has, for the past half century at least, been one of the world’s two worst countries for ferry accident fatalities. Collisions, capsizes and groundings are the most common causes of fatal ferry accidents in the country. Two dramatic and horrifying Bangladeshi ferry accidents are shown on video in Appendix F. They starkly illustrate the complete lack of interest in good seamanship and lookout keeping that is unfortunately so prevalent in Bangladesh.

5.5.7. Considerable real potential for improvement.

However, given its rapidly increasing per capita GDP (Table 5.3.) and the existence of at least two world class shipyards in the country, it appears to have considerable real potential for improvement in terms of reducing its number of ferry accident fatalities. Indeed, a handful of modern vessels are reported to have been introduced and more are believed to be on order. The government of Bangladesh is known to be importing modern ship designs for its own fleet. An encouraging development indeed.

Further, given the nation’s dramatic improvement in life expectancy thanks to the combined efforts of the private sector and a number of NGOs, it could be hoped that what has worked so well in the health sector could be adapted to transport. It would seem to be well worthwhile at least studying Bangladesh’s health improvement achievements and how they were achieved.

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413 And, for example, Islam, T. Ibid
415 Islam, T. Ibid.
417 Appendix A, Ibid.
418 Appendix J.
420 Such as a fleet of hydrographic/oceanographic survey vessels designed by Australia’s One2Three Naval architects.
421 www.irinnews.org, Ibid.
5.6.0. China.

Map 5.3. China has a lengthy coastline, many islands and an extensive system of navigable rivers and canals. It is home to a very large number of ferry services, both domestic and international (University of Texas).

5.6.1. Geography facilitates extensive ferry use.

As the map shows, a number of major river systems flow through the eastern half of the country. They are extensively navigable and are utilised widely for both passenger and cargo transportation. There is also an extensive network of canals. All are heavily used, as is the coastal shipping system. There are conventional monohull Ro-Pax ferry services across the Yellow Sea and Bo Hai Gulf and to the numerous populated islands that dot almost the entire coastline. A number of very serious accidents have involved such conventional monohull Ro-Pax ferries many of which have been elderly imported ships.

422 Appendix A, Ibid.
5.6.2. Very rapid economic development.

China, has developed very rapidly over the three decades to 2016. It has become a comparatively wealthy country with a GDP per capita of almost USD 8,000 in 2015. However, it remains distinctly undemocratic and corrupt as can be seen in Table 5.3.

The country has a significant shipbuilding industry in fact, the world’s largest, and is a major exporter of ships. That industry is supported by numerous globally respected naval architecture and marine engineering schools. It has similarly numerous nautical colleges that train and educate seafarers at all levels. It should be capable of doing much better in terms of safety. Of course, despite its new wealth, it continues to suffer badly from the poor country problems of corruption and cronyism.

5.6.3. Accidents mostly involve domestic ferries.

China’s ferry accidents have almost entirely involved domestic ferries. They have, despite the nation’s increasing wealth, mostly been due to all the poor country causes described throughout this chapter. While most aspects of life in China have improved dramatically, mainly thanks to a rapid rise in per capita GDP the country continues to experience major fatal ferry accidents. The latest involved the Eastern/Oriental Star that capsized and sank in the Yangtze River in June 2015 killing 455, mostly elderly, local people.

Part of the problem in assessing the Chinese ferry safety situation is that, until the late-1980s, China was largely closed to outside news services. The local Chinese Communist Party was unlikely to publicise deficiencies in its system. We know very little about any of the accidents that must have occurred prior to that time. Even since then, we know little because the Chinese government generally will not permit the release of accident reports except in a very limited form on occasions when criminal charges arise. It can probably be safely assumed that the real figures, particularly for the first twenty years, will be considerably worse than shown in the BMPVA database.

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423 See table 5.3.
424 See Table 5.3.
427 See The Economist's Cronyism index, Ibid.
428 See Table 5.3.
429 See case study 3.26.
429 Appendix A, Ibid.
5.6.4. Dilapidated, deplorably crewed vessels.

Given the power of China’s authoritarian government combined with its apparent national desire to be seen as developed, it is particularly disappointing that the country has been unable to noticeably improve the safety standards of its ferries. Having travelled on many of them across large parts of the country, the author has been unimpressed by the deplorable condition and poor crew work of most of them. Even modern ferries are often not well maintained and the lack of concentration and care evinced by crew members can be frightening. Most appear to be more interested in their cigarettes than the risks of collision or fire.\(^{430}\) No Smoking signs are routinely ignored by both passengers and crew personnel on vessels of all kinds.

It seems that the lack of courtesy that combines with fatalism and lack of concentration among car and truck drivers in China has migrated to the ferry industry. The author was once involved in four road accidents while in a taxi during one short journey to central Beijing from the Great Wall of China. Despite its rapid rise economically, China still exhibits many of the developing country traits of poor maintenance, poor lookout and dangerous modification to facilitate overloading. It has a long way to go before it reaches fully developed country standards of maritime safety.

Even the cross-river ferries in Shanghai, which the Chinese government promotes as a „First World“ city are filthy and poorly maintained.\(^{431}\) It is apparent that corruption leads the otherwise powerful authorities to turn a „blind eye“ towards ferry safety deficiencies.

5.6.5. China will likely need to be „shamed“ into improvement.

This is particularly disappointing as Chinese railways, airlines and many bus services are of a very high standard. Given that such high standards can and are being achieved on land and in the air, it is disappointing that the same cannot be said about so many of its ferry services. Even allowing for its population of more than 1.3 billion people, China should have a much safer, cleaner and more comfortable ferry system than it currently does. The Chinese government and private companies are capable of doing much better. It appears, however, that it will have to be „shamed“ into doing so.\(^{432}\)

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\(^{430}\) Personal observation by the author on numerous voyages in many parts of China.

\(^{431}\) As observed by the author on numerous occasions.

\(^{432}\) See author’s comments in Chapter 10.
5.7.0. Democratic Republic of the Congo (DR Congo).

Map 5.4. The Democratic Republic of the Congo is a very large central African country through and around which run some major rivers including the Congo itself. It also has some very large lakes on its eastern border (University of Texas).

5.7.1. Geography, economics and politics necessitate water travel.

As with most countries of similar name, the Democratic Republic of the Congo is neither democratic nor really a republic. In reality, for much of its history it has been ruled by rather brutal dictatorships, both colonial and local. It remains a place of “indiscriminate violence” and developed country government travel websites are replete with warnings such as, “Reconsider your need to travel” or “Avoid non-essential travel”. Thanks to an ongoing state of civil war, there are large groups of refugees in many parts of the country.

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5.7.2. Corruption “strangles” waterway transport.

DR Congo remains beset by corruption (Table 5.3) that afflicts all levels of society from the lowest. However, as Michael Brown and Phillipe Nowala et al explain in their 2004 paper *Combating Low-level Corruption on Waterways in the Democratic Republic of Congo*, while low level corruption pervades and “strangles” all commercial activities, including waterway transport, in the country, it is “possible to make significant reductions” in that corruption.\(^{435}\) Regrettably, it seems that such a reduction has not been achieved in the intervening thirteen years.

Notwithstanding its vast mineral, rubber, palm oil and timber wealth, the DR Congo’s per capita GDP is, thanks largely to very high corruption levels, very low at USD 456 per annum.\(^{436}\) Some 70 per cent of Congolese citizens are claimed to be Christians, 10 per cent Muslim and 20 per cent nativist or animist.\(^{437}\) DR Congo is a large country that requires vast distances to be covered. Internal travel is difficult and there is only a very short coastline except along the Rift valley lakes. There are few roads and railways. As can be seen in Table 1.5, the DRC is also the world’s most dangerous country for road travel. Air travel is too expensive for the vast majority of Congolese citizens and, in any case, the country remains one of the most dangerous places to travel by air despite the best efforts of ICAO.\(^{438}\)

5.7.3. Water – the economical and convenient transport medium.

There are, however, some 14,000 kilometres of navigable waterways spread through the country.\(^{439}\) The longest stretch of navigable water is 1,700 kilometres on the Congo River. This makes water, for both cargo and people, the most economical and convenient medium of transport for most people in the very large country. It is bigger than Europe.

There is a chain of large lakes running through the eastern part of the country as well as numerous rivers, including the Congo itself. However, many of those rivers have numerous and dangerous rapids and waterfalls. One set of rapids in the River Congo, near its mouth, is named the “Cauldron of Hell”, apparently very appropriately.\(^{440}\) Upstream travel is limited.\(^{441}\) Infrastructure is sparse and made roads and railways are rare. Both are tediously slow and subject to interference by bandits. Malaria and yellow fever are rife throughout the country.\(^{442}\)


\(^{436}\) Ibid.


\(^{438}\) ICAO, *State of Global Aviation Safety*, Ibid.


\(^{440}\) Wohl, E. p. 253, Ibid.

\(^{441}\) Ibid.

5.7.4. Many ferry accidents go unreported.

Because of poor communications in much of the country, it can be assumed that many, if not most, ferry accidents go unreported. It is therefore believed that their number is considerably higher than shown in the BMPVA database.

“Known” fatal ferry accidents are more or less evenly spread between the Rift Valley lakes and the rivers. Usually the river boats are considerably smaller and less seaworthy than those navigating the lakes.443 So the numbers of deaths arising from each accident on the lakes are usually much higher although the numbers of accidents are fewer.444 All the usual poverty driven human error causes are cited for practically all the accidents that occur in DR Congo with overloading being the predominant cause.445 An abundance of crocodiles and hippopotamus in the rivers and lakes add to the hazards that are not helped by an absence of any formal search and rescue services. It is claimed that 170 people were “taken” by crocodiles along one small section of the Congo River, near the capital, Kinshasa, in 2012 alone.446

Most of the river boats, called pirogues, are little more than large wooden canoes and, even the comparatively rare larger river vessels are mostly elderly, poorly maintained powered steel scows and barges. Their captains and crews generally have little or no formal maritime education or training. The lake ferries tend to be larger and were mostly pre-fabricated in northern Europe. When built, they were undoubtedly seaworthy. However, again, they are poorly maintained and mostly incompetently operated.447 All vessels, it seems, are commonly badly overloaded and largely devoid of life saving equipment. River and lake travel is really only for the very poor and very desperate.

Apart from the numerous canoes and barge or scow-like, steel built, powered or tug pushed river boats very few significant vessels have been built in-country. There are a few relatively modern fast ferries called Carnot Rapides that operate on the Congo River near the nation’s capital, Kinshasa. They are imported and tickets to ride on them are reported to be very expensive.448

5.7.5. Water travel is still the safest and most reliable means.

While travel by water in DR Congo is extremely hazardous, it is regarded by a leading in-bound tour company to be safer and more reliable than road, rail or air.449 Of the five worst countries for passenger vessel accident fatalities, there is little doubt that DR Congo, a nation of 77 million desperately poor people, will be the most difficult in which to bring about reform. As with Haiti, it seems most unlikely to be able to be reformed in the sense of ferry safety, in the foreseeable future. It appears that

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443 Refer to news articles describing the Bukoba accident listed in Appendix A. Ibid.
444 Appendix A, Baird Maritime Passenger Vessel Accident database, Ibid.
445 Ibid.
447 Appendix A, Ibid.
448 www.congotravelandtours.com, Ibid.
449 Ibid.
little has changed there since Joseph Conrad wrote his novel *Heart of Darkness*, which starkly describes the atmospherics of the place, in 1902.450

5.8.0. Egypt.

Map 5.5. Egypt with its lengthy Red and Mediterranean sea coasts, its important Nile River and its extensive delta as well as the large, man-made Lake Nasser, has a requirement for numerous ferry and tourist boat operations (University of Texas).

5.8.1. Geographic, cultural and economic problems prevail.

Egypt, with its mostly Muslim population of around 92 million is, with a per capita GDP USD 3,615 per annum in 2015, one of the wealthier of the ten nations described here despite its history of political instability.\textsuperscript{451} It is also notably undemocratic and corrupt as shown in Table 5.3.

However, cultural problems, not the least of which appear to be political repression, corruption and fatalism, have ensured that it has a very poor record for ferry and tourist boat safety. It continues to experience frequent fatal accidents.\textsuperscript{452} The greater number of accidents have occurred on the River Nile and Lake Nasser in mostly small tourist vessels and river ferries. The major accidents, in terms of fatalities, have occurred mostly in the Red Sea. They involved large, poorly modified and unstable conventional Ro-Pax ferries that are engaged in the trade of transferring large numbers of Egyptian workers to and from Saudi Arabia and pilgrims travelling to Mecca for the Haj.\textsuperscript{453}

5.8.2. Modified, elderly Ro-Pax ferries make matters worse.

The two worst accidents involved much-modified and elderly European conventional Ro-Pax ferries that had stability robbing, additional decks placed above those with which the ships had originally been designed and constructed. Neither the \textit{Salem Express} nor the \textit{Al Salam Boccaccio 98} should have been permitted to operate in their modified condition.\textsuperscript{454} As described in Chapter 3, both ships were obviously, even to the non-professional eye, neither stable nor seaworthy. Notably, they failed to comply with the Stockholm Rules.\textsuperscript{455}

On the River Nile, vessels seem to have routinely been significantly overloaded and often badly mishandled. Even those owned by major international hotel companies such as Germany’s Kempinski Group’s \textit{Kempinski Ganna}, which caught fire in October 2003 have not been immune from such problems.\textsuperscript{456}

5.8.3. Regulation of inland waterways vessels is non-existent.

Many of the smaller vessels operating on the River Nile and Lake Nasser are simple wooden \textit{feluccas} that are traditional, lateen rigged sail powered inshore boats that are picturesque and very attractive to tourists. They, cross river vehicular ferries and hotel cruise boats have been involved in numerous fatal accidents.\textsuperscript{457} It is probably only when tourists die in such accidents that they are noticed in the outside world. It is believed that many accidents go unreported. Most such vessels are unlicensed and their captains and crews lack formal qualifications. Indeed, from the author’s

\textsuperscript{451} See Table 5.3, above.
\textsuperscript{452} Appendix A, Ibid.
\textsuperscript{453} See case studies on \textit{Salem Express} and \textit{Al Salam Boccaccio} in Chapter 3.
\textsuperscript{454} Appendix A, Ibid.
\textsuperscript{456} Appendix A, Ibid.
\textsuperscript{457} Ibid.
personal observation, many are illiterate. That would preclude them from gaining such qualifications.

5.8.4. Crowded waterways – collisions are common.

The Nile is crowded with passenger, cargo and work boats. Collisions between them are common. As recently as January 2016, at least seventeen people were killed when a ferry sank in the Nile delta. This followed a collision in Cairo between an unlicensed party boat/ferry and a cargo boat in July 2015 that resulted in 36 fatalities. As is the norm in developing countries, the local authorities profess concern and promise to tighten regulations and enforce them more rigorously but, soon after any accident, those good intentions are quietly forgotten.

5.9.0. Haiti.

Map 5.6. Haiti comprises about one third of the Caribbean island of Hispaniola. It is located in the tropical “Hurricane Belt” and relies extensively on water transport around its coasts and islands and on rivers and lakes (University of Texas).

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460 Ibid.
5.9.1. Geography and poverty lead to reliance on water transport.

Haiti, the poorest country in Latin America occupies the western third of the island of Hispaniola.\(^\text{461}\) It has a lengthy coastline and numerous rivers, lakes and islands. Its 11 million inhabitants rely on water transport for much of their movement around their comparatively small country.

Located in the Caribbean „Hurricane Belt“, Haiti has been badly affected by a number of severe hurricanes over recent years.\(^\text{462}\) They and earthquakes kill large numbers of citizens annually in a country that is not at all robust in the face of such natural disasters. Even day-to-day sea voyages are made risky by the strong trade winds that blow regularly through the aptly named Windward Passage that separates the North West of the country from nearby Cuba.

This former Spanish, Dutch then French colony, gained its independence after a devastating revolution in 1804 when it became the world’s first nation comprising mainly black former slaves. While technically „free“, Haitians have continued to suffer from poverty, natural disasters and political chaos and repression for most of the two centuries since independence. The original indigenous Carib inhabitants were practically wiped out in the fifty years following the Spanish settlement of the island by Columbus in 1493. It was essentially repopulated with African slaves managed and bred with by Spanish and, later French, masters. Finally, in the twentieth century, Haiti spent 19 years under American administration.\(^\text{463}\)

Inevitably, therefore, corruption and very restricted democracy are major handicaps to economic progress and its concomitant safety improvements. Table 5.3 shows Haiti at 107 in the Democracy Index and at 141 in its Corruption counterpart.

Haiti’s major, but obviously not very lucrative, industries include mining, mainly bauxite, and agriculture, mostly sugar, fruit and vegetables. However, it seems to have a largely subsistence economy. Hence, despite considerable foreign aid, mainly from the USA, the GDP per capita is only USD 829 per annum, the lowest in the Americas. GDP growth has averaged a depressing 0.3 per cent per annum over fifty years (See Table 5.3.). Malnutrition, it seems, is a significant problem.

5.9.2. Ferries are commonly dangerously unseaworthy.

As with most similarly impoverished countries, the vessels travelled on by the inhabitants are commonly unseaworthy, incompetently manned and often overloaded. Ironically, they often revel in optimistic names such as God’s Will, Praise the Lord and Lazarus.\(^\text{464}\) These, obviously, reflect the widespread Christian beliefs of the inhabitants, some of whom, it seems, also practice an animist variation known as Voodoo. Both sets of beliefs, combined with widespread malnutrition, no matter how

\(^{461}\) Refer to Table 5.3.
\(^{464}\) All are listed in Appendix A, Ibid.

5.9.3. Little real prospect of ferry safety improvement.

Given its history, its ongoing political chaos, its susceptibility to natural disasters and its depressed economy, it would appear that Haiti has few or no prospects for improving the safety of its passenger vessels in the short to medium term. Sadly, therefore, like DR Congo, it appears unlikely to benefit from any international efforts to support the implementation of such improvements in the short term. There are many more promising places to start.

5.10.0. Indonesia.

Map 5.7. Indonesia comprises an archipelago of a claimed 17,000 islands that necessitate considerable sea, and some river, travel for its citizens and visitors. While its main population centres lie in the equatorial belt, it still suffers from occasional severe monsoonal wind and weather events (University of Texas).
5.10.1. Archipelagic geography necessitates water travel.

With 258 million people spread over 17,000 tropical islands and a comparatively fast growing per capita Gross Domestic Product of USD 3,347, Indonesia is the third richest of the ten worst performed countries compared. It, like its neighbouring and similarly densely populated Philippines, is one of the fastest growing Southeast Asian nations. Both countries would seem to have good economic and social potential for rapid and substantial improvements in ferry safety.

As their maps make clear, both countries depend heavily on marine transport for commerce, tourism and family contact. Apart from just their adjoining location, the two countries are similar in many ways. They are at approximately similar levels of development. Both are semi or near democracies and enjoy the benefits of a relatively free press. However, as Table 5.3. clearly shows, both are still significantly corrupt. While they both are subject to a dominant religion – Muslim in the case of Indonesia and Roman Catholicism in the Philippines – their practice is generally considered to be liberal.\textsuperscript{466}

Indonesia is particularly rich in extractive resources: minerals, oil and gas, rubber, palm oil, rice, timber and seafood, are the most important. Those resources are not, however, always very efficiently or cost effectively extracted compared with more developed countries. Industry suffers from frequent and sometimes dramatic government policy changes.\textsuperscript{467}

5.10.2. A resource rich but poorly managed nation.

Although Indonesia is rapidly becoming richer, the riches are not always well or fairly distributed and many poor country problems remain in terms of, particularly, health and safety. Crime, corruption, terrorism, disease, occupational safety and poor education levels are ongoing problems. Travel safety on land, at sea and in the air remains problematic.\textsuperscript{468} Indonesia has continued to experience serious and deadly passenger vessel accidents right to the end of the period studied in 2015 and since with two in the first week of 2018.\textsuperscript{469} As with Bangladesh, DR Congo and the Philippines, developed country tourists continue to be warned on their countries’ travel websites to avoid or at least be very careful about ferry travel.

Overloading, inadequate maintenance and untrained crews continue to blight the Indonesian ferry industry. It would not be unfair to repeat claims made in a 1998 article in the Norwegian shipping newspaper \textit{TradeWinds} that “... black market ticket sales are reported to be rampant”.\textsuperscript{470} And that the 2,200 passenger capacity ferry \textit{Bukit Siguntang}, “... recently sailed carrying 4,800 passengers. According to the

\textsuperscript{466} Described in www.factsanddetails.com/Indonesia/History-andReligion/ and www.asiasociety.org/education/religion-philippines/.
\textsuperscript{468} www.smartraveller.gov.au. Ibid.
\textsuperscript{469} Anon. Indonesia speedboat explosion kills two, injures 18, www.abc.net.au/news/2016-09-15/.
Sydney, 15 September, 2016 and Appendix A, Ibid.
\textsuperscript{470} Ibid.
official (quoted), passengers should not worry as the vessel was constructed in Germany and employs enough safety measures to face any emergency”.471

5.10.3. Many Indonesian ferries are unsafe.

According to The Jakarta Post, “More than half the ferries sailing from Merak port in West Java to Sumatra Island fail international safety standards...”472 That was published in 2003. Despite considerable support from Australia from 2007 to 2010, during which USD 17 million was spent on the Indonesian Transport Safety Assistance Package that focused on passenger ferries and coastal Ro-Ro ships operating between Kupang and Rote island in West Timor, little, if any, improvement can be discerned.473 Indeed, as noted in Chapter 3, Australian broadcaster Jon Faine devoted a chapter in his book From Here To There to a voyage in that same area in 2009. The chapter is titled, very appropriately, Scary Ferry.474 It very accurately encapsulates the dangers of ferry travel, not only in Indonesia, but in most poor, corrupt and undisciplined countries.

Indonesia has a significant local shipbuilding industry but it is mainly focused on non-passenger vessels except for very small ones. Its passenger fleet is very old comprising mostly cast-offs from Japan and Korea together with a few newer, but not new, fast ferries from Australia, Japan and Singapore.475 As can be gleaned from the case studies in Chapter 3, too many of them still are poorly maintained and negligently operated. The Indonesian Government implemented a regulation in 2007 that banned the purchase of foreign ships more than ten years old. It was then estimated that more than sixty of the 167 Ro-Ro/Ro-Pax vessels then operating in the country were more than 25 years old. Even the director of government owned ASDP Indonesia Ferry doubted that “…shipping lines will be able to meet the requirement”.476 He seems to have been completely correct. However, as can be seen in Table 1.6, even Indonesian government owned ships have not been immune from fatal accidents.

In 2010 Indonesia was estimated to have 210 internal Ro-Ro and Ro-Pax ferry routes along with eight landing craft Ro-Pax ferry routes and three routes utilising high speed ferries.477 This estimate seems low to the author who has travelled widely in Indonesia. Furthermore, it fails to take into account the numerous passenger-only ferry routes utilising mostly smaller vessels especially on lakes and rivers and close to coasts. Nor does it account for passenger only vessels operating from tourist resort areas such as Bali and Lombok and the Thousand Island group north of Jakarta. These disputed statistics merely highlight the lack of accurate information that makes it difficult to determine the real extent of the Indonesian ferry safety problem.

471 Anon. Indonesians don’t mind packing their German ferries, TradeWinds, Oslo, December 1998.
474 Faine, J. & J. Ibid.
475 Anon. Jakarta Post, Ibid.
5.10.4. IMO has tentatively tried but failed in Indonesia.

IMO, at the behest of INTERFERRY and the Worldwide Ferry Safety Association, has made some token efforts to try to encourage improvements in ferry passenger safety in Indonesia. Working with the World Bank, IMO in 2009 set itself an ambitious goal of reducing ferry deaths by 90 per cent by 2019. No measurable improvements have been perceived to date. Indeed, further fatal accidents have occurred in 2016, 2017 and 2018. Almost nine years later, at the end of 2017, there seemed to be no hope of the goal being achieved at all. There were two fatal ferry accidents in Indonesia in the first five days of 2018!

Similarly, Indonesia’s road and aviation accident statistics are deplorable. Indeed, a number of Indonesian airlines have been banned from most other countries’ airspace and airports. Overcrowding of aircraft and the unauthorised boarding of passengers appears to affect both the aviation and maritime sectors. The fatal crash of a military cargo aircraft in 2015 that killed 141 people brought this to light. Some 29 of the 141 fatalities were alleged to be illegal fare paying passengers.

That situation is slowly improving with the assistance and support of ICAO and the aviation departments of surrounding countries, primarily Australia and Singapore. However, its appalling road accident record at least shows the country is becoming wealthy enough to support a large fleet of cars. Presumably, that indicates there must be sufficient money available to devote some to improving the local ferry fleet.

5.10.5. Potential for assisted improvement is evident.

Again, most of the behavioural and cultural deficiencies that cause travel accidents remain common and widespread in Indonesia. They should gradually be eliminated as the country’s wealth improves. The potential for change is evident. The recent improvements to its aviation industry and its rapidly improving health standards offer promise of similar improvements in sea travel safety. Regrettably, however, Indonesia continues to experience fatal ferry and tourist boat accidents that particularly affect its tourist industry. It is unlikely, though, that much will be achieved without urging and more effective support from external sources such as a reformed and revitalised IMO as well as Australia’s Australian Maritime Safety Authority (AMSA) which has already provided considerable assistance in improving Indonesia’s Ro-Pax ferry fleet.

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480 To 31 December 2015, see Appendix A, Ibid.
481 Appendix A, Ibid.
483 See Global Health Observatory country views, WHO, at www.apps.who.int/gho/data/node.country/.
484 Anon. Indonesia speedboat explosion kills two, injures 18, Ibid.
485 Anon. Australia to help on Indonesia safety, Ibid.
5.11.0. Myanmar (Burma).

Map 5.8. Myanmar, formerly known as Burma, is located at the northern end of the Bay of Bengal between Thailand and Bangladesh. Apart from religion and population size, it shares many of the same cultural, geographic and economic characteristics as Bangladesh. It has a lengthy coast, numerous offshore islands and overlays a major river delta system (University of Texas).
5.11.1. Politically repressed, geographically water dependent.

Myanmar, spent most of the last fifty years of its history largely cut off from the world under the rule of a repressive and notoriously corrupt military dictatorship.\textsuperscript{486} Prior to that it was occupied for four years as part of the Japanese Empire and spent two centuries as a British colony.\textsuperscript{487} Until 2012, it had only experienced about six years as a semi-democracy.

Despite its considerable mineral, timber, agricultural and oil and gas wealth, most of the 54 million ordinary citizens of Myanmar are poor with a GDP per capita of USD 1,204 per annum as shown in Table 5.3.\textsuperscript{488} The economy is largely subsistence and for many years was dominated by a military facilitated opium and heroin industry. Because the country was effectively closed to the outside world for more than forty of the fifty years studied, its rate of economic growth is unknown. It is believed to have been negligible except for the uncounted illicit drug industry.\textsuperscript{489}

The same Table shows that Myanmar stands at 114 and 147, respectively on the Transparency International democracy and corruption perception indices. Despite considerable reform since 2011, the country remains backward, corrupt and only semi-democratic at best. It also suffers from significant ethnic and religious unrest.\textsuperscript{490} The media is very tightly controlled. So, it shares most of the problems of all the ten worst performing nations for passenger vessel safety. The only real difference is that it is the only one of the ten whose religious affiliations are predominantly Buddhist. In all other respects, it is very similar to Bangladesh and, judging from its fatal ferry accident record since opening somewhat to foreign media in 2007, its fatality statistics will be similar if adjusted for their population differences and extrapolated over the full fifty-year period studied.\textsuperscript{491}

5.11.2. Geographically and climatically similar to Bangladesh.

Geographically, in particular, Myanmar is very similar to Bangladesh. It is located at the head of the Bay of Bengal on which it has a lengthy coastline. The country is overlain with an extensive river system, primarily the Irrawaddy, Chindwin and Salween rivers that flow through Myanmar from the Himalayas to the deltas through which they enter the Bay of Bengal. There are numerous populated islands along the coast that can largely only be accessed by sea.

Climatically, Myanmar is almost entirely tropical and the coast is subject to cyclonic storms as well as strong monsoon winds. While the coastal and low-lying areas in the centre of the country are hot, the northern highlands and mountain areas can be cool. Considerable rainfall ensures that floods are frequent and that the highland rivers flow very swiftly at times. With little road or rail infrastructure but rivers that are

\textsuperscript{486} From, \url{www.infoplease.com/country/myanmar/}.
\textsuperscript{487} Ibid.
\textsuperscript{488} Asian Development Bank statistics, \url{www.adb.org/countries/myanmar/economy/}.
\textsuperscript{489} From the Council on Foreign Relations,\url{www.cfr.org/expert-brief/myanmars-alarming-civil-unrest/}.
\textsuperscript{490} The population of Myanmar is almost exactly one third that of Bangladesh as shown in Table 5.3.
\textsuperscript{491} Described by the Australian Strategic Policy Institute in \url{www.aspi.org.au/publications/onthemyanmar/}. 
navigable for long distances, it is unsurprising that water transport is very important, particularly over longer distances\textsuperscript{492}.

5.11.3. Ferry fatality record is likely to be far worse than reported.

Burma/Myanmar’s effective closure from the remainder of the world from 1966 until 2006/7 meant that very little news was available from the country.\textsuperscript{493} The ruling military dictatorship enforced rigorous censorship. Bad news, such as that reporting on fatal ferry accidents has been hard to come by.\textsuperscript{494} Indeed, the BMPVA database records only three fatal ferry accidents over that forty-year period. Some 667 fatalities arose from those three “known” accidents (an average of 17 fatalities per annum) and none of the three vessels involved was named.

Since 2007, when the once “pariah” state started to open to the outside world, twelve accidents affecting named vessels and causing 584 fatalities have been recorded (an average of 73 fatalities per annum).\textsuperscript{495} The earlier data is obviously completely inadequate. The true figures must be considerably higher. By extrapolating from the 2007-2015 statistics, a logical case can be made for more likely figures of at least 75 accidents and 3,250 fatalities over the whole period from 1966 to 2015.

5.11.4. Myanmar remains a dangerous place for ferry travel.

A predominantly Buddhist and poverty driven fatalism completes the list of factors that have led to Myanmar being a dangerous place for ferry travel despite its almost overwhelming necessity for the average citizen of the country.\textsuperscript{496}

\textsuperscript{492} ASPI, Ibid.
\textsuperscript{494} Ibid.
\textsuperscript{495} Appendix A, Ibid.
\textsuperscript{496} As described in 5.9 and accompanying footnote.
5.12.0. The Philippines.

Map 5.9. The Philippines, like Indonesia, is an archipelago comprising more than 7,000 islands. Sea travel, therefore, is practically unavoidable (University of Texas).
5.12.1. Ferry travel unavoidable in the most archipelagic nation.

The Philippines, with its population of 109 million, increasingly better-educated people also appears to have real potential for improvement in domestic ferry safety.\textsuperscript{497} The country has enjoyed rapid growth in GDP per capita, albeit from a low base. Thanks to remittances from the many Filipinos working overseas and from new industries, such as call centres, it is becoming steadily wealthier.\textsuperscript{498} While the collapse in oil prices in 2014 reduced the potential for Filipino employment in the Persian Gulf Arab countries and Singapore,\textsuperscript{499} improving local economic conditions appear to have ameliorated the detrimental effects arising from that development.\textsuperscript{500}

Despite its encouraging prospects, and significant recent improvement, it remains one of the world"s ten deadliest countries for passenger vessel accidents.\textsuperscript{501} However, it is, since 2000, no longer the deadliest mainly thanks to better information becoming available about other countries. A sad dichotomy is that the Philippines is home to about 190 maritime schools and universities providing their graduates to the global maritime industry, yet the manning and operation of local vessels clearly continue to be sadly lacking in skill and seamanship.\textsuperscript{502}

5.12.2. Ferries remain dangerous despite recent improvements.

The Philippines, between 1995 and 2005, introduced a Domestic Shipping Modernisation Program. It was funded by the Overseas Economic Cooperation Fund of Japan and administered by the Development Bank of the Philippines.\textsuperscript{503} Its objectives were fleet modernisation/renewal and port development. Despite many loans being made, not much seems to have been achieved except for facilitating the sale of elderly Japanese ships into the Philippines and the sale of Japanese earthmoving equipment for port development. Of course, it seems that most foreign aid, particularly Japanese sourced foreign aid, is intended to benefit the donor at least as much as the donee.

The statistics recording known ferry accidents in the Philippines are considered to significantly underestimate the reality.\textsuperscript{504} Indeed, officers of the Philippine Coast Guard have claimed that taking smaller vessel accidents into account would increase the numbers of fatalities by more than 100 per cent.\textsuperscript{505} A common comment is to the effect that: “…far-flung incidents sometimes does (sic) not catch the attention of the

\textsuperscript{497} From www.tradingeconomics.com/philippines/gdp/.
\textsuperscript{498} See Table 5.3.
\textsuperscript{499} From World Bank, www.data.worldbank.org/indicator/BX.TRF.PWKR.DT.GO.ZS/.
\textsuperscript{500} Chanco, B. Remittances are not forever, Demand and Supply column, The Philippine Star, Manila, 21 October 2016.
\textsuperscript{501} Appendix A, Ibid and 5.1.3.
\textsuperscript{502} Anon. The Philippine Maritime Industry: Prospects and Challenges in 2013 and Beyond, Philippine Planning and Policy Office, Manila, 29 May 2103.
\textsuperscript{505} Indeed, retired Philippine Navy rear admiral Feliciana G Salonga of the Subic Bay Metropolitan Authority suggested that there are around 40,000 marine fatalities annually in the Philippines.
national media (except where casualties are simply too many). There are some 4,800 passenger vessels registered in the Philippines of which most are motor bancas. They operate over more than 1,700 routes. There are, of course, many more passenger carrying vessels that are unregistered.

5.12.3. Fatality record is probably worse than it appears.

It must also be emphasised that, while many of the accidents in the Philippines involve small vessels, those causing massive death tolls, while fewer in number, without exception, involve substantial steel, usually conventional Ro-Pax, vessels. Those, presumably, are largely crewed by graduates of those same maritime schools and universities mentioned in 5.12.1. If so, it can only be assumed that their training is deficient.

The ferry safety situation in the Philippines is generally similar to that applying in neighbouring Indonesia. However, the Philippines appears to be benefiting from a more rapid introduction of new and safer ferries that is slowly putting it ahead of Indonesia in terms of ferry safety. These are very encouraging local initiatives that should, through the force of competition, lead to a general improvement in the standards of both the wider local fleet and its operators. The more influential local media in the Philippines would seem to be having a positive encouraging effect on that.

5.12.4. Fast growing tourist and ship building industries will inspire safety improvements.

The Philippines does have an active and growing local shipbuilding industry which is sufficiently competent to produce steel and aluminium vessels for export. Indeed, in tonnage terms it is the world’s fourth largest shipbuilding nation. Its shipbuilding output includes large, high-quality cargo ships from builders such as Japanese owned Tsuneishi, Korea’s Hanjin Heavy Industries and Keppel of Singapore and sophisticated aluminium fast ferries from Australian owned Austal, as well as smaller steel and aluminium vessels from Cebu based Colorado Shipyard and the Herme Shipyard in Bataam. It should, therefore, be able to produce safe and seaworthy vessels for the local market. So far, however, it seems that until very recently, most deliveries of safe modern vessels for domestic operations have been from Chinese and Japanese yards.

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506 Ibalon. Ibid. Page 1.
508 As mentioned in Chapter 4 with respect to the FastCats owned by the Pastrana family’s Archipelago Ferries. Another local company, Starlite Ferries Inc. is claimed to be building a fleet of modern Ro-Pax vessels in Japan. See: www.starliteferries.com/our-fleet/
509 Anon. The Philippine Maritime Industry..., Ibid.
512 The FastCats mentioned above were designed in Australia and constructed in China. In 2017 Austal delivered some modern aluminium catamaran fast ferries from its Cebu shipyard for domestic owners.
Both Indonesia and the Philippines are also noticing the economic and safety benefits accruing from a fast growing tourist industry. Fatal passenger vessel accidents involving foreign tourists can do enormous damage to a country’s image. Most of those seriously invested in the tourist industry in both countries are well aware of that. They will undoubtedly work hard to ensure local ferries are world class in terms of safety.

The considerable output from the country’s maritime schools means that very large numbers of Filipinos are gaining experience on the generally better run vessels owned in developed countries. They are, through practical experience, learning the correct, safe way to operate ships. The author has observed Filipino officers and seamen working well and professionally on foreign flagged and owned ships. He has talked with numerous ship owners who seem satisfied with their Filipino crews. It is to be hoped that they will return to the Philippines to take up positions in the crews of the newer, safer vessels that are being introduced into the country.

5.12.5. Government is well aware of the ferry safety problem.

In conjunction with the Manila based Asian Development Bank, the Philippine Government created and published a strategic plan, Philippines: Transport Sector Assessment, Strategy and Road Map in 2012. That provided a framework for a transport infrastructure, economic and safety development plan for the period “through” 2016. The resulting 2011-2016 Philippine Development Plan (PDP), “…envisions a „safe, secure, efficient, viable, competitive, dependable, integrated, environmentally sustainable and people oriented Philippine transport system”

Noble intentions but, from the author’s observations, the improvements may be happening but they are happening disappointingly slowly.

As with Indonesia, increasing wealth and better health and education should help to lift the safety standards of Filipino ferries and their operators. Given some real support and encouragement by IMO, and wealthier neighbours such as Japan, Australia and Korea, the Philippines would seem to have considerable potential for substantial improvement. Again, the country has an overabundance of cars to the point of having to endure very bad traffic congestion problems. It should thus be able to afford much better ferries.

A significant advance has been the 2012 move by the government to amalgamate all the formerly uncoordinated government bodies that were once responsible for maritime matters into one, the Marine Industry Authority (MARINA) that is responsible for the safety, competitiveness and functional performance of the Philippine maritime industry. That provides hope and already some limited achievement. The PDP does provide at least an outline map for future improvement.

The Philippines is starting to see some substantial investment in safe, modern and economical ferries. As described in Chapters 1, 2 and 6, a local company

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515 Anon. The Philippine Maritime Indus, Ibid.
516 See WHO, Global Health Observatory Country views, Ibid.
517 MARINA, Ibid.
Archipelago Ferry Corp owned by the Pastrana family, has introduced a substantial fleet of “FastCat” catamaran Ro-Pax ferries that were designed by Sea Transport Solutions in Australia and built in China by the Bonny Fair Shipbuilding group. Notably, these inherently safe vessels are fully equipped with high-quality, modern safety equipment and passengers are thoroughly briefed in their use. They are also very well maintained. The company has ordered a number of similar but larger vessels. It should be noted, however, that the company’s MV Fastcat grounded, without significant damage and with no injuries, on its maiden voyage while departing Tubigon port in Bohol en route to Cebu on 16 December 2016. It appears that competent masters are still scarce in the Philippines.

5.12.6. Some promising local examples of safety improvements.

It is to be hoped that the example of the Pastrana family and their competitors, Starlite Ferries Inc, which is rebuilding its fleet with new conventional Ro-Pax ferries from Japan, and Oceanfast Fast Ferries, which is also re-building its fleet with modern Australian designed and locally built fast ferries, will be followed by many other Filipino ferry owners. Presumably, if Philippine airline companies can reach modern international standards, so too can their ferry companies. In 2017, the country, in a long awaited move, banned the importation of second hand ferries of any kind. It has, through MARINA, initiated numerous regulatory reforms since 2005. They, despite several reverses, do appear to be having a positive effect on safety.

It should be noted, however, that despite the best of publicly professed intentions to improve, accidents continue to happen. Indeed, Starlite Ferries’ Starlite Atlantic sank off Batangas in a typhoon on 26 December 2016 with the loss of at least 19 lives. The author has looked closely at a Starlite owned ferry, the Starlite Pioneer, in Caticlan port on Panay Island in February 2017. He was unimpressed. It appears to be the worst kind of conventional monohull Ro-Pax ferry, bluff bowed and apparently unstable.

The Philippines appears to be the country most open to reform and where reform has actually commenced driven largely by the private sector. While it has a long way to go, it would probably be the best place to start a major ferry safety reform campaign supported by IMO, INTERFERRY, wealthier neighbouring nations, the classification societies, international development banks and, even some of the appropriate NGOs which claim to want to improve the life expectancies of poorer people. On the face of it, the Philippines has the greatest potential for the kind of rapid improvement that

518 See Anon. www.philstar.com/cebu-news/2016/12/17/1654291/
520 Gamboa, R. Roro owners starting to see light, Bizlinks, The Philippine Star, Manila, 29 January 2015.
522 The author was informed personally of this by Mr Chet Pastrana at the INTERFERRY 2017 Conference in Split, Croatia, in October 2017.
524 See www.maritimeherald.com/2016/one-dead-and-eight-missing/ and Appendix A, Ibid.
525 While passing through Caticlan port en route to Boracay Island in February 2017.
should encourage similar reform programmes in the other countries with bad ferry safety records.

5.13.0. Senegal.

Map 5.10. Senegal is almost bisected by the much smaller nation of The Gambia. The country has a long, exposed Atlantic Ocean coastline as well as numerous major rivers, their deltas, and lakes (University of Texas).


Remarkably, and probably erroneously, Senegal, a West African former colony of France has achieved the notoriety of its ninth place on the „League Table“ of passenger vessel fatalities entirely thanks to one accident. That involved the capsize and sinking of the grossly overloaded Le Joola off the mouth of the Gambia River which runs through the tiny nation of The Gambia which, in turn, effectively bisects...
Senegal. The accident occurred in the Exclusive Economic Zone of the The Gambia which suggests the voyage involved was an international one. That fact should have aroused the interest of IMO but it failed to do so.

5.13.2. Ferry accident data is inadequate.

The *Le Joola* sinking of 26 September 2002, which killed 1,863 people, is the only fatal accident recorded in the BMPVA database to have involved a Senegalese vessel. That seems very unlikely to be correct. Despite the strong French influence over its former colony, it remains poor and geographically dependent on ferries thanks to its lengthy coastline and extensive river and lake systems.

Senegal, located at the far western point of Africa has a similar 500 year colonial history to most of its neighbours. Commencing with the Portuguese in 1440, it then came under Dutch, French, British and, finally, French colonial rule again. It became independent in 1960. A country of some 13.5 million people, it is generally politically stable and has been described as “quasi democratic” by BBC News in its country profile. Indeed, it is widely regarded as one of the most stable and prosperous African nations. It is multi-ethnic and secular.

Table 5.3 shows Senegal to be the most democratic and least corrupt of the ten worst nations for ferry fatalities. It has a fast growing economy based on tourism, fishing, agricultural products, oil and gas, fertilisers and, allegedly, manufacturing including shipbuilding and repair. That seems as dichotomous as the absence of data about passenger vessel accidents in the country. Much of the information gained about Senegal from an online search is unusually contradictory. It is very difficult to believe.

5.13.3. Rich resources, poor people.

Once primarily a slave marketing centre, Senegal, despite its strong French connections, is about 95 per cent Sunni Muslim and about five per cent Christian. Although its per capita GDP is growing impressively, as is so often the case in Africa, most of the population remains very poor. Diseases, mainly malaria, dengue fever, tuberculosis, cholera, typhoid, hepatitis and similar, are rife. Life expectancy is 60 years from birth and literacy is only about 50 per cent with females being most likely to be illiterate. Road travel is particularly dangerous and petty crime common.

The author has been able to find few local or international media, safety agency or government reports as to other fatal passenger vessel accidents. Indeed, those that do exist describe accidents with small numbers of casualties while mentioning the poor ferry safety record in the country. That reputation cannot, logically, be entirely due to one accident.

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526 Refer to 3.17. for details.
527 Appendix A, Ibid.
529 Appendix A, Ibid.
However, despite the absence of data, the country has a poor reputation for passenger safety. If the photographs of Le Joola prior to its sinking, such as that shown in Chapter 3, are any indication, gross overloading of ferries in the country would appear to be normal behaviour. Indeed, the Australian government’s “Smartraveller” website warns Australians to exercise a “High degree of caution” in Senegal and to, “Reconsider your need to travel outside Dakar (the capital).” 530 It also warns that: “The standard of public transport in Senegal is poor. Ferries, in particular, are often dangerously overcrowded”. The comparable British and Canadian websites offer similar warnings so there must be some basis for them. Perhaps fatal ferry accidents occur so frequently in Senegal that they are not considered newsworthy.

It can be surmised that most of the accidents involve small local vessels known as pirogues and that they mostly kill local people. Presumably, if they were rich foreign tourists, much more publicity would ensue. Two YouTube reports on 2013 voyages on Ro-Pax river ferries confirm that massive overloading continues to occur.531

5.13.4. Ferry accidents mostly kill local people.

The author has seen photographs of river ferries in Senegal and neighbouring The Gambia. They starkly confirm the Smartraveller and similar comments regarding gross overloading. Recent reports of fatal ferry accidents during international voyages between The Gambia and Senegal mention eight deaths in 2013 and five in 2014. On each occasion, there were Europeans among the dead.532

The case of Le Joola, putting it among the world’s worst ferry disasters made it internationally newsworthy, especially as a number of French citizens died in the sinking, but the subsequent inquiry was perfunctory at best. All blame was attributed to the ship’s master and, since he sank with his ship, no criminal charges could be laid.533 Again, judging from earlier photographs of the Senegalese government owned ship, gross overloading was normal. Although two ministers were dismissed as a result of the sinking, it seems that safety standards were, and probably remain, very low.534 While it does tend towards the cautious in its warnings, it appears that the Smartraveller website has good grounds for its comments on Senegalese ferries.

Meanwhile, Le Joola was replaced in 2007 by an impressive new ship Aline Sitoe Diatta which was built by the highly reputable German shipyard Fassmer.535 It is of similar size to the sunken ship and was largely paid for by the German Government and the Euro Bank. It would be interesting to learn whether or not the overloading lesson has been learnt.

531 They show Kanilai car ferry from Gambia to Senegal, July 2013, www.youtube.com/watch?v=dh5d6jMeokM/.
534 Described in Le Joola case study in Chapter 3, 3.17.
5.14.0. Tanzania.

Map 5.11. Tanzania is surrounded by and dotted with very large lakes and rivers as well as having three significantly populous island groups located off its coast (University of Texas).


Tanzania, as can be seen in Table 5.3, is generally regarded as being of middle rank among developing countries in terms of both corruption and democracy. It also has a useful and encouraging rate of growth in GDP per capita and enjoys the benefits of a substantial and growing tourist industry. It has significant mining and agriculture sectors but the benefits of the growing economy are not well spread. The vast majority of the population remain very poor.
The country is surrounded on two sides by very large lakes and is dotted with many others and crossed by numerous large rivers. It also has a lengthy Indian Ocean coast off which lie three populous island groups, notably including Zanzibar and Pemba, to the north of Dar es Salam, which are popular and historic tourist destinations. It is a “wet” country that has considerable scope and need for water transport.

5.14.2. Inadequate reporting conceals a bad safety record.

Unfortunately, though, it has a very bad record for ferry safety. Although most of its recorded fatal ferry accidents have occurred over the past twenty years, it is among the five worst countries in that regard. Indeed, it comes in as fourth worst.\textsuperscript{536} It is suspected that, due to inadequate reporting of accidents prior to 1996 its real record could well be much worse. There is no obvious or known reason why it should suddenly have started to experience fatal passenger vessel accidents from when the Tanzanian Government owned \textit{Bukoba} sank in Lake Victoria in 1996 with massive loss of life.\textsuperscript{537} Perhaps the publicity arising from that accident alerted the outside world to the dangerous reality of Tanzanian ferries.

While Tanzania remains a home for dilapidated old ferries on its lakes and coast and most of the local accidents have involved such vessels, it has imported a number of modern, well-equipped ferries since the mid 2000s. Illustrating the cultural and behavioural problems pertaining to the country, even a very fine example of a modern fast catamaran ferry the \textit{Kilimanjaro II} was involved in a significant fatal accident that killed at least 25 people and was entirely due to very bad seamanship.\textsuperscript{538}

Tanzania has a very mixed and still dynamic ethnic and religious background. The populace includes traditional tribal Africans who practice a mix of animist and Christian religions. Along the Indian Ocean coast ethnicity is more mixed with Portuguese, Arab, Indian, German and English blood mixed in. The Muslim religion is stronger there but so is Catholicism and, increasingly, evangelistic Christianity. This seems to have led to the same kind of fatalism that is prevalent in all the other countries where passenger vessel accidents are abnormally frequent.\textsuperscript{539}

This fatalism is evident in the focus on praying before a voyage that takes precedence over studying the safety facilities of the vessel concerned. That is if there actually is any safety equipment on the vessel. The author has observed such behaviour and a complete lack of interest in such items as life jackets and rafts. In fact, on the island of Zanzibar he noted that lifejackets were very scarce and generally regarded as a waste of time and money. Life rafts were practically invisible except on the newest vessels.

\textsuperscript{536} Appendix A, Ibid.
\textsuperscript{537} See case study 3.14.
\textsuperscript{538} Appendix A, Ibid.
\textsuperscript{539} Described in 5.9.
5.14.3. New vessel safety compromised by old operational failings.

Also obvious was the absence of any interest in keeping a good lookout, even from high-speed vessels. The normal judgement and care required to safely berth vessels without damage was also obviously absent. Despite the generally, but not always, benign weather conditions applying in the region, all of the local ferries showed numerous dents and other minor damage. Most vessels were in poor to very dilapidated condition, even when less than twenty years old. Image 3.20 showing the *Spice Islander* illustrates this phenomenon very clearly in the case of an older vessel.

As discussed in previous case studies describing other similarly developing countries, the vast numbers of cars in the capital, Dar es Salaam, indicate that some of Tanzania’s growing wealth is being spread. That should mean that the country could afford to upgrade its ferries. In fact, a trickle of modern, well-equipped ferries is entering the country.

The *Kilimanjaro II* is one of them. It is both modern and well equipped. It has six near sister-ships. However, it was once plainly the victim of very poor seamanship on the part of its crew. Driven too fast for the conditions, it nose-dived into a sea. Twenty-five of the passengers sitting on its bow were swept overboard and, following a botched rescue effort, they drowned.\(^{540}\)

Normal, global standards of seamanship would have prevented the accident in the first place and then would have ensured the recovery of many more, if not all, of the passengers who were swept overboard. In any case, none of the passengers should have been permitted to travel on the bow in any conditions.

*Skagit*, too, was comparatively modern but she had been dangerously modified and made unstable in order to enable greater carrying capacity. She had been badly overloaded and incompetently handled. Thus, some 293 people died when the vessel capsized in 2012 between Zanzibar and Dar es Salam.\(^{541}\)

5.14.4. Good reform potential once bad habits are eliminated.

Tanzania has a long way to go in terms of ferry safety but, like the other seven promising countries mentioned above (excluding DR Congo and Haiti), and thanks to its improving economy, it appears to have real potential for improvement. Again, such reform is unlikely to be locally inspired or generated, even with a fast growing tourism industry. Any reform that comes about will require support and encouragement from IMO, European nations and, possibly, the classification societies and NGOs.

5.15.0. The ten most dangerous countries in summary.

With the probable, realistic and tragic exceptions of DR Congo and Haiti, the author considers that the remaining eight of the worst ten countries have very real potential for the reform of their ferry services. With the support of ICAO, those countries have

\(^{540}\) Appendix A, Ibid.
\(^{541}\) Ibid.
generally managed to achieve significant improvements in the safety of their civil aviation operations. Indonesia, though, is still regarded as a laggard by ICAO.\textsuperscript{542} This has been achieved through a combination of introducing better, more modern and safer aircraft with improvements in ground facilities, air-traffic control, and actual flight operations.

Owing to data deficiencies, Myanmar has been included in this list but only by extrapolating from its record since 2007.\textsuperscript{543} Given its similarities with neighbouring Bangladesh and its appalling record over the years 2007-2015, it seems logical to have done so. As China is economically strong enough to fund and organise its own internal reforms, that leaves only seven nations, having real potential for reform, but require substantial assistance to achieve it.

More positively, the economies of Bangladesh, Indonesia, Myanmar and the Philippines are all improving.\textsuperscript{544} Those countries are steadily becoming less poor. That should definitely assist in the improvement of their ferry safety records.

The ten worst countries combined have been responsible for at least 78 per cent, and probably 80 per cent, of the world’s ferry fatalities over the half-century to 2015. It is obvious that if IMO and other supporting organisations were able to bring about worthwhile reform in just seven of those ten countries, and encourage China to reform itself, it would make a very significant improvement in the global ferry fatality statistics. Haiti and DR Congo could be tackled later.

Given their apparent potential for rapid reform, it would seem logical to attempt the Philippines first, followed by Bangladesh, Indonesia, Tanzania, Myanmar, Egypt and Senegal, in that order.

If IMO could be persuaded to follow the example of ICAO, it seems reasonable to expect that similar improvements could be achieved with the ferries in those countries. First, though, IMO must be prepared to change its „mindset“ or policy of “not interfering in the internal matters of its sovereign member nations”. Such activities need not represent interfering. Rather, they should be presented as assisting, supporting and encouraging those nations to bring about much needed reforms. What is required from IMO is leadership of the kind that ICAO has been demonstrating for decades.

\textsuperscript{542} ICAO, 2011 State of Global Aviation Safety, ICAO, Montreal, 2011.
\textsuperscript{543} Appendix A, Ibid.
\textsuperscript{544} All four countries have GDP growth rates of at least 3.5 per cent per annum for the past 50 years although, obviously, all started from very low bases. See 5.2. Economic and Cultural Comparison above.
Chapter 6

Technical factors – Mechanical, structural and design

Fewer than eight per cent of fatal ferry accidents and two per cent of fatalities were caused by mechanical or structural failures. Human factors are almost invariably the cause of fatal accidents.

6.1.0. Human factors are almost invariably the cause of fatal accidents.

6.1.1. Technical factors have caused fewer than twelve per cent of fatal ferry accidents and two per cent of fatalities. Human error is the real problem.

As described in Chapters 1 and 2, the majority of passenger vessel accidents have been caused by various forms of human error. Fewer than twelve per cent of the 750 known fatal accidents that occurred between 1966 and 2015 were caused by technical factors, pure accident, sabotage, murder or suicide. Of those, fewer than eight per cent of fatal accidents resulted from mechanical or structural failure. In terms of numbers of fatalities, the figure was nearer two per cent.

Similar proportions apply to the 91 per cent of passenger vessels that are ferries. Accidents attributed to non-human induced mechanical failure rarely result in fatalities. Even if a vessel’s engine or engines break down, or if it catches fire, it will normally be able to be towed to a safe harbour. Such accidents are rarely reported in the general or, even, maritime media.

Certainly, as a perusal of the *Baird Maritime Passenger Vessel Accident (BMPVA) database* makes clear, fatalities have on occasion arisen from such failures. However, examples of such accidents are rare. Of the 681 fatal ferry accidents listed, only 14 or 0.2 per cent were described as resulting from „engine failure“ or „disintegration“ as classified under Type of Incident. Of those, seven, or 50 per cent, involved the disintegration of Filipino motor bancas. However, all of those have ultimately been the result of poor maintenance, inadequate design or construction or general negligence, all human factors.

Indeed, even the capsizes of various Filipino motor bancas following the loss of an outrigger float due to structural failure, could be construed as being due

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545 Appendix A, Ibid.
546 Ibid.
547 Ibid.
to human errors in their design, construction or, more likely, maintenance. One, two or all three must surely be at fault. The disintegration of the large motor banca *Kim Nirvana*, described in Chapter 1, is a good example of that.

6.1.2. Most structural or mechanical failures are due to human error, usually inadequate maintenance.

Examining the database columns in the **BMPVA database**: Claimed cause; Author assessed cause; and, Inquiry adjudication, numerous references to „human error/unseaworthy” can be found.\(^{548}\) In almost every case, however, the only conclusion that can be drawn from the available facts is that any of the very few alleged mechanical or structural failings were primarily due to some form of human error such as negligence, inadequate design, dangerous modifications or poor maintenance.

No cases of pure mechanical or structural failure that are entirely devoid of human influence are recorded in the **BMPVA database**.\(^{549}\) In fact, if a spontaneous mechanical failure occurs, except in the case of motor bancas, it is very unlikely that the vessel concerned will proceed into a catastrophic fatal accident. Similarly, there are very few known examples of spontaneous, non-human induced structural failure that have led to fatal accidents. Pure technical failure simply does not happen. It is irrelevant as a cause of passenger vessel fatalities.

Of the fourteen cases described in 6.1.1, seven were wooden motor bancas, one was an aluminium catamaran, one was constructed of FRP and another of steel. The remaining four were all of wooden construction.

6.1.3. Fires, too, are primarily due to human error.

Much the same applies to fires. While the database lists numerous examples of fires, there are none that have ignited spontaneously. All can be attributed to human errors of either omission or commission.\(^{550}\) Discarded cigarette butts have been a major cause of fires. They have been thrown onto oil or petrol puddles, paper and plastic furnishing material, among petrol fuelled cars and motor cycles, and into inflammable cargoes. Fires have, on rare occasions, been caused by collisions and by fuel, particularly petrol, being stored dangerously close to hot engines. It must be emphasised that such incidents are very rare and that discarded cigarette butts are the major cause of such ignition. Again, they are all, ultimately, caused by human error.

Indeed, Melbourne broadcaster Jon Faine graphically describes his concern at such cigarette carelessness in the chapter titled *Scary Ferry* in his 2009 book *From Here to There*.\(^{551}\) He was horrified by the carelessness of both passengers and crew on an Indonesian conventional Ro-Pax ferry on a

\(^{548}\) Appendix A, Ibid.  
\(^{549}\) Ibid.  
\(^{550}\) Ibid.  
\(^{551}\) Faine, J & J. Ibid.
voyage during which they routinely ignored NO SMOKING signs and, indeed, threw smouldering cigarette butts onto an oil and petrol soaked vehicle deck. Personal observation by the author and anecdotal comments confirm that nothing has changed since in that regard.

The impressive and active European Maritime Safety Agency (EMSA) has become so concerned about the problem of fires on conventional Ro-Pax vessels that it conducted a comprehensive inquiry into the subject. A very clear and remarkably practical report of that inquiry: Study investigating cost effective measures for reducing the risk from fires on ro-ro passenger ships (FIRESAFE), was published in 2016. Unsurprisingly, the main and most practical recommendation arising from that inquiry focused on the need for better training of mariners. Perhaps that was because only two of the report’s eight authors were naval architects! They, presumably, would have recommended complex and expensive engineering solutions to an essentially human behavioural problem.

IUMI, the International Union of Marine Insurers, too, has expressed its concern over the safety of Ro-Ro/Ro-Pax vessels particularly with respect to their vulnerability to vehicle deck fires.

6.1.4. Almost all vessels are at least adequately designed and built.

The reality, as stated in Chapter 1, is that most vessels are at least adequately designed and built. Putting aside human errors, even the most basic of vessels can be navigated safely if they are operated in the manner and in the environment for which they were designed. A competent seaman can and one has even circumnavigated much of the globe in a log canoe.

It is incomprehensible, therefore, that IMO should waste significant quantities of time and money in arguing about mathematical formulae related to tolerance for damage resulting from a hole in a hull. This, in fact, happened in November 2016 during a meeting of the Maritime Safety Committee of IMO. It would be far more sensible if IMO were to focus its efforts on preventing the hull being holed in the first place.

Given the foregoing, IMO could safely assume that the vast majority of naval architects and shipbuilders have the problems of holes in hulls well under control. IMO, unfortunately, does appear to have a strong inclination towards

554 Voss, J. C. Ibid.
555 Choice of two formulae to be discussed at the 97th session of the Maritime Safety Committee (MSC) of IMO. See IMO to focus on Passenger Ship Safety Level, in www.marinelink.com/news/passenger-safety-focus-418535.
556 See press release from Danish Maritime Authority, Passenger ship safety level to be considered by IMO, 18 November 2016, and IMO press release, 14 November 2016.
trying to find expensive technical solutions to simple human problems. This inclination appears to be fuelled by North European and Scandinavian design consultants and naval architecture academics promoting their own, usually complex and expensive solutions to perceived problems.\textsuperscript{557} A corporate sense of proportion in IMO would be very welcome. It would be far better if it were to focus its limited resources on the real causes of most safety problems. As well as modelling itself on ICAO, it would probably be beneficial if it were to closely examine the activities of the very impressive European Maritime Safety Agency (EMSA).

Perhaps, if IMO were to focus more on its self-declared role whereby: “IMO measures cover all aspects of international shipping – including ship design, construction, equipment, manning, operation and disposal – to ensure that this vital sector for (sic) remains safe, environmentally sound, energy efficient and secure”, there would be fewer fatal ferry accidents.\textsuperscript{558}

6.2.1. Conventional, monohull Ro-Pax ferries are statistically a very significant problem.

There is one very important exception to the general rule concerning structural and mechanical causes of accidents. That concerns the very convenient but conceptually unseaworthy conventional monohull Roll-On-Roll-Off (Ro-Ro) or Roll-On-Roll-Off Passenger Vehicle (Ro-Pax) ferries that have been involved in 135 or 18 per cent of fatal ferry accidents and 25 per cent of fatalities over the fifty years studied.\textsuperscript{559} It is estimated that around 4,000 to 6,000 conventional monohull Ro-Pax ferries are currently in service. That figure includes cross-river ferries and landing craft types of all sizes.\textsuperscript{560}

For the 16 years from 2000 to 2015, the monohull Ro-Pax percentage of fatal ferry accidents reduced from 18 to 16 per cent. However the percentage of ferry fatalities attributable to monohull Ro-Pax accidents increased significantly from 25 to 32 per cent over that same period.\textsuperscript{561} There were a total of 91 accidents causing 10,031 fatalities involving conventional Ro-Pax ferries in that latter period. This is quite disproportional to the actual numbers of such vessels in the industry.\textsuperscript{562} It is more nearly proportional to the increasing numbers of elderly monohull Ro-Pax ferries being sold to poorer countries.

The Ro-Pax concept developed during the Second World War when a demand arose for large amphibious landing ships to transfer tanks, trucks and other large vehicles directly onto beaches during seaborne invasions. Thus

\textsuperscript{558} From \textit{Introduction to IMO}, www.imo.org/en/About/Pages/.\textsuperscript{559}
\textsuperscript{559} Appendix A, Ibid.
\textsuperscript{560} The author estimates that Ro-Pax ferries represent fewer than ten per cent of the total global ferry fleet.
were Landing Ship Tanks (LST) conceived.\textsuperscript{563} They evolved into various forms and sizes of landing craft for civilian use. Then, during the 1960s, quite large and complex monohull Ro-Pax ferries were designed and built, initially in Northern Europe, but soon after in North America, Japan, Korea and Australia.\textsuperscript{564} Such expensive ships necessitated considerable investment by the ferry industry in both vessels and their attendant infrastructure such as berths and loading ramps.

\textbf{6.2.2. Fatal conceptual flaw of conventional monohull Ro-Pax ferries makes them particularly vulnerable in an accident.}

Ro-Pax ferry vehicle decks and access doors, except in the case of multi-hulled Ro-Pax ferries, have proved to be fatal conceptual design flaws. They have numerous vulnerabilities.\textsuperscript{565} They, as can be seen from the BMPVA database, are made much worse by age and inadequate maintenance as well as by stability-robbing modifications and inadequate crewing.\textsuperscript{566} They have a significant propensity to capsize and sink following incidents such as capsizes, groundings and fires that other vessels would normally survive.

Even the staunchest exponents of the conventional monohull Ro-Pax ferry concept in Northern Europe have had to admit that the concept has its flaws. In its Public Final Report, the Safer EURORO “Thematic Network” based at the University of Strathclyde’s Ship Stability Research Centre presented a number of suggested means by which monohull Ro-Pax ferries could be made safer.\textsuperscript{567} In something of an EU funded case of “locking the stable door after the horse had bolted”, the report urged a number of professionally self-serving design and structural changes but mostly ignored the fundamental problem of human error. Many of the recommended „improvements” had, in any case, already been implemented six years previously with the introduction of the Stockholm Rule.\textsuperscript{568}

Interestingly, 60 per cent of the vessels described in the case studies of major accidents in Chapter 3, were conventional monohull Ro-Pax ferries. One of their major flaws is that they are conceptually required to have at least one, and frequently two, large holes in their hulls just above the static waterline. They are the doors giving access to the vehicle deck or decks. The Chapter 3 case studies highlight the particular vulnerabilities of such craft. The accompanying images illustrate those weak points well. They are generally large vessels and, so, experience very high death tolls when they are involved in accidents. Because their main role is to carry motor vehicles, they sometimes experience fuel spills, particularly of petrol, on the vehicle deck.

\textsuperscript{565} Refer to General Arrangement drawing of the \textit{Estonia}, Image 6.2. in 6.3.1. below.
\textsuperscript{566} As, for example, in the cases of the \textit{Sewol} and \textit{Al Salam Boccaccio 98} as described in Chapter 3.
Several fatal fires on conventional Ro-Pax ferries have been caused by carelessly discarded cigarette butts igniting those fuel spills.\footnote{See Appendix A, Ibid and Chapter 3 for examples.}

Because of their usually large and complex structures, egress from capsized conventional Ro-Pax ferries is often difficult, if not impossible. As the data in the BMPVA database clearly shows, capsizes are the almost inevitable outcome of collisions and groundings when conventional Ro-Pax ferries are involved because their stability is compromised by the free surface effect of water on their vehicle decks.\footnote{Appendix A, Ibid.} This egress difficulty is often made worse by the illogical positioning of life jackets. This subject has been well explained by respected American naval architect Bruce Hutchison in his October 2017 paper, \textit{Capsize Egress and Survival with Particular Reference to Ro-Ro \& Passenger Vessels}.\footnote{Presented at the Society of Naval Architects and Marine Engineers (SNAME) Conference in Houston, Texas, 24-27 October 2017, \url{www.sname.org}.} Mr Hutchison further explained that: "A salient feature of many (Ro-Pax) capsizes is the rapidity with which it (sic) proceeds".

A brief and very simple article describing the dangers of Ro-Ro ships from a crewman’s perspective was published in 2016 under the heading: \textit{8 Reasons That Make Ro-Ro Ship Unsafe to Work On}.\footnote{Karan, C. in Marine Safety, 9 November 2016. \url{www.marineinsight.com/marine-safety/}.} Its revelations are disturbing. It is a pity that IMO’s “Panel of Experts” and other conventional Ro-Ro apologist theoreticians, mentioned below, will be unlikely to read them.

IMO, impressively, published a paper in 1997 that recognised many of the weaknesses and risks associated with conventional monohull Ro-Ro (or Ro-Pax) vessels.\footnote{Anon. \textit{IMO and ro-ro safety}, IMO, London, January 1997. \url{www.imo.org}.} However, it examined all the known „problem areas“ but ranked crew inadequacies in seventh and last place in their rankings. Regrettably, however, its “Panel of Experts” focused on north European vessels and continued with its highly technical and theoretical approach to very obvious and quite simple problems. In that region, by 1997, the safety problems had largely been contained. The by then well-known problems of conventional Ro-Pax vessels in developing countries were, as usual, not considered nor even mentioned. They have, as noted, continued unabated and largely unrecognised by IMO.\footnote{See Appendix A, Ibid to December 2017.}

6.2.3. \textbf{Southward migration of elderly monohull Ro-Pax ships is a serious danger.}

Since the 1970s, older, obsolete and surplus examples of conventional Ro-Pax ships have migrated southward through the Mediterranean to Africa and from Japan to China, Korea, the Philippines and Indonesia.\footnote{See case studies on Egypt, Indonesia, Philippines, Senegal and Tanzania in Chapter 5.} \textit{Al Salam Boccaccio 98, Da Shun, Le Joola, Sewol, Tamponas II, Moby Prince, Salem Express, Senopati Nusantara, Princess of the Stars} and \textit{Spice Islander} were all typical examples of that phenomenon. Even as recently as February 2017,
an elderly Stena Ro-Pax-Rail ferry was sold via Greece to Iran.576 And, even worse, in March 2017, Washington State Ferries of the United States sold a 63 year old monohull Ro-Pax ferry *Evergreen State* to Grenada for USD 300,000.577 This, after seeing its passenger only ferry *Skagit* sold on, via an intermediary, to Tanzania and capsizing and sinking in 2012 with the loss of 150 to, more likely, 296 lives.576

The *Evergreen State*, apart from being very old, was designed for the sheltered waters of Puget Sound, not for the exposed waters of the aptly named Windward Islands. *Skagit*, incidentally, was built to a Gulf of Mexico crew/supply boat design with an extra deck added to give it more passenger space and less stability. That further facilitated the overloading that led to its capsize. It was sold, via an intermediary, for a similarly derisory USD 400,000.579

Even more alarmingly, BC Ferries, the British Columbia provincial government owned ferry company is understood to have sold a 65 year old protected waters Ro-Pax ferry to windy Fiji.580 Reportedly, this August 2017 sale was inspired by the inability of BC Ferries to arrange scrapping of the vessel in North America because of the amount of asbestos it contained.581 It must be emphasised that both Washington State Ferries and BC Ferries are government owned organisations.582

While there were several fatal accidents involving conventional Ro-Pax ferries in Northern Europe such as those involving *European Gateway, Herald of Free Enterprise, Scandinavian Star, Estonia* and others, the problem became much worse in the developing world.583 It was made so by the gross overloading that was commonly practiced on dangerously modified and poorly maintained and operated vessels there. Most of the really large death tolls have arisen on elderly, significantly modified and often neglected Ro-Pax vessels operating in developing countries.584 Some of those are described in detail in Chapter 3.

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578 Appendix A, Ibid.
580 Affected for the major part of the year by Trade Winds that blow at around 20-25 knots.
581 Reported to the author by senior executives of BC Ferries at the INTERFERRY 2017 Conference in Split in October 2017.
583 Appendix A, Ibid.
6.2.4. Thirty-two per cent of ferry fatalities have involved Ro-Pax ships. Ninety-eight per cent of those occurred in developing countries.

Since January 2000 some 32 per cent of ferry fatalities involved conventional, mostly elderly, second-hand Ro-Pax ferries. Of those, 98 per cent occurred in developing countries. This is disgracefully disproportionate.

While there have only been eight known fatal Ro-Pax accidents, and 11 fatalities, in Northern Europe since 2000, there have been seventeen accidents resulting in 186 fatalities in the Mediterranean Sea. So, even the so-called developed countries of Spain, Italy, France, Turkey and Greece have not yet been able to make their Ro-Pax ferries completely safe. The known Ro-Pax death toll in developing countries reached 9,809 in 58 accidents between 1 January 2000 and 31 December 2015. The comparable figures for developed countries were 224 fatalities in 33 accidents.


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<tr>
<th>Region/Country</th>
<th>North Europe/Baltic</th>
<th>Russia</th>
<th>Med/Turkey</th>
<th>North America*</th>
<th>Latin America</th>
<th>Africa/Middle East</th>
<th>Japan</th>
<th>Asia (ex. Japan)</th>
<th>Oceania</th>
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<td>9</td>
<td>11</td>
<td>1.5</td>
<td>N/A</td>
<td>428</td>
<td>1</td>
<td>89</td>
<td>40</td>
<td>110</td>
</tr>
<tr>
<td>Percentage of total fatalities</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>58%</td>
<td>0%</td>
<td>37%</td>
<td>1%</td>
<td>100%</td>
</tr>
</tbody>
</table>

*All BC Ferries


The numbers of fatalities in developing countries are obviously exacerbated by the overcrowding and evacuation, smoking discipline, lifesaving and rescue problems that are the norm there. There were seven fatalities per Ro-Pax accident in developed countries but 169 in developing countries. So, thanks to the poverty factor, you are more than 24 times as likely to die in a Ro-Pax accident in a developing country as elsewhere.

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585 Appendix A, Ibid.
586 Ibid.
587 See Ibid.
588 Appendix A, Ibid.
589 Ibid.
590 This has also been commented on by Hutchison, B. Ibid.
Put bluntly, developing countries simply do not have the cultural, educational, regulatory and enforcement wherewithal to ensure the safe operation of such complex and inherently vulnerable ships as conventional monohull Ro-Pax ferries.

The dangers of elderly, poorly maintained, imported, conventional Ro-Ro and Ro-Pax ships was noted by Lu Cheng in the Chinese magazine *World Ships & Boats* in 2000. Lu described the capsize and sinking of the sixteen year old Japanese built Ro-Pax *Da Shun* in Bo Hai Bay, northern China in 1999. That accident starkly highlighted the risks associated with poorer countries importing such vessels from richer ones. Without exception, the conventional Ro-Pax ferries involved in fatal accidents in developing and Mediterranean countries are old. Fortunately, albeit slowly, the Chinese government seems to have heeded Mr Lu’s warning. Less fortunately, many other ferry dependent developing countries have failed to heed that warning.

During the 1990s numerous conferences were held by naval architecture schools, learned institutions, classification societies and, of course, by the Maritime Safety Committee of IMO to investigate the problems of conventional monohull Ro-Ro/Ro-Pax vessel safety. These followed and were largely inspired by the *European Gateway, Herald of Free Enterprise, Scandinavian Star, Jan Hewelius* and *Estonia* disasters among others. Probably the most important development arising from those was the implementation of the so-called Stockholm Rules (Or Stockholm Agreement) in the North European countries in 1996.

The Stockholm Agreement was made among several Scandinavian and North-West European Ro-Pax ferry operating states and IMO. Its objective was to prevent further accidents involving conventional Ro-Pax ferries. Fundamentally, the rules aimed at improving the stability and hence the safety of such vessels by addressing their most basic conceptual design weakness. That was to significantly reduce the so-called „free surface“ effects of water on their low, long, open and wide vehicle decks. This was achieved through an amendment to and development of the SOLAS Code. They also defined operating limits as to wave heights and sea conditions. The Rules only apply to international voyages among the 18 nations involved. They did not come into force for six years (in 2002) and there were a number of exemptions.

While the Stockholm Rules, unarguably, has been effective in preventing further fatal accidents in those countries, it has, arguably, been equally effective in moving the problem southward. The ships that were deemed unsafe to operate in the Baltic and North seas and English Channel were...

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592 See Appendix A, Ibid for construction dates.
593 Presented by, among others, The Royal Institution of Naval Architects, DNV, Lloyd’s Register and ABS.
simply sold to operators in the Mediterranean and Africa. There they were frequently modified to increase their capacity and inadequately maintained so as to make them even less safe.\textsuperscript{596} They have been involved in numerous accidents, some of them fatal. Indeed, too many of them as the BMPVA database so clearly shows.\textsuperscript{597}

Ironically, IMO claims its measures cover all aspects of international shipping including, among others, disposal of vessels.\textsuperscript{598} Clearly, it has failed completely to prevent the sale (or disposal) of dangerous, elderly, monohull Ro-Pax ferries from richer to poorer countries. That gross and tragic failure should be more widely exposed, condemned and corrected.

\textbf{6.2.6. Dangers of „grandfathering“:}

There was also the problem of „grandfathering“ whereby older ferries were permitted to continue to operate with only very minor modifications made to slightly improve their safety.\textsuperscript{599} The discussions and debates on that matter and their resultant compromises were hardly the finest demonstration of the ethics and professionalism of the naval architecture profession, most notably of the academic and regulatory branches of it. Safety, which should never be compromised, often was, particularly where it concerned the safety of non-northern European people. Nor, however, could the discussions and debates withstand the lobbying efforts of, mainly north European, Ro-Pax ferry owners, designers and builders and their self-proclaimed „objective“ academic advisers.

As with so many such controversies and debates, the real problem was obscured. The safety of passengers was accorded less importance than the investments of owners and the reputations of certain naval architects, shipbuilders and regulators. Remarkably, the clearly flawed concept of conventional monohull Ro-Pax ferries was permitted to survive with relatively few changes. Simultaneously, of course, many of those same actors, tried very hard to prevent and delay the introduction of the modern, high-speed, aluminium catamaran Ro-Pax ferries\textsuperscript{600} that have proved to be so much safer and less expensive than their conventional steel monohull predecessors.\textsuperscript{601}

\textsuperscript{596} For example Al Salam Boccaccio 98 and Le Joola as described in Chapter 3.
\textsuperscript{597} See Appendix A, Ibid and, more particularly, Appendix H, List of known fatal Ro-Pax ferry accidents.
\textsuperscript{598} Refer to Introduction to IMO, Ibid.
\textsuperscript{599} „Grandfathering“ with not very onerous restrictions has been permitted under both SOLAS and the Stockholm Rules.
\textsuperscript{600} Mostly developed initially in Australia by the Incat and Austal shipbuilding companies. See Jeffs, A. Ibid.
\textsuperscript{601} The author contends that the motive for the original introduction of the High Speed Craft code was a deliberate attempt by the maritime authorities of, particularly, the UK, Denmark and Germany to prevent the development of such craft in Australia because those European countries possessed no such technology.
6.2.7. Fast ferries, particularly multihulls, are very safe ferries.

That negative activity actually resulted in an unintended positive consequence in the implementation of the High Speed Code by IMO. That Code has contributed to the excellent safety reputation of high speed ferries generally operating on both domestic and international routes.\textsuperscript{602} Ironically, if certain of the very stringent safety provisions of the HSC Code, particularly those pertaining to fire safety, were to be extended to conventional Ro-Pax ferries, it would be likely to make them significantly safer.\textsuperscript{603} For the purposes of this work, fast or high speed ferries are defined as those having a service speed exceeding 25 knots.

Without exception, all 36 known fatal high speed ferry accidents have been attributed to human error.\textsuperscript{604} Of those, 27 (75 per cent) were either collisions or groundings. Seven (19 per cent) of those 36 accidents involved fast Ro-Pax ferries and they resulted in a total of nine fatalities, less than two per cent of the total of fast ferry fatalities and an infinitesimal proportion of all ferry fatalities.\textsuperscript{605} There have been 554 fast ferry fatalities but, of those, 318 (or 57\%) were the result of just two accidents involving passenger only fast ferries in Tanzania.\textsuperscript{606}

One of those involved the Skagit, a modified, four engined, Gulf of Mexico crew/supply Offshore Service Vessel (OSV) fitted with an additional deck that made it unstable in open sea conditions, particularly when overloaded. That vessel was originally built for Washington State Ferries to operate in the benign waters of Puget Sound on the west coast of the United States. It was sold, via an intermediary, to Tanzania where, soon afterwards, operating in the open Indian Ocean, and apparently grossly overloaded, it capsized killing an estimated 296 people, 53 per cent of the fifty year fast ferry fatality total.

Frighteningly, similar vessels are currently operating in the Philippines. They are former crew/supply OSVs that have been converted to ferry operations by the simple but dangerous expedient of adding an extra passenger deck.\textsuperscript{607}

\textsuperscript{602} Refer to Appendix E, List of Known Fatal Fast Ferry Accidents 1966-2015. Drawn from Appendix A, the BMPVA database.
\textsuperscript{604} Refer to Table 6.1.
\textsuperscript{605} See Appendix E, Ibid.
\textsuperscript{606} Ibid.
\textsuperscript{607} The author observed two such craft operating between Cataclan on Panay Island and Boracay Island in February 2017.
Image 6.1. The demise of the formerly Washington State Ferries owned Skagit serves as a stark reminder of the dangers of selling inappropriate vessels to developing countries. In this case Tanzania (Wikipedia).

Two years later, in 2014, another fast ferry Kilimanjaro II nosedived at speed in rough seas off Zanzibar.\textsuperscript{608} Twenty-five passengers, who should not have been riding there, were washed off the bow and drowned. There was no significant damage to the ferry and, remarkably, little effort appears to have been made to recover the victims. Kilimanjaro II was a very well designed, built and equipped vessel from the Australian shipyard Richardson Devine Marine.\textsuperscript{609} It was, quite clearly, operated negligently to the point of recklessness.

Fewer than 20 (less than one per cent) fast ferries of the approximately 2,000 that have ever been built have operated in Tanzania. It is very disturbing, therefore, that 57 per cent of all known fast ferry fatalities have occurred in just two accidents in that country.\textsuperscript{610} Having closely observed and experienced ferry operations there, the author is unsurprised at that appalling reality.

Notably, seven of the 36 known fatal accidents involving fast ferries occurred in the Pearl River delta region of China around Hong Kong, Macao and Zhuhai. There are considerably more fast ferries, catamarans and jetfoils, operating in that area than anywhere else on earth.\textsuperscript{611} Those seven accidents resulted in 21 fatalities, an average of three per accident with a maximum of four. All were caused by allisions or collisions. Most fatalities were due to impact injuries.\textsuperscript{612}

\begin{itemize}
  \item \textsuperscript{608} Appendix A, Ibid.
  \item \textsuperscript{609} Ibid.
  \item \textsuperscript{610} According to the \textit{Fast Ferry International Database} there were 1,732 fast ferries in service in June 2017 of a total of about 2,000 ever built. Of them, about 1,200 are multihulls.
  \item \textsuperscript{611} \textit{Fast Ferry International Database}, Ibid.
  \item \textsuperscript{612} See Table 6.1, for details and Appendix A for report references.
\end{itemize}
6.2.8. Fast ferry fatality summary.

<table>
<thead>
<tr>
<th>Vessel Type/Region</th>
<th>Monohull Pax only</th>
<th>Monohull %</th>
<th>Hydrofoil / Hovercraft / Jetfoil</th>
<th>Hydrofoil / Hovercraft / Jetfoil %</th>
<th>Fast Ro Pax</th>
<th>Fast Ro Pax %</th>
<th>Multihull Pax only</th>
<th>Multihull Pax only %</th>
<th>Regional Total</th>
<th>Regional Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediterranean</td>
<td>1</td>
<td>&lt;1%</td>
<td>6</td>
<td>1.4%</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1%</td>
<td>12</td>
<td>2.20%</td>
</tr>
<tr>
<td>Northern Europe</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>1%</td>
<td>7</td>
<td>1</td>
<td>18</td>
<td>3.2%</td>
<td>33</td>
<td>6%</td>
</tr>
<tr>
<td>Pearl River Delta</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>&lt;1%</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td>2.9%</td>
<td>17</td>
<td>3%</td>
</tr>
<tr>
<td>Tanzania</td>
<td>293</td>
<td>53%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>4.5%</td>
<td>31/8</td>
<td>57.5%</td>
</tr>
<tr>
<td>Other</td>
<td>142</td>
<td>26%</td>
<td>22</td>
<td>4%</td>
<td>1</td>
<td>&lt;1%</td>
<td>6</td>
<td>1%</td>
<td>17/1</td>
<td>31%</td>
</tr>
<tr>
<td>Total Fleet</td>
<td>436</td>
<td>79%</td>
<td>27</td>
<td>5%</td>
<td>9</td>
<td>1.60%</td>
<td>69</td>
<td>12.5%</td>
<td>55/4</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 6.2. Summary of fast ferry fatalities by vessel type and region 1966-2015 (BMPVA database).

Eleven of the total of 36 fatal fast ferry accidents involved hydrofoils or jetfoils, a disproportionately high percentage of 30 per cent. The author estimates that fewer than 13 per cent of fast ferries are of the hydrofoil or jetfoil type. It is interesting and telling that five fast ferry owning companies had vessels involved in at least two fatal accidents each. Ten fatal accidents, or 28 per cent of the total, involved Italian built craft. This, also, is disproportionate.

In terms of the overall safety record of fast ferries, it is very important to note that, while they represent no more than five per cent of the total global ferry fleet, they have been involved in fewer than .05 per cent of the fatal accidents recorded in the BMPVA database. Even more importantly, they were responsible for a mere .01 per cent of fatalities. Fast ferries, especially properly designed, constructed and maintained multi-hulled fast ferries, are indeed very safe ferries. Catamaran fast ferries have not been known to capsize or sink, except for one suspicious recent case in the Philippines. Trimaran ferries are not known to have ever been involved in any fatal accidents.

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613 From Fast Ferry International Database. Ibid.
614 Refer to Appendix E, List of all known fatal fast ferry accidents.
615 Appendix A, Ibid.
616 See appendix A, Ibid. 21 December 2017, the Mercraft 3.
617 Ibid.
Of the 554 fatalities that occurred in fast ferry accidents, 435, or 79 per cent involved monohulls, 36 (6.5 per cent) involved hydrofoils and jetfoils and 82, or 15 per cent, catamarans.\textsuperscript{618} As catamarans, at around 1,200 in total, represent 60 per cent of the total fast ferry fleet, monohulls 26 per cent and hydrofoils and jetfoils 14 per cent, catamaran fast ferries are clearly considerably safer than other types.\textsuperscript{619}

There are two main reasons for this. Properly designed constructed and maintained catamaran (and trimaran) ferries are both more stable and less likely to sink than conventional monohull ferries. They are more stable because they are considerably wider compared with their length and usually have a significantly lower centre of gravity. Therefore, they are very unlikely to capsize. Indeed, none are known to have done so.\textsuperscript{620} Further, their widely separated hulls are also multi-compartmented. Most of those compartments are watertight.\textsuperscript{621} So, in the event of their grounding or colliding with another vessel, the majority of those compartments will not be breeched enabling the catamaran to remain afloat and reasonably level.

\textsuperscript{618} Ibid.
\textsuperscript{619} Data from \textit{Fast Ferry International Database}.
\textsuperscript{620} Appendix A, Ibid.
\textsuperscript{621} Refer to Image 6.3. in 6.3.3. below.
6.3.1. Conventional monohull Ro-Pax ferries are inherently dangerous.

Image 6.2. General arrangement drawing of the Estonia, previously Viking Sally, a typical but particularly tragic example of a late 1980s conventional Ro-Pax ferry. Note particularly that the lower of two, wide-open vehicle decks is barely above the static waterline. There is even accommodation beneath the lower vehicle deck and, therefore, below the static waterline. The bow and stern doors inherent in the traditional, monohull Ro-Pax design concept, make the vessels particularly vulnerable to flooding of the vehicle deck and beneath it (Source: Viking Line brochure).
In addition to the damaged stability, and even undamaged stability, vulnerability that their design concept involves, conventional monohull Ro-Pax ferries have also proved to be exceptionally vulnerable to fires. Those fires have mostly ignited in their vehicular cargoes or on spilt fuel on their vehicle decks and spread rapidly, especially where their vehicle decks are partially open to the elements. The fire on board the *Norman Atlantic* in the Ionian Sea as recently as December 2014 is a case in point. A vehicle deck fire on that ship resulted in 32 fatalities.

Naturally, owners of existing conventional Ro-Pax vessels and those financially dependent on them such as Ro-Pax designers, builders and equipment suppliers as well as academic naval architect „expert witnesses”, advocated that existing vessels should have been “grandfathered” and allowed to operate largely as built.

The author believes the concept of conventional monohull Ro-Pax ferries is fundamentally dangerous. The idea of a vessel usually able to be opened at both ends, with a large open vehicle deck between, protected by complex mechanical doors and positioned only slightly above the vessel’s static waterline, simply incorporates too many weak points. Even when there is only one vehicle door located at one end of the vessel as in the case of „landing craft” type Ro-Pax ferries, that vulnerability remains because the single access door is normally at the bow and the vehicle deck is usually too close to the vessel’s static waterline.

**6.3.2. Multi-hulled Ro-Pax ferries have proved to be significantly safer.**

Correctly designed, constructed and maintained multi-hulled Ro-Pax ferries are quite different in that their vehicle decks are located well above their static waterline. Any water taken aboard can, by virtue of that height above their waterline, be simply drained away by gravity. Their two or three distinctly separate hulls are sub-divided into numerous watertight compartments. Even their bridging decks are normally buoyant in themselves. In the case of the Incat 98 metre vessel illustrated in Image 6.3, there are eight such compartments in each hull.

Further, the larger examples are wide enough to not require a forward vehicle access door. Vehicles, even large semi-trailers can be easily turned around on the vehicle deck. Importantly, under the HSC Code, they are required to have far superior fire prevention systems than their conventional monohulled counterparts that operate under the SOLAS Code. Conclusively and very notably, not one multi-hulled Ro-Pax ferry has been involved in any kind of serious accident since they were first introduced in 1988.

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622 The Australian, News Corp, Sydney, 31 December 2014.
623 Appendix A, Ibid.
625 The HSC and SOLAS codes are available from IMO, Ibid.
626 Appendix A, Ibid.
Image 6.3. shows a General Arrangement Drawing of a 98 metre high speed catamaran Ro-Pax ferry designed and constructed by Incat in Tasmania. It is not unique. A number of competing vessels have been built by Austal, Damen, Finnyards and other shipyards.\textsuperscript{627}

Notably, apart from their impressive safety records, such vessels operate at about double the speed of conventional monohull competitors having the same passenger, vehicle and cargo capacities. Obviously, at those higher speeds, they can offer double the voyage frequency. Their capital costs are considerably lower.\textsuperscript{628} They could also be operated at similarly lower speeds to conventional monohull Ro-Pax vessels with significantly reduced fuel consumption and no reduction in safety standards.

\textsuperscript{627} Finnyards is defunct but each of the others has a website.

\textsuperscript{628} In October 2017, Robert Clifford, the Chairman of Incat, advised the author that the average price for a new Incat 110 metre vessel was around USD 90million. In the same month Austal Ships announced the sale of two new 117 metre trimaran Ro-Pax ferries for USD 70 million each. Clarksons Research Services listed a number of new orders for conventional monohull Ro-Pax ferries, of around the same capacity and operating at about 50\% of the speed of the multihull vessels at in excess of USD 200 million each. See Austal press release, October 2017. \url{www.austal.com}. And refer to Clarksons at \url{www.crsi.com}. 
6.3.3. Multi-hulled Ro-Pax ferries are far less vulnerable to human error.

Image 6.3. General arrangement drawing of a 98 metre high speed catamaran Ro-Pax ferry designed and built by Incat in Tasmania. Its vehicle deck is well above the waterline. There is no forward vehicle door. All vehicles, including large trucks, can be turned around on the vehicle deck so enabling stern only access (www.incat.com.au).
Given their now well proven and nearly impeccable safety record, it must be asked why so many regulatory obstacles were put in the way of their development by IMO and various Northern European national marine safety authorities during the early to mid-1990s even as a number of conventional Ro-Pax ferries came to grief. Could it have been a conspiracy to protect the designers, builders and suppliers of equipment to such conventional vessels? Or, perhaps, a move designed to protect the value of the existing fleet?

6.3.4. Even conceptually unsafe vessels require human errors to kill.

Although conventional monohull Ro-Pax ferries and the Filipino motor bancas are problematic because they are conceptually dangerous, they still require human errors to cause them to kill people. If properly maintained, equipped and operated, they can still safely carry passengers from port to port. They do so every day. However, they do undoubtedly have a much worse record for both the number of fatal accidents involving them and for the number of fatalities arising from those accidents. The simple fact is that, due to their designs and structures, they are considerably more vulnerable than other vessels to the effects of human errors.

Motor bancas have in theory a much better record than monohull Ro-Pax ferries. The author believes that this is largely due to the poor recording of fatal ferry accidents in the Philippines and the relative sizes of the vessels. There have been 14 known accidents involving motor bancas from 1980 to 2015. They resulted in 483 fatalities for an average of 35 per accident. Of course, monohull Ro-Pax ferries, being much larger, normally carry significantly more people and operate further offshore than do motor bancas so, numbers of fatalities per accident in Ro-Pax accidents are invariably considerably higher.

It should be repeated, though, that despite their conceptual vulnerabilities, motor bancas still require some form of human error to initiate a fatal accident. However, in the event of such an accident, their design or structural deficiencies make them far more dangerous than other vessels.

Conversely, catamaran and trimaran ferries have an almost blemish free record over the 40 years that they have been operated commercially. The BMPVA database shows only two accidents resulting in more than four fatalities. Both were passenger only vessels. The first involved the Sleipner which was driven at high speed onto granite rocks off the west coast of Norway. This was a clear case of human error in the form of poor lookout and poor seamanship that killed 16 people.

The next was Kilimanjaro II that was driven into a wave at high speed, off Zanzibar, washing a number of passengers overboard from its foredeck,

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629 Such as the Kim Nirvana described in detail in Chapter 3, above.
630 Appendix A, Ibid.
where they should not have been permitted to be anyway. Obviously, this was also human error, in the form of negligence and bad seamanship. While there was no significant damage to the vessel, 25 passengers were left to drown after being washed overboard.

Apart from those accidents, which certainly were not due to structural or mechanical causes, the BMPVA database records only 17 „known” fatal accidents involving catamaran fast ferries. Thirteen of those were collisions, one a fire, and three „Man Overboards” or suicides. Even the fire, on *Stena Voyager*, was attributed to engineering negligence.631 Interestingly, six of the collisions occurred in Hong Kong”s crowded waters where very large numbers of fast catamaran ferries operate.632

Most importantly, only the *Sleipner* accident resulted in the almost complete destruction of the vessel. Of the others, vessel damage was superficial or minor at worst. The *Kilimanjaro II* was almost undamaged. In summary, catamaran and trimaran fast ferries, both Ro-Pax and passenger only, have an excellent safety record. Even if suffering complete engine failure, which is very unlikely given their two widely separated engine rooms, they will remain afloat until repaired or towed home. The author has experienced the failure of all four engines in an Incat Ro-Pax ferry in the English Channel between Guernsey and Weymouth. The vessel eventually reached home unassisted on the power of one engine but it was not a frightening experience in any way.

### 6.4.1. The HSC Code – An unforeseen benefit.

A significant unforeseen and probably unintended benefit has arisen from the obstacles put in the way of the development of fast catamaran ferries in the early to mid-1990s, mentioned above. They have, since 1996, been subject to the IMO HSC Code (High Speed Code).633 While originally intended for vessels engaged in international voyages, the code has been widely adopted in domestic use. That has undoubtedly been a good thing as it covers all aspects of safety including stability, fire, lifesaving, structures and navigation.

If such a strict approach to IMO”s ISM Code had been applied to conventional Ro-Pax ferries, particularly as it applies to stability, fire prevention and life-saving, there would undoubtedly have been fewer fatalities since. The HSC Code is based on and similar to the ICAO code for aircraft. The ferry travelling public would benefit from its wider or, preferably, universal adoption.

Fast ferry designers, builders, owners and operators seem to have coped very well with the HSC Code, despite its allegedly onerous requirements.634 Importantly, it does not appear to have detracted from the profitability of fast ferry operations. In fact, high speed ferries, generally, have a distinctly

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631 Appendix A, bid
632 Ibid.
633 IMO HSC Code, Ibid.
634 Indeed, the author spoke, in December 2016, with Robert Clifford, the Chairman of shipbuilder Incat, who complained about the problems he experienced in building a harbour ferry that was not subject to the HSC Code.
superior safety record to that of slower conventional craft. Indeed, of the 32 known fatal, non-Man Overboard, accidents involving them, all were clearly the result of human error. The HSC Code, regrettably, cannot prevent that.

While the original intentions for the implementation of the HSC Code may have been somewhat malignant in trying to restrict and impede the development of high-speed aluminium catamaran ferries from outside Europe, the final, probably unintended, consequences have been generally beneficial. Perhaps the main safety features of the HSC Code, particularly those concerned with fire prevention and suppression, should be adapted to conventional ferries also and, indeed, to all passenger vessels engaged in both domestic and international trade.

6.4.2. Little likelihood of technical factors causing accidents.

So, apart from the dangerous exceptions of Filipino motor banca ferries and conventional monohull Ro-Pax ferries, there is little likelihood of structural or mechanical failures causing ferry accidents. The fatal accident statistics confirm this. Because there have been so few “known” fatal ferry accidents caused by technical factors, it appears that little can realistically and practically be done to further reduce their incidence.

Even the concept of motor bancas is not entirely dangerous. Their safety could easily, simply and cost-effectively be considerably improved. In reality, thousands of them operate safely enough everyday around the Philippine and Indonesian archipelagos. A stronger structure connecting the outrigger floats to the central hull and more buoyant outriggers would solve most of their problems. Of course, better maintenance and well-enforced rules to prevent them operating offshore and/or by incompetent crews or in bad weather would also bring about a significant improvement.

The oil tanker sector was required to substantially modify the construction of its vessels to incorporate “double skin” hulls in the early nineties. It coped very well with that. There is no reason why monohull conventional Ro-Pax ferries could not be phased out in the same way as were single skin tankers. IMO’s MARPOL 1992 regulations, which managed that phase out, provide an excellent model for a similar global phasing out of conventional monohull Ro-Pax ferries. A ten year phase out would seem to be a practical arrangement.

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635 Appendix A, Ibid.
Image 6.4. This approximately 20 metre Filipino motor banca on which the author was a passenger in February 2017 was held together with string. In fact, mostly monofilament fishing line. Its "stabilising" outrigger float was a bamboo pole! The Philippine Coast Guard mandated "lifejackets" issued to passengers were flimsy, tiny water ski vests (Author).

6.5.1. Conventional monohull Ro-Pax ferries are the major problem technically. They should be banned.

Monohull Ro-Pax ferries, then, are the major problem. They are conceptually dangerous and construction of new examples should be banned. Existing Ro-Pax ferries should be phased out and either converted to other uses or scrapped, as were single-skinned oil tankers in the 1990s. Many of the world"s best naval architecture and equipment manufacturer minds have been long devoted to conceiving a solution to the inherent deficiencies of conventional monohull Ro-Pax ferries. They have not succeeded. Their talents would be better devoted to other, fundamentally safer, craft.

No one has come up with a workable solution to the dangers arising from low opening vehicle access doors and a wide-open deck that is located only slightly above the vessel"s static water line. All manner of expensive "band-aid" solutions have been applied but none of them will really work *en extremis*. They simply have too many conceptual weaknesses that leave them more vulnerable to the effects of human errors than are other design concepts.
Ironically, conventional monohull Ro-Pax ferries are also notably more expensive in terms of capital and crew costs than their high speed aluminium competitors.\textsuperscript{637} Further, if those aluminium vessels were to operate at similar speeds to conventional mono-hulled, steel Ro-Pax vessels, they would be even cheaper to operate as their fuel consumption would be significantly less than that of conventional monohull vessels thanks to the lower resistance of their fine hulls.\textsuperscript{638}

There is an ongoing role for Ro-Pax ferries but all future examples should be built as multihulls or beamy, low-profile monohulls. If it is imperative to persist with monohulled vessels they must be loaded and unloaded from the stern only. There should be no bow doors and vehicle decks must be located significantly higher above the static waterline than is current practice. Designs for and actual examples of such vessels exist.\textsuperscript{639}

An example of a practical design for such a vessel from leading Dutch shipbuilder Damen is shown in Image 6.5. Two examples of that design are now operating safely and successfully in the open Atlantic Ocean off Canada. However, if we persist with building and operating conventional monohull Ro-Pax ferries, we will continue to experience the same kinds of accidents resulting in massive death tolls as we have for the past half-century, especially if they are operated in developing countries.

This should not present an economically, professionally or socially disruptive problem to the owners, designers, equippers and builders of monohull vessels. They will just have to adapt to the safety reality of multi-hulled ships or of mono-hull ferries without bow doors and with vehicle decks located higher above their static waterline than is common practice. The oil tanker sector provides an excellent example of how such an adaption could be accommodated.

\textsuperscript{637} They require significantly larger crew numbers. Up to ten times that of a fast ferry of similar capacity.
\textsuperscript{638} Refer to 6.3.2.
\textsuperscript{639} See the drawing in Image 6.5. from Damen Shipyards Group for a pair of Ro-Pax ferries being built for operations in the St Pierre and Miquelon islands off Canada’s east coast.
Image 6.5. General arrangement drawing of the 2017 launched Damen 5510 monohull Ro-Pax ferry designed and built for operation in the open North Atlantic Ocean off Eastern Canada. The profile of the 55 metre LOA vessel shows that the vehicle deck is safely located well above the static waterline and there is no bow door. A scaled up version of the same design concept could enable semi-trailer trucks to turn around onboard (Damen).
Image 6.6. This comparatively small (55 metres LOA) Ro-Pax ferry developed by Dutch shipbuilder Damen shows that monohull Ro-Pax ships are feasible if sensibly designed without bow doors and with higher than normal vehicle decks and stern doors. Two such vessels are successfully operating in the open Atlantic Ocean off Canada’s east coast (Damen).

6.5.2. Simple, standardised smaller ferry designs would help.

With smaller ferries there is substantial potential for the introduction of simple, standardised designs that could be built almost anywhere of aluminium, FRP, HDPE or even steel. Such vessels could be powered by diesel outboard engines that require no „through-hull“ fittings. If of catamaran hull form, as they should be, they can be practically non-capsizable and unsinkable due to their beam and use of numerous watertight compartments in each hull.

6.5.3. Human factors almost always the cause.

The data presented and discussed throughout this chapter confirms very conclusively that, apart from motor bancas and conventional monohull Ro-Pax ships, there is no particular class of passenger vessel that is inherently dangerous for structural, mechanical or design, in other words „technical“, reasons. Human factors are almost invariably the cause of fatal accidents and, despite their conceptual weaknesses, most of the major fatal accidents involving bancas and conventional monohull Ro-Pax ferries have ultimately been caused by human failings unrelated to their conceptual design weaknesses. The human failings simply exacerbated those weaknesses.

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640 See case studies in Chapter 3 for details of a number of major accidents.
Chapter 7

Human factors – The roles of data collection, analysis, training, education, psychology and insurance – Developing a safety culture

*Human error: Wrongful decisions, mistakes, blunders, carelessness, miscalculations or negligence made by or on the part of human beings.*

7.1.1. Human error – the main overriding cause of almost all fatal ferry accidents.

The statistics described, interpreted and analysed in the foregoing chapters show with considerable clarity that the main overriding cause of almost all fatal ferry accidents is human error. In all its various forms, human error has been the primary cause of 98 per cent of the almost 60,000 fatalities arising from the 750 passenger vessel accidents described and discussed here. Of those, 681, or 91 per cent, occurred on ferries and tourist boats.

Obviously, therefore, effective modification of inadequate or dangerous human behaviour must be the primary objective of any reform efforts. As achievements in other transport sectors, particularly road, oil tankers and aviation, illustrate very clearly, such safety improvement objectives can realistically be attained.

Human behaviour can be modified in order to achieve realistic reform objectives. There are specialist professionals, using mostly psychological techniques, and behavioural modification who are trained to encourage such modification. Of course, traditional maritime and naval training in developed countries used to do that on an ongoing basis.

It is notable that all known airlines, most major oil and mining companies, airforces, navies and many railway operators employ or retain human factor or safety managers and/or consultants who combine the disciplines of engineering, psychology and ergonomics with the objective of improving safety. In stark contrast very few ferry or smaller cruise ship-owning companies appear to do so. In reality only the very largest or most safety conscious of them, such as Carnival Cruise Lines, Royal Caribbean Cruises, Stena, P&O Ferries, Sydney Ferries, Thames Clippers, Washington State Ferries, Archipelago Ferries and BC Ferries do.

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641 In Appendix A, Ibid. To 31 December 2015.
642 Refer to the Chartered Institute of Ergonomics & Human Factors, www.ergonomics.org.uk.
643 From CIEHF, Ibid and individual corporate websites.
Indeed, in the ten worst countries focused on in this study, no ferry owners or ferry owning companies, except Archipelago Ferries in the Philippines, are known to employ or even consult such specialists.\textsuperscript{644} It is obvious that more of them should!

Most of those people are trained professionals who may be psychologists, master mariners, ergonomics engineers or airline training or check pilots or have various combinations of such qualifications. They closely study how and why accidents or near misses have occurred. More importantly, they devise ways to encourage, train and educate human participants to avoid repeating the same kinds of errors in future.

There are numerous human factor consultants who could, indeed should, be retained as consultants by ferry owning companies that are too small to afford staff experts.\textsuperscript{645} The key, though, is that someone should be made responsible for such matters. The possibilities for human error should be investigated, described, analysed and plans made and measures taken to prevent them.

The study of human factors in all manner of corporate, military or government activity has become a recognised professional discipline\textsuperscript{646}. By focusing on the subject in an organised, objective and intellectually analytical way, the consciousness of operational employees can be systematically raised to ensure that they are sufficiently disciplined as to be constantly aware of the safety ramifications of their actions; to be situationally aware; and, most importantly, alert. They need to be made almost instinctively responsive to any abnormality.

This overwhelming preponderance of human factor causes highlights the potential for a significant reduction in ferry fatalities to be achieved by human factors professionals and a wider but closer managerial focus on human errors. That would, in developing countries, be a pioneering and likely very worthwhile activity. As Wayne K. Talley, a prolific pioneering researcher into human factors in maritime accidents put it; it is more constructive to regulate human actions on ships than the physical condition of ships.\textsuperscript{647} Given the foregoing, particularly Chapter 6, there can be little argument with that. Talley also explained, in another paper, his findings that passenger vessel accidents caused by human rather than environmental, structural or mechanical factors result in significantly worse casualties.\textsuperscript{648}

\textsuperscript{644} From an examination of vessel owner websites and personal interviews of owners by the author.

\textsuperscript{645} Details are available from the website of the Chartered Institute of Ergonomics & Human Factors. www.ergonomics.org.uk

\textsuperscript{646} Ibid.


Having extensively studied the safety improvements achieved in the aviation, mining, oil and gas, rail, road transport, construction, international shipping and manufacturing industries in developed countries, it is obvious that attention from human factor experts has contributed substantially to them. The most obviously similar problems and the most impressive results have been in the aviation industry that has improved so significantly since the 1970s.\textsuperscript{649} It seems very likely that the improvements gained from involving human factor experts with ferry operations could be expected to be similar. They can interpret and describe procedural safety deficiencies and devise training, education and promotional programmes to eliminate them.

\textbf{7.1.2. Behavioural improvement is achievable.}

The preliminary figure for passenger vessel fatalities in 2016 came to an estimated 800. That comprises 534 known deaths plus an allowance, based on the author’s long experience and analysis of the data available, of an additional 50\% for unreported fatalities. For 2017, the figures were significantly worse at 742 known deaths giving an estimated total for the full year of at least 1,100, a 39 per cent increase on 2016. The 2016 total was the lowest death toll in fifty years according to the \textit{Baird Maritime Passenger Vessel Accident database}.\textsuperscript{650} In reality, it is probably the lowest in history, or at least since passenger carrying vessels first developed some four thousand years ago.

The 2016 figure of about 800 fatalities compares with the next best year, 2013, when there were about 900. It compares with an estimated average of around 3,000 fatalities per annum over the past fifty-one years. That is a remarkable achievement.

It was a very encouraging development and shows what can be achieved when ferry owners, operators and regulators take more care than usual. The death toll was on course for a significantly lower figure until the end of September 2016 but a spate of fatal accidents occurred in October, November and December that ruined the excellent result that had been achieved until then. Indeed, until the end of September 2016, there had only been about 180 reported deaths.\textsuperscript{651}

Of course, and probably inevitably, the first day of 2017 saw a major accident occur just off Jakarta in Indonesia when a 30 metre wooden, passenger only ferry, the \textit{Zahro Express} was destroyed by fire and 40 or more people perished. The usual human factors seem to have applied: an overloaded, poorly maintained vessel with insufficient lifesaving equipment aboard. This “accident” occurred within the immediate vicinity of the headquarters of the

\textsuperscript{649} See Figure 4.2. and, by comparison, Table 4.1.
\textsuperscript{650} Appendix A, Ibid.
\textsuperscript{651} Ibid.
Indonesian Coast Guard about two nautical miles off the port of Batavia.\footnote{Topsfield, J. and Rosa, A. Indonesian ferry fire: Scores killed and injured in Thousand Islands, www.theage.com.au/auction/printArticle?id=1017123581, Fairfax Media, Melbourne, 2 January 2017.} As usual, there has been no published report of any subsequent inquiry. The facts will have to be gleaned from sparse general media reports.

Five months later, in May 2017 another fire, this time commencing on the vehicle deck, consumed an elderly but substantial Ro-Pax ferry Mutiara Sentosa 1 on a voyage across Indonesia’s Java Sea from Surabaya to Balikpapan. While not yet precisely known, the death toll looks likely to have exceeded 40.\footnote{Appendix A, Ibid.} The global ferry death toll, meanwhile, continued to rise throughout 2017. Showing what can be achieved with the correct approach, the Philippines had recorded no ferry fatalities in 2017 until 21 December when the catamaran fast ferry Mercraft 3 sank in a storm killing about 11 passengers.\footnote{Ibid.} No details of that accident are yet known. However, given the type of vessel concerned and the prevailing conditions, it appears very suspicious.

While we can only hope that this is not a sign of things to come, it is ominous nevertheless. As usual, most of the fatal accidents in 2016 and 2017 occurred in poor or “poorish” countries. The Philippines, Indonesia, Myanmar, Uganda, Yemen, Tanzania, Thailand, Uganda, and Egypt were the more notable offenders in 2016. Indonesia, Brazil, Bangladesh, the Philippines, Malaysia and Myanmar have continued to be in 2017. In the first five days of 2018 there were two fatal ferry accidents in Indonesia. Not a promising start.

There were fewer accidents with fewer resulting fatalities in 2016 in a number of other countries including developed nations such as New Zealand, Italy and France.\footnote{Ibid.} There were, as always, collisions, fires, capsizes due to overloading, sinking in storms or typhoons, a capsize and sinking while crossing a dangerous bar and the almost inevitable lifeboat drill „accident“. Without exception, all could be attributed, as usual, to human error. As could hundreds of non-fatal accidents and „near misses“. They are rarely reported or recorded, unfortunately, so we learn little or nothing from them.

\textbf{7.1.3. Accidents don’t just happen.}

Fires don’t just happen, nor do collisions or capsizes of overloaded vessels. Storms, particularly typhoons, are well and clearly predicted now, even in the Philippines. They, like dangerous sandbars, can be easily avoided thanks, largely, to good navigational charts, GPS satellite navigation systems and to readily accessible and cost free satellite weather tracking websites.\footnote{For example: www.tropicalstormrisk.com, www.metoffice.gov.uk, and www.nhc.noaa.gov.} All that is required is at least adequate seamanship, proper maintenance, care and situational awareness. In every case the human factors of greed, negligence,
lack of training, absence of situational awareness and stupidity are the real causes of these fatalities.\textsuperscript{657}

It is notable that five of the usual worst ten countries for ferry accidents appeared again in 2016 in leading roles with the accidents with the biggest death tolls occurring in them. They are consistently bad performers. To recap, 78 to 80 per cent of the known ferry fatalities over the past 50 years have occurred in those ten worst countries. They are: The Philippines, Bangladesh, Indonesia, Myanmar, Haiti, Egypt, Tanzania, Senegal, China and the DR Congo. A further twelve per cent of fatalities occurred in just ten more countries so that at least 90 per cent of fatalities arose in a mere 20 countries or about ten per cent of the world’s total countries.\textsuperscript{658} Of those, 93 per cent occurred on domestic voyages.\textsuperscript{659}

While the DR Congo and Haiti are obviously far too poor and corrupt to have any serious potential for short-term safety reform, all the others in the worst ten have definite potential and should be capable of doing much better. The Philippines, Bangladesh and Senegal did notably better in 2016, which is gratifying, but they are still home to far too many accidents that continue to result from the same human related causes.\textsuperscript{660}

Without wishing in any way to detract from the impressive (about 11\%) reduction in the number of fatalities in 2016 from the previous lowest total in 2013, the numbers are clearly still much too high. The „known“ data for 2017 is discouraging with the number of fatalities increasing by about 50 per cent over 2016.\textsuperscript{661} Given their causes and their concentration in only ten countries, it has to be possible for the death toll to be reduced significantly further.

The global aviation industry has shown the way. Its record over the past 30 odd years has been very impressive.\textsuperscript{662} It recognised early and accepted that human factors were the predominant causes of accidents and went about reducing them logically, scientifically, and very systematically on a global basis, even in the countries with poor ferry safety records. It works assiduously, globally and constantly to train, educate, promote and discipline airline employees at all levels to ensure they are eternally vigilant in matters of safety.

The techniques developed to bring about those improvements are well known.\textsuperscript{663} As mentioned above, there is now a distinct profession comprising human factors consultants and managers who service the aviation, railway,

\textsuperscript{657} Well described in the case of the United States Navy by Chief of Naval Operations, Admiral John Richardson in a memorandum of 2 November 2017 following a spate of fatal collisions. Similarly, in the USA, the National Transportation Safety Board Chairman, Robert L. Sumwalt commented on a chain of tragic human errors in the \textit{El Faro} Inquiry, 12 December 2017.

\textsuperscript{658} Appendix A, Ibid.

\textsuperscript{659} Ibid.

\textsuperscript{660} Refer to 5.2, Economic, Political and Cultural Comparisons, and Appendix A.

\textsuperscript{661} Appendix A, Ibid.

\textsuperscript{662} Refer to Figure 4.2.

\textsuperscript{663} And are described in Chapter 4.
As far as is known, very few human factors specialists are employed or consulted by the maritime, particularly ferry, sector. They should be. They are obviously very effective in other industries even in so-called poor countries. IMO is and has been for many years very well aware of the „human element“. It has, “Since the 1980s …increasingly addressed the people involved in shipping in its work”. The International Maritime Organisation should, at the very least, be encouraging the use of human factors specialists in the twenty worst countries for ferry fatalities.

The use of the word “encouraging” should be carefully noted. IMO doesn’t need to “interfere” in the internal affairs of its “sovereign member countries” as it is so loathe to do. All it needs to do is emulate its civil aviation counterpart (ICAO) and encourage the kinds of human error reduction reforms that have been so effective in that industry.

7.2.0. The six most dangerous human factors.

The six most common human factors that are the root cause of the errors that lead to fatal passenger vessel accidents are defined and described below. However, as a reminder, Figure 1.1. is reproduced here as Figure 7.1. to illustrate the hierarchy of the human errors that cause such accidents.

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664 Refer to 7.1.1.
7.2.1. Unseaworthy vessels.

As shown by an analysis of the data in the *Baird Maritime Passenger Vessel Accident database* this is clearly the major human error cause of passenger vessel accidents. It is obviously closely related to negligence and the two factors are, in reality, almost inseparable. Negligence, in this sense, is deemed to be more deliberate than careless. Between them, they were the cause of 51 per cent of fatal accidents. There can be little doubt that a vessel is seaworthy if it capsizes or simply sinks without involvement in a collision or grounding, for example. Vessels become seaworthy because they are badly maintained; dangerously modified; poorly designed; or, badly constructed. They also become seaworthy when they are overloaded or otherwise negligently operated. They must be adequately or properly manned. All those factors are the inevitable result of human errors of omission or commission. The New Shorter Oxford English Dictionary aptly and accurately describes *seaworthy* as: “Of a ship etc: in a fit condition to undergo a voyage and to encounter stormy weather.”

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7.2.2. Poor lookout.

The next most significant cause of accidents is poor lookout. Lookout has been defined as: “A person or party employed or stationed to look out; a reconnoitering boat or vessel”. 2. “The action or an act of looking out”. 667 This failing has caused 21.5 per cent of accidents and a similar percentage of fatalities.

It is indisputable that collisions, allisions and groundings can have only one real cause and that is inadequate lookout keeping. That arises from any number of primary causes that range from fatigue, physical eyesight deficiencies, drug or alcohol use, illness such as influenza, inadequate training, inadequate discipline or, as can be seen in the YouTube videos of the Bangladeshi accidents in Appendix F, to sheer stupidity or lack of interest.668 It seems that malnutrition caused apathy or fatalism are the main ultimate driver of such causes as explained in Chapter 5.

All commercial and leisure mariners globally, and vehicle drivers and aircraft pilots, are expected to know the „Rules of the Road“ or COLREGS669 but, obviously, they are as frequently ignored at sea as they are on land in developing countries for mostly the same reasons.670

7.2.3 Overloaded vessels.

Overloaded vessels are quite clearly unseaworthy vessels but, for the purposes of this analysis, they have been kept separate because they are only one of a number of specific factors that may make a vessel unseaworthy. To overload a vessel is to: “load with too great a burden or cargo, put an excessive load on”.671 While at 15.9 per cent, they are only the third biggest cause of accidents, they are, at 33.7 per cent, the major cause of fatalities. Obviously, overloaded vessels have far more people and/or other cargo aboard than they should so that, when they are involved in accidents, they can be expected to have higher fatality rates than correctly loaded vessels in similar situations. The Le Joola and Spice Islander accidents are good examples of that phenomenon.672

Overloading has many parents. Greed, obviously, and stupidity, ignorance, inadequate regulation and non-existent enforcement are some of the more common. Mostly, operators in poor and poorly regulated countries, seem to get away with overloading but, when something goes wrong, such as a collision or grounding, or, even, too sharp a turn, an overloaded vessel becomes a very dangerous vessel. They are less stable and, inevitably, have

667 Ibid.
668 See Appendix F.
669 IMO, www.imo.org/COLREGS/
670 See Figure 1.5.
672 Described in Chapter 3, 3.17. and 3. 23.
significantly less life saving equipment than necessary. Overloading will invariably exacerbate other safety deficiencies.

Overloading, unsurprisingly, usually involves unseaworthy, poorly maintained or neglected vessels.

7.2.4. Negligence.

Negligence, obviously, is something of a “catch all” word that encompasses a number of human errors. More specifically, though, it is used here in the sense of its New Shorter Oxford English Dictionary definition of: “Lack of attention to what ought to be done; failure to take proper or necessary care of a thing or person; lack of necessary or reasonable care in doing something; carelessness”.

An Indian study of the causes of 25 sinkings in the Arabian Sea in the three years to October 2007 concluded that in 23 cases, “…the primary cause was Indian seafarers not exercising due care or displaying their professional skills in discharging their duties…”. Interestingly, while that study was revealed by the Deputy Director General of Shipping in India, it failed to appear on the Directorate’s website. However, while unseaworthy vessels, poor lookout and overloaded vessels could also, of course, be described generally as negligence, they are better described more specifically when the evidence of them is obvious.

7.2.5. Poor seamanship.

Another “catch all” expression that is closely related to negligence and is used here when the evidence points to it as the sole most precise description of the cause of an accident. Seamanship in this case can be defined as: “… the art or practice of managing a ship or boat at sea; the skill of a good seaman”.

In the BMPVA database, as far as numbers of accidents are concerned, poor seamanship is classified among “Others” but, among numbers of fatalities, it is the fifth biggest cause at 4.3 per cent of fatalities.

7.2.6. Suicides/Accidents.

These somewhat nebulous words are used to describe obvious suicides, man overboard and slip and fall accidents. In many cases it is difficult to be certain as, for example, with a person overboard, whether it is a fall or suicide or, even, a murder. That is, was it accidental or deliberate? The vast majority of such incidents involve cruise ships rather than ferries and drugs or alcohol appear to often be involved. Suicides and accidents comprise 4.1 per cent of

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674 Analysis revealed by India’s Nautical Surveyor, Captain Deepak Kapoor, in Lloyd’s Register-Fairplay, 12 November 2007.
fatal passenger vessel accidents but are immaterial as far as the total numbers of ferry fatalities are concerned.  

7.2.7. The hierarchy of accident causes.

It must be emphasised that this hierarchy is author assessed and is derived from the often very limited reports that are available as to the causes of many of the „known” accidents incorporated in the BMPVA database. Nevertheless, there is no better available source of such information so it must suffice for the purposes of this thesis. In any case, where full, descriptive official reports have become available, they have generally, with the notable exception of the multi-national Estonia, inquiry, agreed closely with the author’s assessment.

7.3.1. Analysis of human factors or errors and their effects – the human element.

Considerable research has been conducted into this subject, particularly since 1980. Several learned and practical books have been written and numerous papers and articles published. Many of those have been cited in earlier chapters. All that thought and effort has led to considerable improvement in the safety consciousness and behaviour of mariners in developed countries. Much of this has been achieved by better training methods and a relentless focus on the importance of situational awareness to mariners, particularly watch keepers. Crews and other employees of ferry companies must be constantly reminded to think safety. Safety consciousness has to be drilled into them so that it becomes practically instinctive as it is in the aviation industry. The development and maintenance of a safety culture is now widely considered to be imperative.

Regrettably, however, practically all of that improvement has been seen in the developed world. As has been shown often enough in the foregoing, poorer developing countries continue to experience an alarming frequency of fatal passenger vessel accidents. They, almost without exception, (93%) involve domestic ferries. In reality, in the first seventeen years of this third millennium, the average annual global death toll has changed very little. And, most importantly, human error remains the predominant cause of maritime accidents even in western developed countries.

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676 Appendix A, Ibid.
677 The author strongly disagrees with the major findings of Laur, U. (Chairman) et al. Final Report on the Capsizing …of the… MV Estonia, EDITA, Tallinn, 1997. He believes the final assessment was a political compromise and that more blame should have been attributed to the ship’s master and owners. He feels that too much blame was directed at the builder and designer. In other words, that the cause was overwhelmingly one of human error rather than of technical failure.
679 Appendix A, Ibid.
The seemingly impossible imperative is to transfer some of that research, training, thought, education, discipline, regulation and enforcement from the developed to the developing worlds. While in the African countries educational standards, generally, are low, in Asian maritime nations, with the notable exception of Myanmar, the majority of people have received at least a primary education.\(^{680}\) That means that effective safety training and education should be achievable in at least half of the worst ten countries. Again, sadly, there seems to be considerable reluctance, or at least an absence of will, on the part of IMO to at least try to emulate the very successful work of its ICAO counterpart in such countries.

Norwegian researchers Rumawas and Asbjornslett overstate the obvious with respect to the Philippines and other developing countries in their paper *A proposed model to account (for) human factors in safety critical systems*.\(^{681}\) Quoting Spouge, Lawson and Weisbrod, they introduce their paper with the comment that: “The conditions are characterised by low operating standards, cheap fares, mixture of cargo and passengers, low safety awareness, inadequate regulations, inadequate vessels, second-hand fleet, overcrowding and unpleasant services.”\(^{682}\) They have then tried to create a mathematical model to predict and prevent fatal human errors affecting ferry operations. Their approach seems far too complicated to be likely to be introduced in practice. Human behaviour seems rarely to comply with mathematical models. It can be analysed and described far more simply and effectively without using them.

An American Bureau of Shipping analysis was more realistic.\(^{683}\) It at least gathered real data that was as accurate as possible from the US, UK, Canada and Australia. There inquiries are open, fair, careful, and their determinations publicly available. Their work that, obviously, excludes developing country data, concludes that 50 per cent of maritime accidents “are initiated by human error” while a further 30 per cent were “due to failures of humans to avoid an accident”. That, presumably, amounts to almost the same thing. Their analysis provides an illuminating overview of human error causal factors in developed countries. Regrettably, due to the data deficiencies that afflict all such studies, including this one, they did not examine their developing country counterparts.

Several organisations and individuals have tried to instil a safety culture into governments and ferry operators in developing countries. IMO has at least paid lip service to the ideal. It has given minimal support and its imprimatur to an effort by INTERFERRY, in concert with the Worldwide Ferry Safety

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682 Ibid.
Association, to encourage improvement in Bangladesh and Indonesia. That programme had the laudable but completely unrealistic objective of reducing ferry fatalities by 90 per cent over the ten years from the end of 2005. To its credit, though, perhaps the dramatic reductions in fatalities in 2013 and 2016 may have been due in some measure to the programme. Unfortunately, however, the other years in the sequence showed no real improvement and large numbers of fatalities have continued to occur in both countries since.

As far back as May 1991, J. R. Spouge published a paper Passenger ferry safety in the Philippines in which he compared the risk of ferry travel in the Philippines with that in the UK. He came to the logical conclusion that, “...the most important underlying cause of the accident record is poverty and therefore the most effective solution is not naval architectural but lies in economic and political development”. While very largely correct, in the sense of poverty induced fatalism, ignorance and carelessness, he did overlook the obvious conceptual design deficiencies of the flimsy motor bancas and neglected elderly and often poorly conventional modified Ro-Pax ferries that continue to be widely used in the Philippines despite their appalling safety record.

There is little doubt, though, that the widespread attention to human error induced accidents in many areas of endeavour in the developed world since the 1980s has had many positive results. Indeed, the author contributed to one such programme in the mid-1970s. It was inspired and directed by Sir Tristan Antico, Chairman and managing director of a then large Australian building materials company Pioneer Concrete. Antico had become alarmed at the number of human error caused accidents affecting his employees and determined to significantly reduce them. Basically, through personal example, good communications, humour, leadership and training, a very sound safety culture was imbued throughout the company’s work force. Employees were reminded to think safety. A significant reduction in minor and major accidents ensued within two years. A safety culture was imbued.

One of the world’s largest ferry owning companies, Canada’s state owned BC Ferries, has shown what a focus on human errors can achieve. In a major awakening, following the scandal arising from the grounding and sinking of its Ro-Pax ferry Queen of the North in 2006, BC Ferries made significant efforts to improve its safety behaviour throughout the very large company. In the following decade it has only suffered two known fatalities and no significant vessel damage. The company attributes that success to maintaining a constant focus on safety on the part of all its employees.

685 Appendix A, Ibid.
686 Requested from Researchgate but only Abstract received. No details available.
687 Personal experience of the author. Pioneer Concrete no longer exists nor, unfortunately, do any examples of the documents utilised in the programme.
Regrettably, this dramatic and substantial improvement has been tarnished by BC Ferries’ inexplicable sale of a very elderly sheltered waters Ro-Pax ferry to Fiji. The company has somewhat redeemed itself since with the very conditional sale of its 53 year old ferry Queen of Burnaby.

The Philippines Government, through its Maritime Industry Authority (MARINA), has implemented an extensive regulatory programme since 2013. While progress has been slow it has been discernable and provides a good example of what can be achieved by a determined developing country government.

The inculcation of a safety culture is achievable if enthusiastically promoted from the top. It would certainly be a good investment in any organisation, particularly those involved with public transport.

7.4.1. Wider analyses of human factor roles in fatalities.

Probably the best, most effective, in terms of inspiring reforms, and most widely reported MBOI was that into the Herald of Free Enterprise capsize. Even more focused and therefore interesting was an analysis of the accident and the subsequent inquiry by investigative journalist Mick Hamer that was published in The New Scientist on 23 July 1987. Mr Hamer’s article presents a devastating summary of the main points made in the report of Justice Sir Barry Sheen’s very thorough Formal Investigation into the circumstances of the accident. It describes a litany of human errors on the part of almost all involved from senior management through the master to the lowliest seaman. It also describes the inevitable attempts to “cover-up” the facts and shift the blame, particularly by the vessel’s owner and the responsible government authorities. Mr Hamer’s most salient points were:-

- “The capsize took about 90 seconds…”
- “The speed of the capsize was the direct cause of the high death toll…”
- “It is the fundamental design of the ferry that, I understand, is the problem…”, M. Thatcher, Prime Minister.
- “I have no evidence to support the view that this was due to any fault in the design of the ship”. J. Moore, Secretary of State for Transport.
- “…naval architect told the inquiry that …roll-on roll-off ferries should have a subdivided car deck to prevent water from sloshing across…”

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689 See details in 6.2.2.
690 Described on www.govdeals.ca, December 2017.
691 Detailed in www.marina.gov.ph/policies/listMC/.
692 See Appendix A, Ibid for trends.
“The rapid capsize caused the great loss of life. That is the area which is so difficult”, Sir Barry Sheen.

“The shipping companies (Ferry owners) are now fighting a scarcely veiled rearguard action to delay or shelve (deck) subdivision”.

“The immediate cause of the accident was not a subject of controversy at the inquiry. The bow doors...were open. The assistant bosun, whose job it was to close them, was asleep”.

“When the speed reached 16 knots, the water began to enter the bow doors and the ferry was doomed”.

“Much of the evidence at the inquiry concerned the slipshod operating methods of the vessel’s operators”.

“The buccaneering spirit of the company...”

“The inquiry heard that on another occasion, another ferry had sailed with its watertight doors open. Again, this was because the crew member...had fallen asleep”.

“Communications in the company were so poor that...”

“Captain Martin, Townsend Thoresen’s senior captain sent a memorandum saying: „It is so important to the safety of the ship that they (the bow and stern doors) are closed, we should have bridge indication”. The company treated this request with derision”.

“The company had plenty of warnings. Its captains regularly pointed out serious deficiencies”.

“Following his review of safety in the wake of the sinking of Townsend Thoresen’s ferry the European Gateway, in 1982 (6 fatalities), Captain Martin wrote: „The company could be considered negligent on a number of points, particularly when it affects commercial interests“.

“He warned about the dangers of overloading”.

“The company replied that this was an operational matter, implying that overloading did not affect the safety of the ship”.

“...shore staff counted the number of passengers boarding the ships...separate counts by the crew on board had been abandoned to remove the possibility of discrepancies...”

“Nevertheless, several captains carried out spot checks because the captain is legally liable if the ship is overloaded. These spot checks revealed large discrepancies between the two counts”.

“The possibility of overloading was all the more serious because the draughts were virtually never read”.

“...Townsend Thoresen...relied on declarations of the weight of their lorries by drivers. These declarations were frequently false...by an average of 10 per cent”.

“The Herald of Free Enterprise was almost certainly overloaded on the night of the accident...”

“The company’s strategy at the inquiry was to admit its shortcomings and to argue that it had remedied them. P&O took over Townsend Thoresen three months before the accident”.

“The shipowners (P&O and rival Sealink), through the General Council of British Shipping, and after talks with the Department of Transport, have started a research programme on ferry safety. The research will
...the lawyer representing the Secretary of State for Transport at the inquiry, questioned whether this study was a device to forestall, or delay, subdividing car decks near the waterline".

- "Marshall Meek, vice-president of the Royal Institution of Naval Architects, said that the principle of subdividing decks dated back to before the Titanic, Britain’s worst maritime disaster. He said: „Ro-ros are more likely to capsize”.

- “Meek said that he strongly suspected that the shipowners often hid behind the delays in achieving international agreement to avoid costly changes in design".

- “…a senior nautical surveyor…said that it was policy for Britain to negotiate changes in design through the International Maritime Organisation. He gave an example concerning lifeboats…” which took 18 years to be implemented.

- “I cannot understand the reluctance… to lead the field in safety”, Justice Sir Barry Sheen.

- “On 1 May, two Sealink train ferries collided off Dover…On 2 June, a Townsend Thoresen ferry ran aground just outside Larne Harbour in Ireland. In neither case was there injury”.

Townsend Thoresen, it should be remembered, is the company that threatened to sue the author's company, Baird Publications, for defamation after it published a series of articles exposing the safety deficiencies of many English Channel and North Sea ferries, including but without specifically mentioning Townsend Thoresen’s ships, in the months prior to the Herald of Free Enterprise tragedy. It was also the owner of the Ro-Pax ferry European Gateway which capsized on the opposite side of the North Sea, killing six people five years before the Herald of Free Enterprise capsized. Townsend Thoresen was purchased by P&O Ferries three months before the latter accident.

The Sheen Inquiry exposed the multitude of human errors of both omission and commission that were the norm among major ferry operators in some of the most developed countries at the time. Many of these had been highlighted in the articles written by Dag Pike and published in Baird Publications’ magazine Work Boat World that are mentioned above. It took nearly a decade and three more major Ro-Pax ferry accidents, involving the Scandinavian Star, Jan Heweliusz and Estonia, and a further 1,116 fatalities before any significant reforms were implemented in Northern Europe with the implementation of the Stockholm Rules.

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696 Hamer, M./ Sheen, B. Ibid.
697 Appendix A, Ibid.
699 Appendix A, Ibid.
700 Refer to 6.2.2.
Inevitably, even the Stockholm Rules involved considerable compromise and prevarication on the part of ship owners, their consulting and employed naval architects and some national regulators. However, as the data in the BMPVA database shows, the rules have been effective in the Northern Europe region in which they apply.\textsuperscript{701}

Tragically, they have still not been implemented elsewhere and the same kinds of human errors, or worse, continue to cause numerous significant fatal accidents every year. The reports of the MBOIs into the Rabaul Queen and Sewol accidents are disappointingly reminiscent of that into the Herald of Free Enterprise disaster.\textsuperscript{702} Worse still, those reports of very thorough inquiries are exceedingly rare. Most other fatal ferry accidents are barely inquired into or reported on at all.

As with road accidents in developed countries prior to the publication of Ralph Nader’s influential Unsafe at Any Speed,\textsuperscript{703} when accidents were routinely investigated by untrained junior policemen, investigations of ferry accidents in developing countries are generally accorded a very low priority. Indeed, apart from the three inquiries mentioned above and that into the Marchioness collision and capsize as well as most of the Hong Kong Marine Department’s accident inquiries, useful reports emanating from MBOIs are disappointingly scarce, particularly in developing countries. They are practically non-existent in the countries where most of the major fatal ferry accidents occur. Of course, inevitably, the most thorough inquiries and the most enlightening reports are produced in the countries where fatal ferry accidents occur least frequently.

\textbf{7.5.1. IMO's Human Element Vision.}

As have most other maritime organisations that are concerned with safety, IMO has devoted considerable time, money and discussion to solving or reducing the problem of human error. Most particularly during the mid-1990s, IMO reviewed and revised its STCW (Standards of Training Certification and Watchkeeping for Seafarers with an increased focus on human factors or the human element.\textsuperscript{704} Further, in 2006 and through to 2010, it again reviewed the STCW Code and Convention culminating in the, so-called, Manila Amendments which entered into force on 1 January 2012.\textsuperscript{705} It declared: “The safety and security of life at sea, protection of the marine environment and over 90% of the world’s trade depends on the professionalism and competence of seafarers”.

\textsuperscript{701} See Appendix A.
\textsuperscript{702} See case studies of each accident in Chapter 3.
\textsuperscript{703} Nader, R. Unsafe at Any Speed, Pocket Books, New York, 1966. Its publication inspired global road safety improvements by exposing the far too close relationships between American car manufacturers and governments.
\textsuperscript{704} In its Vision, Principles and Goals, resolution A.850(20) of November 1997, IMO adopted, in part, a vision: To significantly enhance maritime safety and the quality of the marine environment by addressing human element issues to improve performance;
\textsuperscript{705} IMO Resolution A.1022(26) which entered into force on 1 July 2010.
Such resolutions and many like them illustrate an understanding and realisation of the importance of human factors to the safety of maritime activity. There is little doubt that wider realisation, combined with a focus on the dangers of conventional monohull Ro-Pax ferries, has led to a significant reduction in the numbers of ferry accidents and fatalities in the developed world, the OECD countries in other words. That is shown clearly by the data in the BMPVA database.\footnote{Appendix A. Ibid. Particularly 1995 to 2015.} However, and tragically, that message is obviously not getting through to most of the developing countries where, since 2000, the accident and fatality rates have remained largely constant.

Indeed, despite the best declared intentions of IMO and its far more enthusiastic and effective collaborators in INTERFERRY and the Worldwide Ferry Safety Association, their combined plan to reduce global ferry fatalities by 90 per cent over the ten years from 2005 to 2014 has sadly and very embarrassingly failed.\footnote{The objective was detailed in Lawson, C. T. and Weisbrod, R. E. Ferry Transport: The Realm of responsibility for Ferry Disasters in Developing Nations, 2004. The data is verified in the BMPVA database.} That failure was not due to an absence of effort and good intentions on the part of INTERFERRY and its associated WFSA, rather, it was due more to a lack of will on the part of IMO.\footnote{For Interferry's intentions and approach, refer to Roueche, L. Ferry safety: Lending a hand, Cruise & Ferry Info, Gothenburg, June 2005, p. 4.}

So, IMO has paid attention to human factors, elements and errors and even allowed for them in revisions to its STCW and SOLAS codes. The problem is that human errors are continuing to cause fatalities in passenger vessel accidents and IMO seems to be at a loss as to what to do to prevent them in developing countries in particular. IMO continues to make grand statements of realisation and intent but it also continues to fail to follow up with action on its own part. It fails most notably to persuade or support its poorer “sovereign member nations” to take any action inspired by its grand statements.

IMO also tends to focus excessively on the, nonetheless important, contributing factors of fatigue and poor working conditions rather than on proven potential cures such as more and better safety training and more rigorous disciplines. It would be preferable if it left the fatigue and working condition problems to its related organisation the International Labour Organisation (ILO) and took a more holistic approach to all human factor problems.

7.5.2. Classification societies, too, have researched human error extensively.

The classification societies, particularly Lloyd”s Register, DNV GL, Bureau Veritas and ABS, have analysed, researched, discussed and published extensively on the maritime dangers of human error for more than thirty years. They have made numerous recommendations as to how human errors could
be significantly reduced, if not eliminated.\textsuperscript{709} As with the similar efforts of IMO, however, their work has very definitely borne fruit in developed countries. There, as the data in the \textit{BMPVA database} clearly shows, there has been a very significant reduction in the numbers of both accidents and fatalities. Their influence, however, has been negligible in the developing countries where the vast majority of fatal ferry accidents have occurred and continue to occur.\textsuperscript{710} They effectively have little or no influence on domestic ferry operations in developing countries. In such countries the activities of the classification societies is almost entirely focused on international shipping, particularly cargo shipping. Few, if any, domestically operating passenger vessels are „in class” there.\textsuperscript{711} It is to be hoped that situation will change eventually.

Nevertheless, their work has been approached thoroughly and scientifically and its results are of considerable value even allowing for their largely ineffectual dissemination to those places where they could be most useful. If nothing else, they could provide useful educational, training and propaganda material if IMO were to seriously encourage safety improvements in the developing countries where they are most needed. The classification societies have undoubtedly met with considerable success in many of the developed countries where both the number of ferry accidents and their deadliness have been significantly reduced over the past two decades.\textsuperscript{712} At least they have shown how the human error problem should be approached.

Their newsletters, corporate magazines, brochures and conference papers have consistently promoted the requirement and the means to reduce human errors. DNV GL, for example, in an online article, compares the ferry industry crew fatality rate in OECD countries with whole of industry „best practice” and shows it is ten times higher in the maritime industry.\textsuperscript{713} The article promotes three safety goals: “using human error as a symptom of weakness in the system, rather than as an explanation for an accident; to manage major accident risks; and, to assess and improve the safety culture”. It states, very reasonably, that: “People are making mistakes but it is very seldom that the mistakes are deliberate”. Further, it reasons: “…the deliberate violation link is almost non-existing and that the wrong action or judgement is the main contributor to accidents”. In other words, as Joseph Conrad put it so well more than a century ago in his novel \textit{Lord Jim}, we need to determine “why” accidents happen much more than “how” they happen.\textsuperscript{714} Few Marine Boards of Inquiry, as they are currently constituted, manage to determine “why”.


\textsuperscript{710} Very clearly illustrated in the \textit{BMPVA database}, Appendix A, Ibid.

\textsuperscript{711} Indeed, any examination of records of vessels beyond the OECD and major „flag of convenience” countries will be virtually devoid of references to classification societies.

\textsuperscript{712} Appendix A, Ibid.

\textsuperscript{713} \textit{Safety in the ferry industry – Taking the next step up the safety ladder, www.dnv.gl.com/article/safety-in-the-ferry-industry/}

\textsuperscript{714} Conrad, J. \textit{Lord Jim}, Ibid.
Moving toward a discussion of safety culture, the article states that: “If the ferry industry wants to improve in this area, it needs to establish an understanding of the company’s responsibility to facilitate good human performance. If human error occurs it needs to be treated as a symptom of weakness in the system, and not as a standalone human error”\textsuperscript{715}. It says, “safety culture has been defined in many different ways in literature, however the saying „it’s what you do when no one is watching” sums up the definitions quite well”\textsuperscript{716}

Lloyd’s Register, too, has highlighted the human factor problem in many of its publications. An example is its October 2008 publication, \textit{Human Focus}. Under the heading, \textit{The human element: A perfect storm}, it describes, “The list of reported problems involving the people in shipping seems to grow all the time”.\textsuperscript{717} It mentions many of the problems described elsewhere in this work, such as: “Navigation accidents… Slips, trips and falls. Near misses. Morale… Terms of employment. Accommodation conditions. Human error. Poor equipment maintenance… Attitudes and culture. Communication difficulties… Fatigue. Complacency. Poor training. Lack of experience. Ship-shore conflicts”.

The articles mention problems of adapting to new technology; competence requirements lagging new regulations and technology; and, outsourcing and subcontracting. They say: “It is time to rethink how people are incorporated into the maritime system”. Further, it states, very presciently: “The human element is widely accepted as the greatest source of operational risk to modern ships. For ship operators, being able to manage this risk effectively will help to reduce incidents involving damage to life, vessels, cargo and the environment, as well as encouraging an effective, motivated and satisfied workforce”.

Lloyd’s Register has gone to considerable lengths, and expense, to establish and fund the Lloyd’s Register Educational Trust Research Unit (LRETRU) that operates as a charity to help “protect life and property and support education, engineering-related research and public engagement”\textsuperscript{718}. It has sponsored significant research and, most significantly in the present context, a Cardiff University study into “safety and perceptions of risk in the maritime sector”\textsuperscript{719}.

The most useful and revealing paper arising from that research reveals very significant differences between perceptions of risk and the reality of accidents in the minds of mariners. The study also highlights the scarcity of useful data describing „ship level” events and seafarer injury\textsuperscript{720}. This ongoing problem is described in 2.1.3.

\textsuperscript{715} DNV GL, \textit{Safety in the ferry industry}. Ibid.
\textsuperscript{716} Ibid.
\textsuperscript{718} For details, see \url{www.lr.org/en/research-and-innovation/lr-foundation/}.
\textsuperscript{719} Bailey, N. J., Ellis, N. and Sampson, H. \textit{Safety and perceptions of risk: a comparison between respondent perceptions and recorded accident data}, Seafarers International Research Centre, Cardiff, 2010.
\textsuperscript{720} Bailey, N. J. et al. Ibid, p. 45.
Impressively, the Lloyd’s Register Foundation in its *Insight report on global safety challenges* for 2017, mentions the “safety challenge” of passenger ferries. It recommends as follows: “Seek to influence the IMO to enforce regions to take up regulations that would make ferries safer in design and methods of use.”

French based Bureau Veritas, too, has backed similar studies and in 1999 published the very useful and impressively honest book *Safety at Sea – Policies, Regulations & International Law*, by Philippe Boisson. It is a very comprehensive review of all aspects of maritime safety approached from a very practical and realistic legal perspective.

The statistics show clearly that all the research by the governments of western developed nations and their associated research and educational institutions and classification societies is having a positive effect on maritime safety in those developed countries. That is laudable and gratifying. The problem described, analysed and considered in this thesis is that those valuable reforms are not, however, being effectively introduced into the much more needy developing countries. They, after all, are where the major part of the problem has always been and continues to be.

### 7.5.3. Governments, generally, are well aware of the human error problem.

Marine and transport departments of developed country governments are well aware of human error as a major cause of accidents. Many of them go to considerable trouble and expense to educate, train and inform mariners of the dangers of such accidents. They sponsor, facilitate and organise numerous accident avoidance programmes. They also assiduously investigate accidents and widely disseminate the reports of those investigations and publicise the lessons that can be learnt from them. Some of them, such as the Transport Department in the Australian state of New South Wales, employ behavioural scientists such as psychologists with that in mind. Regrettably, those practices are generally non-existent in the developing countries where so many of the fatal ferry accidents occur.

Countries such as Australia, Canada, New Zealand, the United States, Japan, the United Kingdom and all the west European and Scandinavian nations have similar and very highly developed systems in place that are focused on accident avoidance. Hong Kong and Singapore, with their particularly crowded waterways and high general standards of living and education, are similarly conscious of the dangers of human error caused marine accidents.

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722 Refer in earlier chapters, particularly in 2.1.4, to Boisson, P. Ibid.

723 Appendix A, Ibid.

724 Personal conversation with Dr. B. Barnes of the New South Wales Department of Roads and Maritime Services in Sydney in 2016. His role is to improve driver behavior using psychological techniques.
In Australia, for example, the New South Wales state government Office of Transport Safety Investigations is responsible for “identifying „why” (author’s quotes) an accident or incident occurred and to make recommendations to prevent a similar occurrence happening in the future.” As of 17 April 2017, the OTSI website listed thirty complete or “in-progress” Investigation Reports on ferry accidents or incidents on Sydney Harbour dating from February 2004 to October 2016. Most were minor and only two involved one and four fatalities respectively. However, all were carefully investigated and the lessons learnt publicised. All the other Australian state governments have departments that take similar approaches.

Nationally, the Australian Transport Safety Bureau performs a similar function for accidents and incidents that occur in Commonwealth waters beyond state boundaries. Its reports are detailed, readable, instructive and widely disseminated. They also: “…seek to identify safety issues and encourage safety action to reduce the risk of future accidents and incidents”. They aim to determine „why” accidents occurred.

The United Kingdom, similarly, has its Marine Accident Investigation Branch which conducts investigations into and reports on all significant marine incidents and accidents. The MAIB’s objectives are identical to those of its Australian counterparts. So, too, are New Zealand’s Transport Accident Investigation Commission and Canada’s Marine Accidents and Investigations section of its Transport and Infrastructure Department.

Because it has dual civil and military roles, the United States Coast Guard carries out policing activities in addition to the investigation and analysis activities of its counterparts in other countries. Nevertheless, it performs all their other accident prevention activities. The US Coast Guard’s Office of Investigations & Casualty Analysis leads the “…Coast Guard’s investigation program to promote safety, protect the environment, and to prevent future accidents”.

Most other developed nations take similar approaches to the problem of maritime transport safety. The data in Appendix A show that their efforts have, unsurprisingly, been largely successful. Those governments share their knowledge among themselves both through and beyond IMO at various conferences, seminars and symposia held around the world. They are remarkably co-operative and constructive and mostly work diligently to reduce the human error effect on marine safety. As a result, they mostly use similarly effective educational, promotional and enforcement techniques.

Appendix A, Ibid.
For examples, see www.atsb.com.au/marine/.
See www.gov.uk/maib-reports/.
See www.canada.ca/en/services/transport/marine/marineaccidentsandinvestigations/.
See www.uscg.mil/hq/cg5/cg545/.
Even the governments of developing countries such as the Philippines, Bangladesh and Papua New-Guinea are well aware of the safety deficiencies of their domestic ferry industries. The author has discussed the problem at length with a number of senior maritime officials in each of those countries. They unanimously agree that human error is the real cause of most fatal accidents. Their difficulty lies in persuading their governments to take constructive action to remedy the problem. At least, though, despite generally inadequate support, they have been employed by their governments to try to improve domestic maritime safety. Further, as noted in 7.3.1, the Philippines has recently been making considerable regulatory efforts towards that objective.

7.5.4. Industry and professional associations are similarly active.

The global ferry industry association INTERFERRY has a domestic ferry safety sub-committee (Of which the author is a member) that investigates safety matters and trends and actively promotes greater ferry safety, especially through its associated organisation, the Worldwide Ferry Safety Association. The latter organises specific focused ferry safety conferences annually in New York to date. Encouragingly, however, its 2019 conference will be held in Bangkok. INTERFERRY also holds annual conferences at changing venues around the world. They always have a safety component in which IMO involvement is encouraged. Indeed, the WFSA conducts International Student Design Competitions in conjunction with government or operator representatives from developing nations. It also promotes „e-learning“ and the greater use of weather and navigational technology.

The recently appointed (late 2016) chief executive of INTERFERRY, Michael Corrigan, was previously the CEO of BC Ferries where as COO in 2006 he dealt with the aftermath of the fatal Queen of the North foundering. He has actual experience of such accidents, and the importance of their human factors. He has done much to prevent their recurrence. The WFSA should, it might be argued, become more effective as some of its conferences are held in developing countries rather than New York.

Nevertheless, the WFSA, through its active research programme, has compiled generally similar causal statistics for ferry accidents to the author’s. Its data are not as extensive but their trends are similar. It states, for example, that 95 per cent of ferry accidents occur in developing nations (the same figure as the author) and that, using “liberal” criteria, “… 86 per cent of lives

732 Refer to Personae for details of Carlos Agustin, Gualterio dela Cruz, Fakhrul Islam and Nurur Rahman. Each of them has discussed the ferry safety problem of human error with the author with respect to the Philippines, Bangladesh and Papua New Guinea.
733 For more information, refer to www.interferry.com.
734 See www.ferrysafety.org.
735 Refer to interview by Hothof, P. of Shippax, 12 May 2017.
736 In www.magazines.marinelink.com/Magazines/MarineNews/201501/.
lost were linked to human error”. This compares with the author’s estimate of 98 per cent. The WFSA has, in conjunction with INTERFERRY, as mentioned in 7.5.1 above, been trying to work with IMO in Bangladesh, Indonesia and the Philippines to promote greater ferry safety. Disappointingly, those efforts have met with negligible success so far except, to a still limited extent, in the Philippines.

The London based professional association for master mariners, The Nautical Institute, has arguably carried out more research, educational and promotional work on the marine human error problem than any other organisation. It has published widely and constructively on the subject. Apart from numerous magazine articles and conference papers, it has published substantial books such as: Managing Safety and Quality in Shipping; Improving Ship Operational Design; Human Performance and Limitation for Mariners; Casualty Management Guidelines; Collisions and Their Causes; Managing Collision Avoidance at Sea; and, Maritime Education and Training. A number of those have been cited elsewhere in this work but all share the objective of reducing human errors in the maritime domain.

Despite all that valuable effort, in his January 2017 editorial, the Nautical Institute’s President, Captain Keith Stevens, commented to the effect that the safety message fails to get through. Despite the expenditure of considerable effort and money by most shipping companies injuries and deaths continue. This, he said, is irrespective of “nationality, culture, gender or age of the seafarers”. He recommends more concentration on training seafarers to think and act “in the now”. The heading on his article, “Being aware, staying safe”, summed up his message well. In other words, training them to think and concentrate. This is something that is clearly not happening sufficiently, even in the developed world where his organisation, of necessity, most closely focuses its efforts.

Another very valuable maritime safety encouragement organisation is the also British based CHIRP Maritime. CHIRP (Confidential Hazardous Incident Reporting Programme) encourages incident reporting, even of minor incidents and „near misses”, in an endeavour to encourage learning from such experiences. The organisation arose from the aviation industry, where such experiential learning is widely valued and used. It is becoming more widely known and recognised in the maritime industry although, regrettably, mainly in developed countries. It publishes very valuable instructive articles in its own newsletter and more widely. They are simple and based closely on actual

738 All published by The Nautical Institute, www.nautinst.org.
740 Refer to www.chirpmaritime.org for background.
experiences.\textsuperscript{741} IMO has been alerted as to its work by the UK Government.\textsuperscript{742}

Again, as with so many other human error reduction efforts, they are largely effective in developed nation environments but practically invisible in the developing countries where they are obviously most needed. So, too, are so many of the other human error focused texts that have been cited in previous chapters. A similar experience has confronted road safety campaigners in developing countries.\textsuperscript{743} This, obviously, has become a major component of the human error conundrum – how do we transfer proven human error reduction techniques to the poorer countries where they are most needed? How do we encourage the inculcation of a safety culture into such countries?

7.6.1. How, then, is a “safety culture” to be developed?

The Australian state government body Workplace Health & Safety Queensland informs us that:-

\begin{quote}
A safety culture is an organisational culture that places a high level of importance on safety beliefs, values and attitudes – and these are shared by the majority of people within the company or workplace. It can be characterised as “the way we do things around here”. A positive safety culture can result in improved workplace health and safety (WHS) and organisational performance.
\end{quote}

For a safety culture to be successful it needs to be led from the top – that is, safety culture needs to be embraced and practised by the CEO and senior managers.\textsuperscript{744}

As with the wider topic of human error, safety culture has been extensively studied, written about and promoted. It is related to and bound up in the ever more intensive safety consciousness that has become widespread in most developed countries since the early 1980s. Led by the aviation, oil tanker and road safety developments described in Chapter 4, the promotional techniques have been notably effective. They have, as a result spread widely through most forms of human activities in those countries and elsewhere.

However, while there are some encouraging developments occurring in places such as the Philippines,\textsuperscript{745} the concept of a safety culture is still little known and unappreciated in the poorer parts of the world except in the aviation industry. It is to be hoped that as has happened in the developed

\textsuperscript{742} In a 19 May 2017 letter to the IMO Secretary-General from Ms Katy Ware, Permanent Representative of the UK to the IMO.
\textsuperscript{743} See Figure 1.5.
\textsuperscript{744} From the introduction to a safety culture pamphlet published by Workplace Health and Safety Queensland.
\textsuperscript{745} Refer to an example in 5.12. of the Archipelago Ferry Corp in the Philippines.
world, aviation safety consciousness will gradually spread through ferries to road safety and beyond.

Workplace Health and Safety Queensland asserts that even in industries such as construction, where safety used commonly to be disregarded, a safety culture can be developed and encouraged by implementing these culture actions:-

1. Communicate company values
2. Demonstrate leadership
3. Clarify required and expected behaviour
4. Develop positive safety attitudes
5. Personalise safety outcomes
6. Engage and own safety responsibilities and accountabilities
7. Increase hazard/risk awareness and preventive behaviours
8. Improve understanding and effective implementation of safety management systems
9. Monitor, review and reflect on personal effectiveness.\textsuperscript{746}

Such may be appropriate in developed countries enjoying high general standards of education. Their likely effectiveness in poorer countries is doubtful, however. The ongoing problem of poverty caused fatalism as discussed in Chapter 5 seems to be a major obstacle to reform. It is, unfortunately, a problem that is very difficult to solve.

There are many useful and accurate descriptions of „safety culture”. One of the better and more widely used comes from the United Kingdom Health and Safety Commission. It states:

\textit{The product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and style and proficiency of, an organisation’s health and safety management.}\textsuperscript{747}

Put more simply, perhaps, a good safety culture can be promoted and developed by good training techniques and practices and leadership example.

Again, a more cynical view based on the author’s personal observations in developing countries and the reports of the MBOIs into the \textit{Rabaul Queen} and \textit{Sewol} disasters, suggests that such visions of a safety culture may be more likely to be realised in developed and well-educated countries.\textsuperscript{748} In developing countries, more brutal, militaristic techniques for instilling a safety culture among employees appear more likely to be successful. There is little evidence of any safety training of ferry crews being conducted in developing countries. Perhaps, therefore, an organised campaign of customer avoidance,\textsuperscript{746}

\textsuperscript{746} W H & S Queensland, Ibid.
\textsuperscript{748} Refer to 3.24. and 3.25.
or a boycott, might force recalcitrant ferry owners to act to introduce the kinds of readily accessible safety training programmes that are required.

A 2015 study Measuring Safety Culture on Ships Using Safety Climate: A Study among Indian Officers was revealing as to how difficult it is to instil a safety culture among officers in a developing country environment. Importantly, it found among these comparatively well-educated seafarers, that, “The perception of safety level of seafarers was found to be low indicating the existence of misalignments between safety culture values and the actual safety climate”. It also found national culture, probably unsurprisingly, to be an important factor in efforts to promote a safety culture.

The study also found that: “Although the (IMO) ISM Code is considered to provide a good basis for safety management, the extent of its implementation is a widely held concern with ISM audits and statutory surveys widely perceived to be of very limited benefit in helping to drive forward positive changes in safety management and leadership”. So, as recently as 2015, it found that, “…there appears to be a significant gap between espoused safety values and those actually found on board…” This is not encouraging.

By contrast, though, Lu, C. S. and Yang, C. S. found in a 2010 study of Taiwanese ferry crews that, a “… greater safety climate will lead to better safety behaviour and further reduce accident occurrences”. This, perhaps, reinforces the view that it is more likely that an effective safety culture can be instilled in a developed, educated country, like Taiwan.

Mr Lu has studied ferry safety widely in the context of Taiwanese operations. He determined that, “…crew members’ ability was the most important dimension in the passenger ferry context…”.

Britain’s Royal Navy, while far from flawless as far as accidents are concerned, has maintained a generally good and effective safety culture for generations. A reason for this may well be that the Navy, “…fosters cheerfulness and nourishes its collective memory”. This was proposed in a managerial advice essay by Andrew St. George. He states that the captain sets the mood of a vessel and that good communications are enhanced by “banter” and “informal networks”. The Royal Navy’s “style of leadership”, he suggests, “fosters trust, respect and collective effort”. It is an approach that has facilitated an effective safety culture for well over a century.

Often, but usually only in wealthier and military communities, humour can be very effective in promoting the safety message. It has certainly helped in the

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Royal Navy and the author noted and utilised it in his Pioneer Concrete experience. The Canadian aviation safety promotion company System Safety uses humour widely in its promotional literature and videos. Humour can be very effective psychologically in promoting safety culture.

Swedish based Stena Line is one of the world’s largest ferry operators. Impressively, if disappointingly unusually, it employs a safety manager. In the 1990s he was Mr Per Nordstrom, who is, among other things, a qualified naval architect. Mr Nordstrom spoke at the Cruise & Ferry 95 Conference in London on the subject: *The human factor in ferry safety.*

Importantly, he commented as follows: “I am convinced that there is a human error behind close to 100 per cent of all accidents at sea”. Further, he emphasised: “There is though, one significant problem with ferries. When something goes wrong or out of hand it can effect and involve many hundreds of passengers”. He added: “We as shipowners have to take full responsibility of how the ship is built, equipped, maintained and last but not least manned and organised”.

Mr Nordstrom also commented on the need for ferry owners to deal with education, training, motivation and organisation in order to develop a safety culture. Significantly, Stena Line has never suffered a serious, multiple fatality ferry accident.

Resarching a paper published in the journal *Industrial Safety* on *Cultural factors in maritime accidents*, Finnish ethnologist Anne Ala-Pollanen examined the 121 accidents recorded as occurring in the Baltic Sea during 2011. This was undertaken against a background of maritime culture. Ms Ala-Pollanen points out that, while most recent studies largely blame human factors for maritime accidents, “…there are no worldwide standardized accident reporting systems in the maritime domain to summarize causal themes from accident data…” She states that: “Accidents are not usually caused by a single failure or mistake, but by the confluence of a whole series, or chain, of errors”.

She also raised another possible maritime cultural problem in its “emphasis on masculinity” and maritime traditions that may now be outmoded if not obsolete. An interesting idea.

### 7.6.2. The aviation industry, as usual, shows us the way.

As discussed in Chapter 4, the aviation industry, particularly since about 1980, has successfully shown all other industries the way with respect to safety training, education and culture. The story of the recovery of the Qantas Airbus A380, QF32, from a very dangerous and damaging engine explosion is

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753 Described in 7.3.1.
an example of the aviation safety culture working to perfection.\textsuperscript{757} It describes the recovery from a situation that could easily have degenerated so as to cause hundreds of deaths. All the positive factors of aviation safety culture were displayed there.

The aviation industry has been imbued with a much more safety conscious culture than the maritime industry. Partly, this must be due to the clear effectiveness dichotomy that distinguishes ICAO from IMO. Partly it may be because ships work in two dimensions rather than the three of aircraft. That requires greater situational awareness. Partly it could be because aircraft travel so much faster than ships, thus requiring much greater concentration. And, partly, it may be possible that the generally much greater asset value of aircraft than ships ensures that their operators focus better.

Despite the best efforts of shipowners, governments, classification societies, professional associations and the maritime media, the safety message is still failing to get through to seafarers as Captain Stevens’ comments in 7.5.4. make clear. Obviously, it must very effectively concentrate the minds of aviators to know that if they do make an error, the high speeds at which their aircraft operates makes fatalities almost inevitable. Seafarers are equally as aware that usually any errors they make will not result in fatalities. Their minds, therefore, are less likely to be as focussed as are those of aviators.

These factors make it unlikely that the rigorous operational standards and the very strong safety culture of most aviation industry operators will ever be fully transferred to the maritime industry. Nevertheless, they provide an excellent and well proven model for the maritime industry to copy. The inarguable fact is that the aviation industry’s safety education, training, culture and techniques have been impressively successful for nearly four decades. The maritime industry, particularly the ferry sector, should follow aviation’s example much more closely than it does.

The author discussed elsewhere the strange safety dichotomy between the aviation and maritime industries as follows:-

7.6.3. Aviation vs. Maritime – A strange safety dichotomy

Having studied the problems of maritime safety – particularly with respect to passenger vessels – for nearly forty years, I have been struck by the vastly different attitudes prevailing in the aviation and maritime industries.

I am well aware that I am far from the first to notice this but I think that what really amazes me is that this strange dichotomy endures. It seems irrational to me that, generally speaking, the lives of aviation passengers are regarded as being far more valuable and important than their ship or boat passenger counterparts.

\textsuperscript{757} Hughes, A. J. What Air Crash Investigations Didn’t Tell You About QF 32 (Airbus 380), Airlines & Aviation, 26 December 2014, Reprinted on LinkedIn, 22 January 2017.
This also manifests itself in the differing attitudes and consciousness of mariners and aviators. Perhaps, having been trained in both spheres, I am more conscious than most of the differences.

I well remember a short voyage I took aboard a Royal Australian Navy Attack class patrol boat from Melbourne to Westernport in the early eighties. It was neither the first nor the last such voyage I have been fortunate enough to take on the vessels of a number of navies. What stood out, however, was that this particular boat was commanded by a naval aviator. His pre-voyage safety briefing was careful, comprehensive and comprehensible, even by the lowliest and youngest rating in his crew. I have, notably, never experienced the same again.

Now that I am more than ever intently studying the problem of fatal passenger vessel accidents, I am often reminded of that fundamental attitudinal difference between most mariners and most aviators. I hasten to note that I use the word “most” very advisedly as I have seen and experienced “careless cowboys” in both worlds.

In its many clear and concise texts on maritime safety, command, seamanship and navigation, the always excellent Nautical Institute frequently refers to aviation industry procedures by way of illustration of best, or at least better, practice. They are very right to do so since the dichotomy between the aviation and maritime industries is most starkly defined in their differing approaches to safety.

Obviously, approaches to safety also differ within both transport media. For example, oil and gas service vessel and gas tanker personnel are generally far more safety conscious than their counterparts operating fishing boats or passenger vessels except, mostly, cruise ships. That statement is derived both from my personal observation and from accident statistics.

A notable and very interesting phenomenon is that both the numbers and rates per flying hours and passenger miles of passenger aircraft accidents and fatalities have been steadily declining over the past half century. With passenger shipping, the opposite has been the case. This is partially due to the fact that reports and records of passenger vessel accidents were scarce until the advent of the internet. Until about 2000, many shipping accidents were simply never reported. Aviation accidents, on the other hand, were faithfully and comprehensively reported and recorded assiduously and in great detail. Apart from in the richest, most developed countries, maritime accidents were widely ignored.

This relative absence of passenger shipping accident statistics offers a very sharp contrast between shipping and aviation and probably best sums up the dichotomy between the sectors. Aviation is very careful to collate, compile, study and learn from its accident statistics. Shipping, generally, tries very hard to suppress them.
I invite readers to refer to the International Maritime Organisation’s online GISIS database and its accident statistics. This Global Integrated Shipping Information System is a well meaning but completely inadequate attempt by IMO to match its aviation counterpart, ICAO, in the provision and study of accident statistics. Sadly, GISIS, apart from as far as the rich developed countries are concerned, is almost completely useless. Refer to some of the more notable developing country accidents you know of and see how GISIS approaches their recording. Then compare and contrast that with ICAO’s treatment of even the least known aviation accidents. It is a very and tragically revealing exercise.

Starting from this paucity of data, the differences between aviation and maritime approaches to safety multiply dramatically. Anyone who has travelled by either ferry or passenger aircraft would be well aware of the differences between the approaches to safety in the two sectors. Safety is serious business in aviation. In shipping, regrettably, it is too often a grudgingly made afterthought at best.

Safety regulations and reporting requirements are rigorously enforced globally in aviation. In shipping, even in developed countries, they are frequently regarded lackadaisically. In developing countries they are generally ignored.

Shipping has much to learn from aviation in terms of safety and many other matters. It is high time we took the aviation example much more seriously.  

Safety, it seems, is a state of mind. That state of mind is dominant globally in aviation and in developed country shipping but practically and tragically non-existent in most non-aviation activities in developing countries.

7.6.4. Adapting proven human error solutions to the maritime industry.

Israeli American psychologists Daniel Kahneman and Amos Tversky demonstrated that humans are “wired to make mistakes”. However, they showed that people value and take note of gains and losses, thus making their behaviour able to be modified. Kahneman was awarded the Nobel Prize in 2002 for his work on behavioural economics.

This ability to modify human behaviour has been proved almost ad nauseum in successful campaigns to improve safety in almost all industries and much of public behaviour in most developed countries. It would seem that the psychological techniques the pair researched and developed in the 1970s and 1980s should be readily adaptable to the maritime industry, even in developing countries.

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In their work on improving safety in complex systems, Marais et al described the “interactive complexity” of “tightly coupled” systems such as aircraft, aircraft carriers, air traffic control towers and nuclear power plants. They also referred to ferries and described the “complex interactions” in the *Herald of Free Enterprise* accident.

Using a rather convoluted and confusing diagram, they described quite clearly how: “The type of bottom-up decentralized decision-making advocated for HROs (High Risk Organizations) can lead to major accidents in complex socio-technical systems.” This analysis was based on the *Herald of Free Enterprise* accident. They described ferries as complex and high-tech and claimed that “… learning from accidents is not the only or even the most effective way to lower risk in high-tech systems”.

Their analysis compares the objectives of greater reliability and safety in systems and suggest that they sometimes conflict. They logically claim that a systems approach to safety is more likely to be effective than a component approach.

Other marine accident analyses describe issues of language, fatigue and working conditions as being contributors to human errors. Language, however, seems unlikely to be a factor in domestic ferry accidents where almost all fatalities (93%) have occurred. Fatigue and working conditions logically appear to be significant contributors. However, obviously, elimination or improvement of those in developing countries will require very significant government intervention.

7.7.1. Better training would eliminate many problems.

With some 180 active maritime training and education institutions, it is incongruous that the Philippines continues to have such a bad ferry safety record. That, the author has been advised by Commodore Dante La Jiminez, is due to the fact that almost all graduates of those institutions are employed outside the Philippines. The fact that their graduates are in considerable demand from developed country shipowners confirms that advice.

So, as in most, if not all, of the twenty most dangerous countries for ferry accidents, it appears that crew training is dangerously deficient, at least as far as domestic ferries are concerned. The 2016 *Allianz Safety & Shipping Review* from leading marine insurance underwriter, Allianz, confirms that. Discussing passenger ship safety, it states that: “some Asian routes are many

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761 Ibid. p. 9.
762 A good source of such information is Mr Bob Couttie’s Philippine based Maritime Accident Casebook. [www.marineinsight.com/marine-safety/](http://www.marineinsight.com/marine-safety/). Note that it is non-government.
763 Commodore Dante La Jiminez (See Personae) is Chairman of the Philippine Association of Maritime Institutions.
years behind recognised international standards, as evidenced by a number of ferry losses in South East Asian waters".764

One of the major handicaps restricting an insurance led safety improvement is due to the very inadequate data available about domestic ferry accidents in developing countries. Indeed, at the International Union of Marine Insurers 2017 Conference in Tokyo, in which the author participated, there was a100 minute workshop dedicated to the problems of „Facts & Figures”.765 Indeed, the marine and Protection & Indemnity (P&I) insurance sectors appear to be increasingly interested in the risks associated with domestic ferry operations. The very fact of the author being invited to address the 2017 IUMI Tokyo Conference indicates that. The marine insurance sector, generally, could be a very powerful reforming influence as far as domestic ferry safety is concerned. Fortunately, it appears likely that it will be.

The Allianz Review describes an increase in fatigue related insurance claims, low crew numbers and a “future staffing shortage”. It comments that “…training remains below par in some areas…”. Complacency, boredom, drudgery and “routinisation” have been described as additional human error inducing factors in an editorial in trade magazine Ferry Technology.766 All these would indicate an urgent need for increased and improved training of, particularly domestic, ferry crews. Much greater discipline of crews is equally urgently needed.

Leading Australian fishing vessel owner Hagen Stehr AO, wrote in May 2016 that: “Training is still an unappreciated field of endeavour”.767 Mr. Stehr is the founding chairman of the Australian Maritime Academy. He is well aware of the safety deficiencies of the fishing industry that are similar to those exhibited by the ferry industry.

Describing problems he sees in the fishing industry, he commented: “…I did advocate strict laws and controls in the maritime and fishing sectors concerning training, skills and knowledge, for our crews to become more professional, committed, have a pride in their positions, and to eliminate the „she’ll be right mate” attitude so entrenched in our industry”. He concluded his comments thus: “The conclusion is that training and tough analysis of skills are imperative in a safety conscious industry and you can never get enough training.

Another Australian, Captain Kim Cleggett, the founder of International Maritime Services, a global vessel delivery and crew training business,768 commented to the author thus: “Many of the (Asian) crews we work with have the paper qualifications but they lack the experience and „hands on” training

768 See www.inationalmaritime.com.
required to make them competent. We frequently need to retrain them to make them safe to go to sea with”.  

As Lu and Yang, in their 2010 paper *Safety climate and safety behaviour in the passenger ferry context* describe it, “…the majority of workplace accidents and injuries can be attributed to the unsafe work practices of employees rather than unsafe working conditions”. Their work was based on a study of practices in a Taiwanese ferry industry context but set against research into wider, global literature.

They concluded that a management led and inspired safety climate is vital and that, “…safety training and emergency preparedness are positively associated with safety behaviour, including safety compliance and safety participation, whereas safety policy and safety communication have a positive but not significant influence on safety compliance”. In other words, their very extensive research confirms that effective safety training significantly improves safety behaviour and consciousness.

7.7.2. Who will pay for such training?

Who will pay for such training in developing countries? Ultimately, it will probably be a combination of national government and foreign aid money. An extant example is the support provided to Indonesia by the Australian Maritime Safety Authority. Meanwhile, however, private companies such as the large Dutch shipbuilding company Damen Shipyards Group are practical and effective benefactors. In the Philippines, for example, Damen joined with the Netherlands Shipping Training Centre in 2016 to offer a training course they have developed for Philippines based ferry crew. The launching press release explained: "The training package will feature a number of elements, including rules and regulations (ISM Code), crew and crisis management and – important in public transportation – cross-cultural differences".

As with most other aspects of ferry safety in developing countries, the wheel does not need to be re-invented. The maritime industry in developed countries and many other industries globally have excellent training programs that could readily and economically be adapted to local conditions even in the most impoverished of nations. Again, what is required to make it happen is a willingness on the part of IMO and the national governments concerned to ensure that it does happen. Very regrettably, there is little evidence of such will forthcoming from IMO headquarters in London or from the capitals of the countries concerned. It seems more likely that the private sector, some NGOs and benevolent neighbouring developed countries will make things happen, perhaps with some encouragement from insurers.

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769 Conversation with the author at INTERFERRY 2017 Conference in Split, October 2017.
771 Ibid. p. 339.
7.8.0. Insurers to demand reforms.

While most of the smaller vessels that are involved in fatal accidents are believed to be un-insured, the larger ones – with the biggest death tolls – appear to be at least partially insured, especially in Indonesia and the Philippines. Press reports of the aftermath of accidents often refer to insurance claims and disputes, particularly in the Philippines. In developed countries ships are invariably insured. Passenger compensation costs, even in developing countries, are apparently increasing rapidly. They have already done so in developed countries. This, obviously, is of considerable concern to insurers who can be expected to act rationally and logically in their own best interests in response.

As far back as in 2000 at the London conference of the International Union of Marine Insurance (IUMI), a leading underwriter, David Davies of Royal and Sun Alliance said that a major cruise ship loss “would blow the guts out of the market”. The rapid growth in the predominantly American owned cruise industry over the last twenty years has highlighted the problems facing the marine insurance sector. Obviously, American litigation habits make the problem particularly alarming to insurers in that jurisdiction but those habits are inevitably spreading globally. IMO has dithered and a division between rich and poor countries has opened as the value of a human life has been debated. Is, for example, a Filipino worth as much as a Frenchman?

Commencing at an IMO conference in Athens in December 1974, the dithering and debate finally resulted in the „Entry into force“ in April 2014, forty years later, of the Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL). According to IMO: “The Convention establishes a regime of liability for damage suffered by passengers carried on a seagoing vessel”. However, unless such was caused recklessly, the carrier’s liability, including for death or injury, can be limited to 250,000 SDR (Special Drawing Rights), or about USD 345,000, per person. The Convention requires carriers to be insured accordingly.

At the time of publication none of the ten worst countries for ferry fatalities were signatories to the PAL Convention. Indeed, by January 2016 only 24 countries were. Again, IMO has shown itself unwilling, even with more than forty years to prepare, to persuade, cajole, demand or influence its poorer member states to take this elementary step towards ensuring greater ferry safety.

While the passenger vessel insurance debate has tended to focus on cruise ships because of the staggering amounts of money likely to be involved – one incident with passenger deaths, pollution and salvage involved could easily

773 There are numerous examples in Appendix A, particularly with respect to Sulpicio Lines and Negros Navigation.
775 For details refer to www.imo.org/en/About/conventions/.
exceed USD 1 billion. Indeed, it already has in the case of the Costa Concordia.\textsuperscript{777} However, in the 1990s, the Norwegian protection and indemnity club (P&I Club) Skuld, had to pay out on the Scandinavian Star, Estonia and Sleipner ferry disasters, among others, that cost 1,057 lives in total. By the beginning of 2000, Skuld was in financial trouble and required re-structuring.\textsuperscript{778}

The availability and costs of insurance cover for ferries, therefore, is already a problem in developed countries and becoming one in developing countries where larger ferries operate such as Indonesia and the Philippines. It is difficult to imagine that the insurers of ferry owning companies such as Sulpicio Lines and Negros Navigation, or their successors, have failed to see the implications of the spread of accession to the PAL Convention. It seems inevitable that even their governments will eventually accede to it.

Meanwhile, such companies are evidently at least partially insured. Given their appalling accident records, the risks involved in insuring them must give all marine insurers and P&I clubs considerable food for thought. It must also make careful and responsible operators think about how much of their own premiums subsidise such irresponsible operators. No doubt they will be informing their insurers of their concerns.

The International Union of Marine Insurance, which represents hull insurers as distinct from protection and indemnity insurers, and its members are well aware of the safety problems facing developing country ferries. They have a sound overall general knowledge of the appalling safety record of ferry owners in such countries. Their problem, which they openly acknowledge, is that they lack accurate, detailed data with which to properly estimate risk.\textsuperscript{779} The topic has been extensively discussed at their annual conferences, most particularly in Hong Kong in 2014 and Tokyo in 2017. At the former conference naval architect Stuart Ballantyne gave a very detailed explanation of the ferry safety problem in developing countries and proffered some practical potential solutions.\textsuperscript{780}

The author was subsequently invited to deliver a paper on developing country domestic ferry accidents at the IUMI 2017 Conference in Tokyo.\textsuperscript{781} He suggested that the insurance industry should do more, in its own best interests, to encourage greater safety consciousness among ferry operators and regulators in such countries. As described in 7.7.1, the industry, at that conference, lamented the paucity of available data on marine accidents

\textsuperscript{777} The total claims exceeded USD 2 billion according to: www.artemis.bm/blog/2014/07/15/ and www.independent.co.uk/news/business/news/costa-concordia/.
\textsuperscript{779} See presentation by Seltman, A. Global marine insurance report, at the IUMI Conference, Genoa, September 2016 slide headed Data Challenges.
\textsuperscript{780} Presentation by Stuart Ballantyne at the IUMI Conference, Hong Kong, September 2014, www.iumi.com.
generally and domestic ferry accidents in particular. The IUMI 2017 Conference dedicated a session to that problem.782

So, clearly, the marine and protection and indemnity insurance providers are well aware of the problem and of the problems they face as ferry operators in developing countries increasingly seek to purchase insurance cover from them. They are already aware that the Asia-Pacific region is the fastest growing for hull cargo and P&I insurance premium income.783 However, so far, they have little passenger vessel claims experience in the region.784 It can be assumed that, as that happens, insurers will require much greater emphasis on safety from those owners. Insurance obviously involves risk but it is not gambling. Insurers will ensure that the vessel operators they insure behave responsibly.

Insurers, generally, are becoming increasingly proactive in risk reduction. The industry’s interest in obtaining more and better data about ferry safety risk is indicative of that. An interesting related move made by major industry participants could be readily adapted to the ferry sector. In that example, five major marine insurers have united to refuse to insure fishing vessels that have been blacklisted for pirate fishing, also known as illegal, unreported and unregulated (IUU) fishing.785

7.9.0. Proven human error solutions are well known.

The topic of human error, particularly maritime human error, has been widely researched, analysed, discussed and written about. Numerous very effective solutions to it have been developed, proposed, promoted and effectively implemented. It has been approached rigorously in most commercial and government activities, including maritime activities, in most developed countries. Those solutions have proved to be very effective in widespread practice across many industries and many cultures.786

Even in developing countries, industries such as aviation, oil tanker, mining and offshore oil and gas implement safety regimes that are identical to those in force in the developed world. They are equally as effective there. Employees from developing countries working in developed countries have been readily trained to developed country safety standards.

So, standard developed country safety training techniques could readily be transferred to developing countries – as they already are in certain industries – if only the will to do so were there. The real problem lies in the unwillingness of national governments to act and the absence of any apparent will on the part of IMO to persuade them to so act or to support them in doing so.

782 IUMI 2017 Tokyo, Conference Programme, Ibid.
783 Sellman, A. Ibid.
784 Ibid.
786 As has been shown in the foregoing pages.
Further, as ferry operating businesses in developing countries mature, they will increasingly need to purchase hull, cargo and P&I insurance. Before insuring such risks, insurers will obviously do everything they can to reduce them. They will certainly not insure against almost inevitable disasters. That must have a positive effect.
Evacuation, lifesaving and search and rescue deficiencies

*It’s no use having the best most expensive evacuation and life saving equipment available if it is unable to be readily accessed or launched or, even worse, if the master of the vessel and his crew are incompetent. Equipment and procedures must be practical and appropriate to the local cultural, educational and economic situation.*

8.1.0. Evacuation, lifesaving and SAR deficiencies cause many fatalities.

Sadly, the *BMPVA database* is replete with instances of fatalities being directly attributable to inadequate evacuation or escape equipment, organisation or procedures.\(^787\) The same applies to lifesaving equipment and, after the event, to inadequate or botched search and rescue (SAR) efforts. While, obviously, such problems arise occasionally in developed countries, they continue to occur with disappointing frequency in developing ones. Combined, they contribute to significant numbers of unnecessary fatalities.

Normally, the most common accidents, groundings, collisions, allisions and disintegrations, happen very rapidly. Too frequently, they result in capsizes. Thus an organised evacuation is usually more difficult than from accidents involving fires and explosions.\(^788\) When a vessel capsizes, as it usually does - except in the cases of multihulls - following those common accidents, there is rarely sufficient time available to organise a disciplined and orderly evacuation. Survivors find themselves in the sea and dependent upon any lifejackets, lifeboats or liferafts and Emergency Position Indicating Radio Beacons (EPIRB) that happen to float free. Otherwise, they must rely on flotsam. Lifesaving equipment should be purchased and installed with that reality in mind.

The *BMPVA database* records 750 fatal passenger vessel accidents from 1966 to 2015.\(^789\) Notably, ferries were involved in 681 (or 91%) of them. Of the total PV accidents, 555 or 74 per cent resulted from collisions, allisions, groundings, disintegration or straight capsizes. The difficulty of evacuation or escape from such accidents is emphasised by the fact that 90 per cent of the known fatalities arose from them. Conversely, 97 accidents, or 13 per cent of the total, resulted from fires or explosions that resulted in eight per cent of all fatalities.

\(^{787}\) See the Notes column in Appendix A, Ibid.
\(^{788}\) Commented on at length and with particular reference to developing country Ro-Pax ferry accidents by American naval architect Bruce Hutchison, Ibid.
\(^{789}\) Appendix A, Ibid.
8.2.1. Evacuation difficulties are the primary problem.

An orderly and successful evacuation depends upon a number of factors. The first is the speed of the accident. Allisions, collisions, groundings and disintegrations usually happen very rapidly and often result in capsizes and/or nearly immediate sinkings.\(^790\) This problem is exacerbated in the case of conventional monohull Ro-Pax ferries by their complex internal layouts and structures.\(^791\) When neither crews nor passengers are trained or even briefed as to how to respond to such an accident, the chances of a successful outcome are small. They are even less so if exit signs are inadequate; if safety exits are locked or blocked; and, if life jackets and rafts are invisible or inaccessible as they often are from the author’s observation. Small, enclosed monohull ferries or tourist boats are particularly dangerous in such situations.\(^792\)

8.2.2. Some vessel types are much harder to evacuate.

Successful evacuations also depend on the damaged stability and buoyancy of the vessel. If it submerges quickly, there is obviously a major impediment to evacuation. If exits are locked or if, as in the case of the Sewol, the passengers are ordered by the master to remain in their cabins, chances of survival are negligible.\(^793\) Conventional monohull Ro-Pax ferries are particularly susceptible to damaged stability deficiencies and tend to lose buoyancy almost instantly if capsized.

Aluminium or FRP multi-hulled ferries, therefore, are incomparably safer in such accidents than are monohull ferries constructed of any material.\(^794\) Catamarans tend to remain largely afloat and relatively stable even after severe accidents. The only known instance of that not happening was in the 1999 case of the Sleipner where the vessel grounded on a granite reef at such speed that it practically disintegrated.\(^795\) More of the 16 fatalities in that case were due to impact injuries than to drowning or hypothermia. Even then, apparently, the wreckage of the vessel remained upright and largely above water.

Even large monohull Ro-Pax ferries such as the Herald of Free Enterprise, Jan Heweliusz, Estonia, Al Salam Boccaccio 98, Le Joola and several others have tended to capsize and/or sink very rapidly following an accident.\(^796\) This largely precludes significant evacuation and, in any case, the lifeboats with

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\(^790\) For example, see the videos of a ferry collision and capsize in Bangladesh in Appendix F
\(^791\) Explained in detail by Hutchison, B. *Capsize Egress and Survival with Particular Reference to RO-RO & Passenger Vessels*, Ibid.
\(^792\) Note the rapidity of the capsize in the second of the two videos in Appendix F.
\(^793\) For details refer to 3.25.
\(^794\) See, for example, the detailed reports of the Lamma IV ferry collision in Hong Kong on 1 October 2012 in Appendix A. There an aluminium monohull ferry collided with an aluminium catamaran ferry. There were 39 fatalities on the monohull and none on the catamaran.
\(^795\) For details see Appendix A and Chapter 3 generally.
\(^796\) See Chapter 3 generally for details.
which they have been expensively equipped have proved to be largely useless.

8.2.3. Evacuation problems have been studied extensively.

Numerous academic, classification society, maritime media and regulatory studies have been made about evacuation from ships and of human reactions to and behaviour during such evacuations. One Korean study published in 2003 examined IMO’s May 1999 “guidelines for the evacuation analysis of Ro-Ro passenger ships to prevent loss of life in maritime accidents”. It concluded that the IMO proposals were insufficient to increase, “…the degree of passenger safety to a satisfactory level”.

It gave as an example the botched evacuation from the non-fatal and not very serious grounding of the aluminium catamaran fast ferry St. Malo off Jersey, in the Channel Islands, in 1995. That accident, which resulted in minor injuries and mild hypothermia for 55 elderly passengers, was more due to officer incompetence than to the IMO guidelines. The captain was widely criticised by the subsequent MBOI and in the media for his illogical evacuation procedure which followed his appalling seamanship in taking the dangerous short cut that originally caused the grounding.

The vessel did not sink and, as is always the case, the vessel itself, if it remains afloat, is the best place of refuge for survivors. Indeed, all those aboard could have stepped directly off the vessel onto rescue craft, of which many were available, without getting wet. Instead, the captain unnecessarily deployed his vessel’s inflatable liferafts and directed his passengers to jump into them from heights of more than a metre. They were where the ankle fractures, hypothermia and other injuries were sustained among the passengers.

While the authors of that paper drew the correct conclusions from their study, their analysis and reasoning was wrong. They stated that: “This shows that evacuation analysis is meaningless in practical situations if it does not take account of rolling, pitching and listing of the ship and panic of the passengers”. In reality, this author contends, only the listing of the ship was relevant in the St. Malo case. It could not roll or pitch as it was hard aground on rocks. The most important factors contributing to the injuries of the passengers were the captain’s original negligence and the incompetent manner in which he directed the evacuation. His was clearly human error and no amount of mathematical analysis can explain or justify that.

798 For an excellent summary report of the subsequent MAIB investigation, refer to www.independent.co.uk/news/ferry-captain-who-hit-rocks-risked-300-lives/.
800 St. Malo investigation report, Ibid.
801 Lee, D. et al. Ibid.
8.2.4. Meaningless mathematically based evacuation analysis.

Mathematically based evacuation analysis is indeed meaningless. Very few accidents are the same. Nor do human beings react uniformly to them. Vessels, crews, masters, weather conditions and types of passenger reactions differ from case to case. They cannot be modelled in the abstract. Equations are of little or no use in predicting weather or human behaviour. Evacuation principles and practices can only realistically be studied and taught as generalities and by studying cases of actual accidents. The most important preventative measure is to employ captains who are quick thinkers, innovators and improvisers who have common sense.

The study’s authors would have done far better to have examined the much less successful evacuations of the *Herald of Free Enterprise* and *Estonia* which they mentioned in their introduction but failed to examine.\(^ {802}\) Those accidents starkly exposed the inadequacies of evacuation procedures and equipment in 1987 and 1994 and which have barely improved today except where evacuation chute systems with integrated inflatable life rafts, or marine evacuation systems (MES) are fitted, mainly to fast ferries.\(^ {803}\)

All the *St. Malo* accident really proved was that fast aluminium catamaran ferries are exceptionally safe even in the hands of a negligent and incompetent captain. Human errors from the *Titanic* through the *Estonia* and *St. Malo* to the *Kilimanjaro II* and many more prove that, even if you have an excellent vessel and equipment, a negligent or incompetent captain will largely negate that.

A more recent study took a psychosocial approach to examining passenger “knowledge and perceptions of safety and risk during voyage at sea”.\(^ {804}\) Essentially, that Norwegian focused study showed that older passengers took more notice of safety briefings than their younger counterparts and that *in vivo* safety briefings, as are standard practice in aviation, were more effective than video only instructions. It took a somewhat more realistic approach to the *St. Malo* grounding than its Korean counterpart but still missed the point of the lessons learnt from it. It did, however, learn enough to present serious doubts about the value of IMO’s 2002 evacuation analysis.

8.2.5. The importance of effective safety briefings.

The study emphasised the importance of effective safety briefings for both feelings of passenger security and the likelihood of a successful evacuation. It should be noted, though, that the subjects of the Norwegian study were affluent, generally well-educated and travelling on well constructed and

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\(^{802}\) See case studies in Chapter 3.

\(^{803}\) Refer to websites of Liferaft Systems Australia and Viking Lifesaving Equipment, Ibid. for examples of available systems.

equipped and competently crewed vessels. Rather unlike their counterparts in developing countries who would be unlikely to be given a safety briefing at all.

This same theme was examined in a 1999 article *How to cope with crisis point – Understanding how passengers react in an emergency is crucial to safe evacuation* in Lloyd"s Cruise International. This described a British study of the case of the May 1999 fire and sinking of the cruise ship *Sun Vista* in daylight in glassy calm weather in the Malacca Straits. Although it was a near perfect evacuation with all 1,104 people aboard safely evacuated by lifeboat to almost immediate rescue, it was a most unusual scenario. However, the important point made was that it is “…essential for crew to understand how humans tend to react in a crisis or a crowd”.

This experience was reinforced in a contemporary Canadian study reported in Lloyd"s List in 1999. That study was made in the context of ferries and tourist boats rather than cruise ships. It simulated evacuation behaviour and passenger paths. It discovered that it is wrong to think that passengers necessarily panic. Rather, they “…defer to figures of authority even when they are wrong”. The problem occurs when the figures of authority, usually the captain, let them down. Even then, though, panic does not necessarily ensue.

Evacuation remains a topic of considerable debate. Organisations as diverse as IMO, INTERFERRY, the Institute of Marine Engineers, the Bahamas Maritime Authority, the British MCA, the International Council of Cruise Lines, the Royal Institution of Naval Architects, DNV-GL, Lloyd’s Register, the U.S. Coast Guard, Australian Maritime Safety Authority, the British maritime union, Nautilus, and many others have looked frequently at the problems of passenger ship evacuation and the deficiencies of lifeboats and their launching systems.

While some slight improvements have been made, the recent appalling disaster of the *Costa Concordia* evacuation in 2012 proves that there is still a long way to go. That applies to the cruise ship sector that takes such problems very seriously. The ferry sector in developing countries is another matter again. It is much worse and, generally, owners and crews have proved to be uninterested in safety matters. Even in developed countries, however, safety briefings and availability of and access to life jackets and rafts can still be wholly inadequate.

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807 For example, see articles by Parker, S. in various issues of Lloyd"s Cruise International, Informa Group, London during 2000 and www.worldmaritimene.ws/archives/201888/.
808 See Appendix A for details.
809 As the author noted during a cruise on two separate Zurichsee owned ferries on Lake Zurich, Switzerland, in October 2017. See 8.2.6. below.
8.2.6. Exits and life saving equipment must be accessible, obvious and easily used.

It is regrettable that the great majority of fatal accidents in developing countries are caused by allisions, collisions, groundings capsizes and disintegrations. They, almost invariably, as mentioned, result in rapid capsize or sinking. So, in such countries, especially in smaller vessels, lifejackets ought to be worn at all times and lifeboats, Carley Floats, strobe lights, EPIRBs and liferafts should be of the simple “float free” type. That would give survivors of such accidents some hope of remaining afloat until rescuers find them.

Outbreaks of fires, from whatever cause, usually provide sufficient time for an orderly evacuation to take place if the vessel’s crew is well trained and disciplined and adequate lifesaving equipment is fitted. That, obviously, is not always the case as we saw with the Tamponas II, Moby Prince, Norman Atlantic and numerous other examples.

Even in developed countries, to give two recent instances, inadequately briefed passengers relied on directions from officers and crew who were more interested in saving themselves than attending to passengers. This happened in Italy with the Costa Concordia grounding and capsize in 2012 and with the capsize of the Sewol in Korea in 2014. In the former case the passengers were largely left to their own resources while the master and officers evacuated. In the latter the passengers were ordered to remain in their cabins as the vessel sank and, again, the officers evacuated. This resulted in 32 deaths in the case of the Costa Concordia and nearly ten times as many, mostly teenage children, on the Sewol. In both cases the responsible ship masters and some of their officers, following exhaustive MBOIs and criminal trials, were sentenced to lengthy prison terms.

The author, as mentioned previously, published a series of articles written by Dag Pike that described the many safety deficiencies of Ro-Pax ferries operating in the English Channel and North Sea during the mid-1980s. Apart from numerous unsafe operating procedures, the articles described such dangerous practices as obscuring exit signs and even chaining exit doors closed. The author has also observed many other examples of dangerous practices in the United Kingdom as recently as 2013. One particularly egregious example, in the early 1990s, was aboard a near sister-ship to the Thames tourist ferry Marchioness shortly after that vessel capsized following a collision in 1989 with 51 fatalities resulting. The exit doors were insufficient and lifejackets very difficult to access. There was no safety briefing, just a blatant request for a tip from the crew.

810 See Appendix A generally and Chapter 3 for case studies.
811 Refer to 3.5. and 3.10. and Chapter 3 more generally.
812 For details of the Sewol sinking, refer to 3. 25.
813 Appendix A, Ibid.
814 Aboard the Scillonian III operating from Penzance to the Scilly Islands.
815 Appendix A, Ibid.
During various travels through South East Asia in recent years, the author has sailed on numerous, mostly smaller, domestic ferries and tourist boats. Few, if any, beyond Singapore and Hong Kong are equipped with sufficient, accessible or effective lifejackets. Even on Hong Kong’s iconic Star Ferries, life jackets are difficult to access.

Life rafts or Carley Floats are rare, EPIRBs and strobe lights even rarer and printed evacuation instructions or verbal safety briefings non-existent. Exits are often blocked by cargo or passenger luggage. Crews rarely appear concerned with either the comfort or safety of their passengers. There are exceptions but, as of early 2017, they are rare.

Even in highly developed countries, ferry safety is not always taken sufficiently seriously. For example, the author travelled on two ferries on Lake Zurich in Switzerland in October 2017. Both were operated by a Swiss government owned company, Zurchsee. Neither offered printed or verbal safety briefings; there were no life rafts or Carley floats obviously fitted; and, life jackets were stowed obscurely. This, despite the very cold water on which they operated. Two emails were sent to the managing director of Zurchsee enquiring about these deficiencies but no response has been received.816

8.3.1. Little effective safety equipment reaches developing countries.

A vast amount of evacuation, lifesaving and SAR equipment and training in techniques is available on the world market. However, regrettably, despite the best efforts of some generous rich country governments, very little of it finds its way to the appropriate places in developing countries. Consequently, in the twenty nations in which 89 per cent of passenger vessel fatalities have occurred, such equipment and training in its use is scarce to non-existent. Except, that is, for training in the Philippines. That country has numerous maritime schools and colleges but they seem to be very largely focussed on providing graduates for international rather than domestic employers. Filipino domestic ferries and tourist boats, except very new ones, are generally poorly equipped. As in all the other countries discussed, few, if any, EPIRBs or Automatic Identification Systems (AIS) are known to be fitted there.

Even where such equipment is fitted to ferries in developing countries, it is often of inferior quality and of impractical sizes and inaccessible. For example, the author has noted on recent ferry and tourist boat voyages in Thailand and the Philippines that lifejackets are sometimes required to be worn. That would be a considerable improvement if the lifejackets issued were actually of adequate size and quality and capable of supporting an unconscious survivor with his or her face out of the water. They were not. They were cheap and of very poor quality and poorly maintained. Apparently, they were more intended to satisfy regulatory inspections than for any lifesaving effectiveness.

816 Refer to Bibliography.
8.3.2. Much IMO “approved” safety equipment is heavy, difficult, expensive, impractical and even dangerous.

Much of the equipment that is available in both rich and poor countries continues to be heavy, expensive, difficult and even dangerous to use. Lifeboats and their launching equipment continue to be a major problem. Too many lifeboat launching drills result in fatalities. Some inflatable life rafts are still being sold that require the use of a powered crane to launch them. Indeed, as recently as 2013 the author travelled on an elderly (36 years) English ferry, the *Scillonian III* with such an arrangement. If there had been engine failure, which often accompanies an accident, an absence of hydraulic power would have made life raft launching very difficult, if not impossible.

It is becoming apparent that traditional, standard lifeboats are becoming an expensive and sometimes dangerous anachronism. Most serious accidents such as those that befell the *Herald of Free Enterprise*, *Scandinavian Star*, *Estonia*, *Al Salam Boccaccio 68*, *Moby Prince*, *Sewol* and *Costa Concordia* found them wanting, if not completely useless. On all except the latter, evacuation was the fundamental problem. However, those survivors who did manage to evacuate were rarely able to access the lifeboats, if any, that were launched.

Ferries, certainly, and even most cruise ships, rarely venture far from other marine traffic. Any survivors are unlikely to have to wait long for rescue, usually considerably less than 48 hours, especially when, or if, their vessel is fitted with a now globally mandatory automatically activated EPIRB. EPIRBs and AIS transmitters are inexpensive and very effective. Even the *Rabaul Queen* was equipped with one that worked effectively (albeit via stations in New Zealand and Australia.) and led to a rapid rescue effort. Even that, sadly, was too late. The grossly overloaded and under-equipped vessel capsized quickly and sank causing the deaths of many passengers.

8.3.3. Conventional lifeboats are an expensive, complex, heavy and largely inadequate solution.

Following the sinking of the *Titanic* in 1912 various types of lifeboat and various ratios of them to the numbers of people on board have been mandated by various authorities, ultimately by IMO with its SOLAS Code. Lifeboats have undoubtedly saved many lives but mostly under favourable conditions. Launching them, particularly larger and heavier examples, in anything but benign conditions can be very dangerous. This is confirmed by the numerous examples of lifeboat drills gone wrong in the *BMPVA*

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817 An experienced ship master, Captain Phillip Rentell MNI, commented: “...few masters with any common sense would consider putting boats in the water during their weekly crew drill”. In *Seaways*, The Nautical Institute, London, July 2000, p.13.
818 In July 2013 on the Penzance to Scilly Islands ferry.
819 Refer to case studies in Chapter 3.
820 Chapter 3, Ibid.
database.\textsuperscript{822} That list, of course, only records passenger vessels. Lifeboat drills on non-passenger vessels have killed many more people.

Lifeboats and their launching and retrieval systems have undergone considerable development in the century since the 	extit{Titanic} sinking. One notable feature of that development is that they have steadily become larger, heavier, more complex and, inevitably, more expensive. So have their launching systems. That, also inevitably, is largely the result of the ever increasing amount and complexity of the regulations covering their construction and operation.\textsuperscript{823}

As Captain Phillip Rentell MNI, an experienced cruise ship master described it in an essay in the Nautical Institute magazine \textit{Seaways}, passenger ship evacuation is, “A master’s worst nightmare”.\textsuperscript{824} There he described the dangers of a, “…slow and cumbersome davit launching system”. He advocated the then (in 2000) recently introduced evacuation chutes. He explained that in anything more than very light winds the possibility of safely launching more than half a passenger ship”s lifeboats was slim. He further doubted the effectiveness of “archaic” lifejackets in keeping survivors” faces out of the water and in reducing hypothermia. His conclusions about then current safety and survival systems in use in 2000 were generally negative. Little has changed since despite a number of IMO and other conferences that were aimed at encouraging improvement.

Captain Rentell”s essay drew considerable comment in subsequent issues of \textit{Seaways} from his fellow master mariners. Almost all were supportive and some described even worse problems.\textsuperscript{825} Essentially, even after more than a century of SOLAS and its predecessors, experienced and thoughtful passenger ship masters have serious doubts about the effectiveness of SOLAS mandated safety equipment and evacuation procedures.

8.3.4. Evacuation and lifesaving equipment should be simpler, lighter, cheaper and easier to use.

Given that reality, it seems logical and practical that even vessels operating well offshore should be equipped with inflatable life rafts accessed via evacuation chutes as on aircraft. They are far less expensive and lighter than traditional rigid hulled lifeboats and considerably simpler and easier to launch and access.

A number of companies such as Liferaft Systems Australia, Zodiac of France and Viking Lifesaving Equipment of Denmark manufacture proven systems.\textsuperscript{826}

\textsuperscript{822} Appendix A, Ibid.
\textsuperscript{823} For example, see the Guidance notes: \textit{Lifeboat release and retrieval systems – new IMO regulations}, Lloyd’s Register, London, May 2012.
\textsuperscript{825} Ibid. October 2000.
\textsuperscript{826} Details available from manufacturers” websites: \url{www.lsames.com} and \url{www.VIKINGsafetyshop.com}. 
Described accurately as “Marine Evacuation Systems”, they can be deployed in less than a minute and are able to evacuate 100 people in fewer than four minutes per raft. They will also more reliably “float free” than traditional lifeboats have been known to be and even their access chutes are buoyant and so provide additional refuge for survivors.

Image 8.1. Liferaft Systems Australia (LSA) evacuation chutes and liferafts deployed as Marine Evacuation Systems (MES) from an Austal built fast trimaran Ro-Pax ferry in a training exercise (LSA pic).

For vessels operating on inshore or riverine routes (in other words, almost all domestic ferries) effective evacuation and survival systems can be simpler and less expensive still. Obviously it would be preferable if passengers were required to wear lifejackets at all times on board. However, if that is unacceptable or impractical, they should at least be properly briefed on their location and how to don them. Carley floats, EPIRBs and strobe lights should also be of the “float free” type to allow for the likely reality of a rapid capsize or sinking. They would at least offer accident survivors a reasonable chance of recovery.

8.3.5. Currently mandated safety equipment is often inappropriate to poor tropical countries.

Regrettably, in both rich and poor countries, much of the equipment mandated by IMO and national authorities is inappropriately heavy, expensive, complex and expensive to maintain. It requires careful and frequent training to ensure that crews are capable of using it effectively. Similarly, if passengers are

827 As claimed on the LSA website www.lsames.com/mes/.
briefed at all on the „safety features”, as the airlines call them, of their vessel, it is usually a cursory and frequently ignored briefing given, on a usually unintelligible public address system, after the commencement of the voyage. Evacuation, lifesaving and survival would be more economical and likely to be successful if simpler, lighter and less expensive equipment were to be specified.

Indeed, much of the IMO and national authority prescribed equipment is designed with rich, North Atlantic countries and economies in mind. It has been lobbied for and promoted by manufacturers in such countries. It tends to be heavy, complex and expensive to buy and maintain. It is also intended for use in very cold water. A very understandable primary objective for it is to prevent or reduce hypothermia in cold climates. The safety equipment prescribed for poor tropical countries should be more appropriate for warmer environments and relative poverty. It should be significantly cheaper, simpler, lighter and easier to use. It should require practically no maintenance so inflatable equipment is generally inappropriate.

It is notable, albeit arguable, that lifeboats, rescue boats and their associated launching and recovery equipment are heavy, complicated, expensive, high-maintenance and frequently dangerous. While no one, apparently, has carefully studied the subject, it is entirely possible that over the last fifty years more people have been killed or injured in lifeboat drills or training exercises than have been saved by them. The design of simpler, safer and lighter lifeboats and their associated launching equipment could make a worthy topic for future study. That could possibly be inspired by the organisation of a global contest with a significant cash prize as the reward for success.

8.3.6. Alternative, more economical, safety equipment is available.

Alternative solutions are readily available and many are of lower cost than some of the mandated equipment prescribed for ferries. There are also lighter and more effective solutions available that may be more expensive but which have been proved to be very effective even in poor conditions.

Much more appropriate to coastal and riverine ferry operations in developing countries would be the modern development of what IMO describes as Rigid Liferafts or the Carley Float, the Karly Float. They are fitted to many commercial vessels in Australia and beyond including tourist boats and small ferries. They are compact and easy to both stow and launch. They are very durable and require practically no maintenance, other than an occasional wash. A twenty person version is priced at USD 900 retail in Australia. In China, they are even less expensive. That compares with an enclosed inflatable liferaft of the same capacity for around USD 5,000 plus biennial servicing costs of about USD 1,000.

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The author has seen numerous versions of them fitted to ferries and tour boats in many parts of the world. For domestic ferries operating close to shore they are a sensible and economical solution. They should be used more widely.

Image 8.2. An inexpensive, lightweight Carley Float or “marine rigid lifesaving life float and raft” of traditional style but made of HDPE. It is manufactured by Chinese company Zhenjiang Matchau Marine Equipment Co (From website). 829

As they are simple, flat and „Rotomoulded” from HDPE, the 20 person Karly Floats could undoubtedly be manufactured for considerably lower prices in developing countries. While they are one metre by 2.1 metre flat rafts weighing 37.5 kilograms, more “boat-shaped” and protective craft could also be readily, cheaply and lightly manufactured from HDPE. The author has seen locally manufactured examples on tugs in the Philippines. They would provide greater protection to survivors but would cost probably 50 per cent more than Karly Floats. Like them, though, they would require minimal maintenance.

Much the same applies to lifejackets. On the same website, SOLAS compliant commercial coastal lifejackets are advertised at USD 30. 830 They are presumably manufactured in China. The author has purchased similar lifejackets from his local yacht chandler in Australia for USD 12. Strobe lights, lifebuoys and EPIRBS are all now available at similarly low prices, especially in developing countries. 831 So, there is no excuse financially for adequate life saving equipment to not be fitted at a price for a complete package of considerably less than USD100 per person.

831 EPIRBS are emergency position indicating radio beacons that pinpoint the position of survivors to rescuers via satellite. Strobe lights make survivors easily visible at night.
Even less expensive and therefore appropriate to very poor countries such as DR Congo and Haiti would be the pool noodles described in Chapter 1. They should not cost more than 50 US cents each. Indeed, that was their retail price in Australia in 2016 for models fitted with flashing LED lights. They are easily stowed, maintenance free, simple to understand, easy to use and readily deployed. They will keep a conscious adult afloat indefinitely. While not recommended where superior alternatives are affordable, they are significantly better than nothing.

8.4.1. Search and Rescue failures remain a serious problem.

Considerable amounts of government and private donor money have been spent on the provision of search and rescue services and their associated equipment. This is particularly the case in western developed countries but also in China, the Philippines and South Korea, three of the worst performing countries as far as ferry fatalities are concerned. All three have substantial coast guard organisations. However, all seem to fail too frequently in both preventing accidents and in being in the right place at the right time to conduct effective SAR operations. Indonesia, too, has a coast guard but it appears to

832 See Image 1.7.
be even less effective than those of the other three nations mentioned. In the other six countries of the worst ten, SAR services are practically non-existent. Any hope of rescue there will, in the absence of fatalistic indifference, be based on the possibility of assistance being provided by a vessel coincidentally passing by.

Almost all developed coastal countries possess SAR organisations of a generally high standard. They tend to be very effective and reliable with strong traditions of service. Combined with the widespread use of EPIRBs, AIS and high quality safety equipment, they ensure that the chances of survivor recovery are high. Countries such as the United Kingdom, Ireland, France, Germany, Canada, Australia, Japan, the Netherlands, New Zealand, Norway, Spain, Greece, Turkey and the United States have had adequate to good SAR services in place for well over a century. Ironically, but unsurprisingly, they are less likely to experience fatal accidents in the first place.

Most have well co-ordinated partnership arrangements with defence forces and bodies such as customs services. Their floating and flying assets can readily be pressed into service to assist with SAR operations when required. That effectively multiplies the capabilities of the SAR service itself. The use of substantial fleets of fixed wing aircraft and helicopters as well as patrol boats and warships significantly enhance the chances of finding and recovering survivors of a passenger vessel accident.

Most developed countries now require strict adherence to IMO’s ISM, SOLAS or High Speed Craft codes or a local equivalent for domestic operations. They also tend to have well-established and equipped SAR services. These are often a mixture of both government and voluntary services. There is even a well-organised and funded NGO, the International Maritime Rescue Federation (IMRF) that represents such services and organises international SAR conferences where developments are discussed.

Developed country SAR services also appear better able to effectively cooperate with commercial tug and OSV operators and commercial shipping more widely to assist with SAR activities. They are generally happy to assist because they may require help themselves one day. This kind of effective cooperation exemplifies the spirit and intent of the IMO SAR Code and makes the SAR function in the developed world generally very successful. In a coincidental way it happens to some degree in developing countries but it would be better if more structured arrangements could be established there. A formal recognition by all parties that such co-operation exists would seem likely to make it more effective.

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833 The case studies in Chapter 3 describe a number of such scenarios.
834 Refer to 8.4.2.
8.4.2. Excellent models exist for effective SAR organisation.

Numerous histories of the various national rescue services have been written. They describe their people, processes and equipment in considerable detail. All offer excellent proven models for SAR services that could be adopted elsewhere if the money were available. Similarly, many excellent books have been published on the subjects of rescue and salvage. Most would provide useful guidance to any national government in any attempts it might make to improve its SAR services. So would the websites of the various national organisations.

The development of those services was boosted during the Second World War with the establishment of very effective Air Sea Rescue (ASR) services by the UK, USA, Australia and Canada in particular. These were developed to recover downed pilots who were very expensive to replace. Japan, notably, was largely devoid of such services and suffered from crippling losses of pilots as the war progressed. Effective radio-location devices and fast recovery boats were highly refined through the course of the war. Some 13,000 aircrew and hundreds of sailors were recovered by the British ASR service during the course of WW II. The other Allied services were similarly successful. They proved to be a very good investment and an excellent model for succeeding civilian rescue services.

Civilian rescue services have also proved that rapid SAR response organisations can be a very good investment.

The wartime ASR services developed doctrine and techniques for search and rescue that were easily and very effectively passed to their civilian counterparts for peacetime use. Their vessels, equipment, communications systems and procedures all had widespread civilian applications. Interestingly, T. E. Lawrence, of Lawrence of Arabia fame, was very constructively involved with the development of new and improved fast rescue craft in the 1920s and 1930s. He applied considerable intellect to their development.

IMO has developed and invoked a Search and Rescue Convention (SAR) that guides the wider maritime world generally in SAR matters. However, as is becoming tediously familiar, the SAR Convention appears to have had little effect in developing countries. That is particularly so in the ten countries

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839 Sutherland, J. & Canwell, D. Ibid.
concentrated on in this study. Very little appears to be happening in them in the form of establishing and maintaining either governmental or NGO organisations for SAR. Fortunately, most such countries have comparatively crowded waterways so that opportunistic rescues by passing vessels are the norm. Passing vessels, however, as has been noted, cannot always be relied upon to undertake rescues.\textsuperscript{842} The absence of formally focused SAR organisations is an unfortunate fact of life in many developing countries. It significantly reduces the chances of successful discovery and recovery of maritime accident survivors.

8.4.3. IMO’s SAR Convention has proved to be effective where implemented. EPIRBs and AIS are very effective when fitted.

The SAR Convention, generally, while certainly of benefit, particularly for training purposes, in developed countries, has been less useful elsewhere. One more recent (1999) component of it, however, has contributed to rapid SAR responses in cases such as the \textit{Rabaul Queen}.\textsuperscript{843} That is the widespread mandatory introduction of automatically activated Emergency Position Indicating Radio Beacons (EPIRB) by IMO and co-operating nations.\textsuperscript{844}

When registered, maintained and stored correctly in a „float free“ situation, EPIRBs do facilitate rapid responses to distress calls as, in addition to transmitting a MAYDAY distress message, they incorporate a GPS which broadcasts the precise position of the distressed vessel. Unfortunately, since they cost about USD 250, few vessels operating domestically in developing countries are equipped with EPIRBs. It would be better if they were made mandatory on a global basis as they are in developed countries. It would be better still if the fitting of AIS transceivers were also made mandatory.

More recently, the development of effective, efficient and relatively easy to use unmanned vehicles or „drones“ have been promoted as having a SAR role. This would seem to be logical, achievable and probably very cost effective, particularly for the search part of the activity. At the International Maritime Rescue Federation Future Technology Panel meeting in 2016, Professor John Dalziel of Dalhousie University, Canada, described the work being done at his university on assessing the possibilities for using unmanned vehicles in SAR activities.\textsuperscript{845} Their preliminary conclusions were very positive.

8.4.4. Real efforts being made to promote better SAR services.

Both the International Maritime Rescue Federation and the Worldwide Ferry Safety Association have tried hard to promote the establishment of effective

\textsuperscript{842} Note comment in 8.3.1. Para 1.
\textsuperscript{843} Refer to 3.24. for details.
\textsuperscript{844} For background refer to \textit{Search and Rescue and the GMDSS}, Focus on IMO, IMO, London, March 1999.
SAR organisations throughout the world. Kiersten Reid-Sander of the WFSA presented an illuminating paper on the subject at the 2015 International Maritime Rescue Conference. In that she highlighted the paucity of SAR resources in the ten worst and a number of other countries. Despite their best and very generous efforts, the two organisations have so far met with little success in developing countries. Inevitably, they have been least successful in the ten worst countries for fatal ferry accidents.

The WFSA works to define and explain the extent of the ferry safety problem. It promotes the quest for effective solutions to it. Its data on the SAR deficiencies of, particularly, poorer countries is an important component of that role.

For its part, the IMRF, which obviously focuses on SAR aspects, has developed two very useful online information services that can be freely and very beneficially accessed by both developing country and developed country SAR services. Released at the World Maritime Rescue Congress in Bemerhaven in 2015, the Rescue Boat Guidelines (RBG) and the Mass Rescue Operations (MRO) library collate global case studies and experience to accelerate the SAR learning experience.

8.5.0. Evacuation, lifesaving and SAR deficiencies remain although practical and economical solutions are available.

Despite the many advances made during the fifty years considered here, most of the benefits of them have accrued to developed nations. The poorer parts of the world, especially the ten worst performing countries discussed here, have made little or no progress. The challenge remains to transfer or adapt such proven effective developments to the very real needs of the countries where most fatal ferry accidents continue to occur.

Emergency egress from many ferry types, most particularly conventional monohull Ro-Pax vessels, remains a significant problem even in developed countries. It requires particular attention, however, in developing countries where most such vessels seem now to meet their fates. Again, the design concept of such ferries makes them particularly vulnerable in the event of an accident, many of which result in capsize.

Evacuation systems, lifesaving equipment and SAR services could all be significantly improved at affordable cost everywhere except, probably and unfortunately, DR Congo and Haiti. If such improvements were to be made, very substantial numbers of lives would undoubtedly be saved.

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848 Published as an “eBook” online at www.international-maritime-rescue.org/index.php/homemropublic.
849 Explained in detail by American naval architect Bruce Hutchison, Ibid.
The actual costs of doing so would be achievably low if the will were there to try to reduce fatality rates. The capital costs of the lifesaving equipment need be no more than USD 100 per passenger on a typical small, 40-50 passenger ferry. Sensibly but minimally maintained, largely by just an occasional wash in fresh water, that equipment should last considerably more than a decade. So, a real outlay of less than USD 10 per annum per passenger seat or space could ensure a much greater degree of survivability from ferry accidents. An EPIRB, at around USD 350 and an AIS transceiver at USD 500 per vessel would improve the chances of survivor recovery immeasurably.
Chapter 9

National and international regulatory and enforcement deficiencies

Too many regulations, not enough enforcement.

9.1.0. A global problem.

I think one point we could all agree on is that the solution does not necessarily lie in creating more and more legislation. Over the last three and a half decades, IMO has adopted several shelves full of rules and regulations. They have certainly helped to improve the situation. However, regulations are only effective if they are put into practice and are enforced and there is no doubt that many IMO conventions and other standards are not implemented as rigorously as they should be. Before adopting still more regulations, we should, therefore, concentrate on assuring that the ones that already exist are, in fact, applied to all ships throughout the world.

W. A. O'Neil, Secretary-General, IMO, 1990-2003


The preceding chapters describe a litany of regulatory and enforcement deficiencies that have served to facilitate the making of human errors. While most obvious in those countries having the worst records for ferry fatalities, which are almost invariably comparatively poor and less developed, they are not alone. Richer, developed countries continue to experience, albeit more rarely and usually less deadly, fatal accidents for the same ultimate human error reasons. They, however, have been better prepared and financially able to invest in the training and education of mariners that is so essential to reducing human errors as well as in the SAR systems to recover from them.

IMO has focused on the implementation of its SOLAS Code. However, although it applies on all domestic and international voyages except by warships or ships navigating on the North American Great Lakes, it tends to be ignored for both domestic and international voyages in or between poorer countries. It should, like the IMO MARPOL and COLREGS codes, be more rigorously implemented domestically in all IMO member nations. IMO, apart from the occasional token conference, has evinced little serious and practical

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850 O'Neil, W. A. Secretary-General of the International Maritime Organisation, from an Opening Address to the IMO Assembly, London, 1996.
851 See especially SOLAS Chapter V.
interest in trying to reduce the numbers of ferry accidents by properly implementing its codes in developing countries.

It has been particularly remiss in not implementing its casualty and near miss reporting and Safety Investigation codes or its IMO Member State Audit Scheme (IMSAS) in any of the twenty most dangerous countries for ferry travel except China. Although only in force since January 2016, IMSAS would appear to be an obvious and effective means by which IMO could encourage improvements in domestic ferry safety in developing countries.

9.1.2. IMO is well aware of the domestic ferry safety problem.

Clearly, as can be seen from Secretary-General O’Neill’s obviously heart-felt comments, successive heads of IMO have been well aware of the problems that face their organisation. However, all have been reluctant to get involved at the member nation level. They all respond to the “why can’t you do more?” question with similar answers to the effect that: “We cannot interfere in the internal affairs of our sovereign member nations”.

This, then, is the kernel of the problem. The vast majority of ferry fatalities, 93 per cent, occur on domestic voyages but this jurisdictional hurdle very effectively prevents IMO from making more than token efforts to prevent them.

Another serious problem for IMO is the very effective lobbying that sometimes diverts it from its usually well-intentioned course. The London based NGO InfluenceMap claimed in October 2017 that certain corporations and shipping industry associations had undue influence over IMO decision making, particularly with respect to shipping exhaust gas emissions. Its report stated that: “…at the most recent IMO environmental committee meeting 31% of nations were represented in part by direct business interests”. It said, “The IMO appears to be the only UN agency to allow such extensive corporate representation in the policy-making process”. The author noted similar influences at work in the early days of the introduction of fast aluminium catamaran Ro-Pax ferries when owners, designers and builders of conventional Ro-Pax vessels worked closely with their government IMO delegates to retard that development. Perversely and amusingly, that lobbying had an unintended but widely beneficial consequence with the introduction of the HSC Code.

Unsurprisingly, IMO and various shipping industry associations such as BIMCO, the World Shipping Council and the International Chamber of

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852 There is no evidence of the implementation of any of the MSC/MEPC codes or of IMSAS, which became mandatory on 1 January 2016, in any of developing nations examined here except China.
853 See 1.5.1. for comments by former President Gloria Macapagal Arroya of the Philippines and previous Secretaries-General William O’Neil and Efthimios Mitropolos of IMO.
854 Appendix A, Ibid.
Shipping attacked the InfluenceMap report. InfluenceMap responded vigorously and was supported by credible shipping industry leaders such as Warwick Norman, CEO of RightShip, and the Chairman of the International Bunker Industry Association. Indeed, the chairman of the IBIA, Jens Maul Jorgensen was quoted thus: “The IMO has become an impenetrable system in which political factors again and again trump well thought-out decisions that involve common sense and considerations for shipowners and operators around the world”.  

It is notable that the widely quoted IMO press release, in which Secretary-General Lim Kitack refuted the criticism of its efforts on emissions reduction, was not available on the IMO press release archive a month after its publication.

9.1.3. IMO, generally, fails to ‘follow-up’:

IMO has promulgated and published numerous „Codes” related to the promotion of safety. The problem is that it provides them with little or no effective follow-up or support especially with respect to domestic operations in developing countries. It could well be asked whether this, too, is due to the kinds of „corporate capture” mentioned above. This is its most obvious failing. Its rectification would undoubtedly lead to a very significant reduction in the numbers of ferry fatalities.

The inadequacies of IMO mirror those of its parent body the United Nations Organisation and many of its other operating subsidiaries except, most notably, ICAO. Then President elect, Donald Trump, summed up the views of many when, in December 2016, he stated on Twitter that: The United Nations has such great potential but right now it is just a club for people to get together, talk and have a good time. So sad!

That is a very commonly held view globally that is often expressed by donors to, beneficiaries of and observers of UN activities. Certainly, the article in Bloomberg Businessweek from which that quotation was taken, lists a litany of bureaucratic incompetence, corruption, „wastefulness and sclerosis” on the part of the UN generally. The author and members of his family have observed and experienced such deficiencies personally in countries such as Cambodia, Thailand, Malaysia, Ethiopia, the Philippines and DR Congo. The whole UN organisation including subsidiary bodies such as IMO, FAO, UNICEF, UNHCR and others would undoubtedly benefit from drastic reform.

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856 From Chambers, S. Authors of IMO „corporate capture” report respond to criticism, Splash247, Singapore, 26 October 2017.
858 Published in, for example, the web news of Seatrade Cruise News, Splash247 and Shippingwatch around 24/25 October 2017. Not available on the list of IMO press releases of that period as of 16 November 2017 on www.imo.org.
860 Ibid.
Apart from ICAO, few UN subsidiaries appear, to the interested observer, to be working either effectively or economically.

Wastefulness, certainly, is widely evident. There is an obvious need for much tighter administrative control and significantly greater accountability throughout the organisation. Corruption, too, is facilitated by an absence of standard commercial management controls. The author has experience as a victim of that in dealings with FAO.\textsuperscript{861} IMO, like much of the UN, would benefit from less funding and more spending and behavioural discipline. The solutions to the problems outlined here will not require any significant funds. Rather, they must be very carefully costed, planned and administered. Simply throwing money at such problems will not help. It is more likely to encourage further corruption and incompetence.

Another apparently significant contributor to the deficiencies of IMO is its remoteness from the places where most ferry accident problems occur. Its headquarters location in central London seems to very largely restrict its focus of attention to the North Atlantic region at best and only to Europe at worst. While European accidents are generally well described in its GISIS database of marine accidents, the same certainly cannot be said for accidents in Asia, Latin America or Africa, for example.\textsuperscript{862} Similarly, IMO evinced far more interest in the Costa Concordia sinking than in several far deadlier accidents that occurred in Asia and Africa in the same year. They seemed to barely to register on the institutional mind of IMO.

Meanwhile, fatal ferry accidents continue to occur in Asian and Latin American countries, where there are generally plenty of regulations but minimal enforcement, and in African countries where there are practically none of either. The difficulty is to determine who should take responsibility for that state of affairs and then to ensure that someone does so. Should it be IMO? Should it be the local authority? Should it be a combination of both? Or, should it be a separate external body such as a specialised ferry safety NGO if both IMO and the local authority are beyond redemption?

\textbf{9.1.4. IMO is the most important weak link in the regulatory chain but there are many other national versions of it.}

Obviously, such decisions will very much depend on local conditions. In reality, it will probably involve a combination of all players with support and urging from both local and international media and developed country governments. Nothing significant is likely to happen without strong public and media demand for safer ferries. Similarly, given IMO’s aversion to interfering in the internal affairs of sovereign member states (indeed its legal duty to not interfere), particularly in matters concerned with domestic voyages, its involvement will need to be of the persuasive, supportive and advisory kind.

\textsuperscript{861} The author's company, Baird Publications, was significantly disadvantaged financially by a "side payment" made by a conference venue to a since dismissed FAO accountant.
\textsuperscript{862} Refer to the GISIS database at www.imo.org for numerous examples of IMO's badly disproportionate Euro-centric focus.
That, done properly, such as by the judicious use of IMSAS, could be very effective.\footnote{Refer to 9.1.1. Para 4.} Despite its many obvious weaknesses, IMO is generally and widely well-regarded within the maritime industry.\footnote{The author has discussed IMO widely among the global maritime industry generally.} Probably that is on the basis that there is no alternative.

The various IMO instruments such as SOLAS, COLREGS, MARPOL, SAR, ISM, HSC and Code of Safety for Small Passenger Ships, among others, provide an excellent and very useful foundation or framework that would be readily adapted by national governments to provide the basis for their own regulations.\footnote{Details of all IMO codes are listed in the Bibliography, or refer to www.imo.org.} In most cases, it seems, that has been done. COLREGS, for example, are mandatory, even if not normally closely adhered to, in all member nations. MARPOL, while not legally mandatory, is effectively so in almost all countries. The practical deficiencies lie in IMO’s inability to effectively promulgate or promote its other generally very sensible and practical codes in developing countries. The same applies also to the general apparent lack of interest on the part of many developing country governments in enforcing such regulations as they have in place.

9.1.5. Oil tanker reforms show what IMO is capable of.

It is disappointing that IMO has been unable or unwilling to apply itself to the domestic ferry safety problem. It showed what it is capable of in working with the oil tanker industry, through INTERTANKO, and many national governments to bring about a very significant reduction in the number of oil spills since 1970. Described in Chapter 4, that campaign reduced the number of marine oil spills by more than 90 per cent between 1970 and 2015 despite oil tanker numbers more than doubling over the same period.\footnote{Refer to 4.5.2.} The oil tanker experience shows that IMO would be similarly capable of acting to reduce the numbers of ferry fatalities. It simply requires the will to do so.

Chapter 5 described the economic, social, cultural and geographic factors that contribute to the disproportionately large numbers of ferry accidents and fatalities that occur in the ten worst performing countries. That chapter also mentions the politico-legal barriers to reform that are endemic in those same countries. The following pages describe the regulatory and enforcement realities of the ten most dangerous countries. Those realities are also very largely applicable to most of the next ten worst performing countries. The safety problems of the twenty most dangerous countries are generally similar.

9.2.1. The Philippines – Major enforcement weaknesses but government is well intentioned and has good potential.

The Philippines provides good examples of most of the ferry safety problems. It has clear and well-defined maritime regulations in place that trace their
origins to the nation”s half century of American colonisation. They have since been modified and adapted to comply generally with current IMO codes. Those regulations are intended to be enforced by a substantial bureaucracy in MARINA (The Marine Industry Authority) and a relatively well-equipped, managed and manned Coast Guard.

The reality, though, is that the theoretically effective system is not yet so. Through corruption, disinterest, cronyism or any number of other cultural reasons, negligent, greedy ferry owners largely ignore MARINA, the PCG and the regulations they are charged with enforcing. They actively lobby against safety reform. Otherwise, when that fails, presumably, they bribe officials of those organisations. This is so particularly in the provinces beyond the capital Manila.

As has been noted elsewhere in this work, that situation is changing with promising results. That change, though, is coming about very slowly. It is obvious, however, that without a very focussed and strong „naming and shaming“ effort conducted from outside the Philippines, it will be a very lengthy and difficult process to overcome the inertia of the existing system. Assassination of journalists and others who expose corrupt behaviour is not unusual there. The appalling safety records of ferry owning companies such as Sulpicio Lines and their owners should be made known worldwide. Potential passengers everywhere should be warned against travelling on their ships.

The print and electronic media in the Philippines frequently expose marine safety deficiencies in the country. The government promises reform and the wider ferry industry reacts against it on the grounds of impossible expense. A 2017 article in The Manila Times typically highlighted the problem. In 1999 the Philippine Government mandated the implementation of the ISM Code in domestic shipping including for passenger vessels. This was supplemented a year later with the adoption of the National Safety Management Code (NSM) in domestic shipping to cover all vessels.

Inevitably, there was “…continuing opposition from stakeholders who expressed concern on the burden and difficulties in complying with the international standards imposed by the ISM Code“. In 2015 the government rescinded the NSM Code and imposed the ISM Code for domestic voyages.

Subsequent fatal accidents involving the Ro-Pax ferry Starlight Atlantic and other vessels confirmed that the ISM Code continued to be ignored through 2016. As the author of that article concluded: “The recent sea mishaps have somehow diminished the confidence in the fervent commitment of improving

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867 From 1898 to 1948 less three years of Japanese occupation from 1942 to 1945.
869 For examples, see www.cpj.org/killed/asia/philippines/ and www.en.unesco.org/sites/.../unesco_condemns_killing_of_journalists_philippines_en/.
871 Pimental, B. V. Ibid.
the safety record of domestic shipping. It is incumbent on government and the shipowners/management and crews to reverse that perception.  

There are very brave crusading individuals and associations in the Philippines that are promoting greater safety and the elimination of corruption in the local maritime industry. Led by Commodore Dante La Jiminez, president of the Philippine Association of Maritime Institutions, a multi-sectoral task force to Save the Seafaring Industry was established in 1994. However, as detailed in local maritime magazine *Marino World*, "Midstream stakeholders blocked powerful opportunists tailor-fitting ordinances to serve their vested interests. The movement apparently, “…lost wind gradually against the inspired task force."  

Filipino “…ferry captains are required to submit a document called the Master Oath of Safety Departure (MOSD – testifying that the vessel meets all requirements and disclosing the number of passengers on board – to the coast guard before every sailing”. The same 2009 article in *Time* describes inadequate coast guard oversight, document falsification and government good intentions. It concludes with a comment from the transport industry under-secretary and MARINA administrator, Elena Bautista: “The main issue here is the safety culture of the Philippines,” she said. “We have very, very low regard for safety”. Meanwhile, the July 2016 appointed director of MARINA, Marcial Amaro, was dismissed on 4 January 2018 by Philippines President Rodrigo Duterte for alleged “excessive foreign travel”. Perhaps he attended too many IMO meetings?  

The author, having travelled extensively, both domestically and internationally, on the two main Philippine airlines, Cebu-Pacific and Philippine Airlines, disputes Ms Bautista’s allegations about the safety culture of the Philippines. From his experience and observation, those airlines maintain world-class safety standards. Their unblemished record proves it. If the Philippines government, presumably encouraged and supported by ICAO, can ensure that its airlines can maintain those standards on both international and domestic flights, it should be able to do the same with its ferries.  

Encouragingly, as mentioned in Chapter 1, there are a number of local domestic ferry operators that are operating safe vessels safely and promoting themselves accordingly. Even without external support for safety reform, the strong competition provided by well-funded newcomers such as Archipelago Ferry Corp, owner of the FastCats and its competitor Oceanfast Fast Ferries, will eventually inspire wider improvement. They, and other companies, have established their businesses by promoting their international

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872 Ibid.  
873 From www.marinerslegazpi.edu.ph.  
875 Binlot, A. Ibid.  
876 See www.vanguardngr.com/2018/01/.  
877 Refer to the FastCat ferries mentioned in 1.14.4.  
878 Mentioned in the Philippines case study in Chapter 5.
safety standards. It is to be hoped that other ferry owners will learn from their example.

Meanwhile, the President of the Philippine Register of Shipping, William Hernandez, commented that, despite a strong effort by MARINA in promoting greater safety, much remains to be done. He alleged that ship maintenance is inadequate and that class certification is handed out corruptly. He said that the government needed to do better in “promulgating its rules”.

There is much more to be done in the Philippines but its brave and largely free press and frequently well-intentioned, semi-democratic government should enable reform to be gradually achieved. That reform movement would be much stronger if it were better supported by IMO. In reality, though, it is more likely that foreign media exposure of the dangers of domestic ferry travel there will damage the tourist industry and force local ferry owners to behave better. The government has the tools, it just needs the will to use them effectively. A dedicated global ferry safety NGO could expose the dangers of Filipino ferry travel by facilitating the placement of revealing articles in newspaper travel sections, travel magazines and travel guides. The resulting commercial pressure would help to encourage reform.

9.2.2. China, too, is well intentioned but slow acting.

China, too, has substantial, well-organised, well-manned and well-equipped maritime authorities and an impressive, quasi-naval coast guard. It has a central government that loudly espouses its intention to eliminate corruption and, like the Philippines, it has numerous well-regarded nautical schools that should be improving the quality of the captains and crews who man its ferries. However, as in the Philippines, old bad habits are very slow to be corrected. „The system” again. That system, unlike in the Philippines and Indonesia, is not democratic and the press is not free.

While corruption is known to be still rife, the central government proclaims its anti-corruption credentials and has been very publicly punishing corrupt officials recently, even at the highest levels. China has, in addition to the Maritime Safety Administration of the Ministry of Communication (CMSA) and Coast Guard, some 20 local maritime administrations in each of the major maritime provinces. The CMSA, alone, has a fleet of more than 500 boats. The Chinese Coast Guard and a number of other maritime departments such as customs and fisheries also have numerous patrol craft.

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Following a number of accidents, especially the sinking of the Ro-Pax ferry Dashun in the Yellow Sea in 1999 with 290 fatalities, the Chinese Government introduced new safety rules. They applied particularly to conventional Ro-Pax vessels. A total of 249 Chinese ships sank in 1999 leading to 769 deaths. The State Maritime Bureau ruled in the next year that all coastal ferries including river ferries that enter coastal waters were required to fit a „Black Box” Vessel Data Recorder (VDR) within 12 months.

Less than two years later, the Ministry of Communications banned individually owned companies from operating passenger ferries. Reportedly, the ministry claimed that China’s more than 80,000 individually owned shipping businesses were the main cause of shipping accidents. Those businesses did not only operate ferries.

Needless to say, there have been numerous accidents involving Chinese ships since 2002. There have been many fatalities arising from passenger ship accidents in domestic operations. It is believed that the annual number of accidents has reduced but, because of the absence of data for the period prior to 2000 and, to a lesser degree since, it is impossible to make accurate comparisons. The known annual numbers of ferry fatalities do seem to be declining, however.

The Chinese authorities appear to now be conscious of their ferry safety problem and are attempting to eliminate it. Judging from the data for the past decade, they are making progress, albeit slowly. The Oriental/Eastern Star disaster of 2015 was a notable setback. However, China’s Communist government does have the power, the personnel and the equipment to achieve substantial safety reform if it applies itself fully to achieving that objective. A Chinese Government endorsed presentation made at the December 2017 ASEAN Ferry Safety Forum in Shanghai revealed some interesting data and some encouraging intentions.

**9.2.3. Indonesia – Plentiful regulations, regulators and investigators but insufficient enforcement.**

Indonesia possesses both a Directorate General of Sea Communications and a Coast Guard, now known as the Badan Keamanan Laut Republik Indonesia (BAKAMLA). They are well established, well manned, possibly to the point of over-manning, and relatively well equipped. The country has more than adequate regulations that are generally in accord with IMO’s codes. It has

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885 This forced those operators to incorporate to obtain operating licenses. Described in www.lrfairplay.com 9 August 2001.
886 For details refer to Appendix A, Ibid.
887 See Appendix A, Ibid, for more information as well as case study summary in 3.26.
889 Details from, Rusdi, S. The dilemma of Indonesia’s coast guard, The Jakarta Post, Jakarta, 11 February 2015.
even banned the importation of ships including ferries but more in an
devour to protect the local shipbuilding industry than to improve safety.\textsuperscript{890}

Indonesia also has a seemingly well intentioned but largely ineffectual
transport safety organisation, the National Transportation Safety Committee of
Indonesia, (NTSC), that is responsible for investigating and analysing ferry
accidents, among others.\textsuperscript{891} It is meant to publicise its findings. As is so often
the case with accident inquiries, it has been suggested by local naval architect
and Marine Safety Investigator, Aliel Nurwahyudy, that there is too much
focus on the how of the accident and too little on the why. However his
summary of recommendations for the period 2003-2013 attributes almost all
accident causes to human factors. Inadequate supervision and training as
well as crew fatigue are listed as the most important factors.\textsuperscript{892}

Indonesia has an ongoing close and supportive maritime cooperation
relationship with Australia.\textsuperscript{893} The current president, Joko Widodi, has
declared his country to be “a global maritime fulcrum” with a vision of better
managing all Indonesia’s plethora of maritime resources.

That vision, however, is proving very difficult to realise. There are “entrenched
interests” and „turf wars”.\textsuperscript{894} “Getting the adequate resources for BAKAML continues to be challenging” and, finally, the director of BAKAML was, in
April 2017, facing corruption allegations.\textsuperscript{895} That is in keeping with the general
reputation for rampant corruption that surrounds both the Indonesian Navy
and Coast Guard.\textsuperscript{896} So, despite the best of presidential intentions, maritime
safety reforms are proving very difficult to realise in Indonesia.

Again, as the country values its important and rapidly growing tourist industry,
achieving safety reform will be most effectively inspired by international media
exposure. That would be well enhanced by serious support from IMO.

\textbf{9.2.4. Bangladesh has similar problems to Indonesia.}

Bangladesh, too, has a substantial and very well manned Department of
Shipping and a well equipped coast guard.\textsuperscript{897} There are some excellent and
dedicated senior bureaucrats who have for many years been attempting to

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\textsuperscript{890}Reported in Hellenic Shipping News Worldwide, 23 June 2015.
\textsuperscript{891}Mentioned in Nurwahyud. A, \textit{Contemporary Issues in Domestic Ro-Ro Passenger Ferry
Operation in Developing Countries}, Master of Science thesis, World Maritime University,
\textsuperscript{892}Nurwahyudd, A. Ibid.
\textsuperscript{893}Described in 9.3.
\textsuperscript{894}Refer to Rusdi, S. Ibid.
\textsuperscript{895}Described by Parameswaran, P. in \textit{Confronting Indonesia’s Maritime Coordination
\textsuperscript{896}The author has been aware for many years of well-founded allegations of corruption in
those organisations emanating from a number of ship owners with operations in South-East
Asia. They regard bribing officers of the Indonesian Coast Guard and Navy as well as judges
as simply a cost of doing business. Transparency International offers many other examples.
\textsuperscript{897}Refer to the Bangladesh Department of Shipping website, \url{www.dos.gov.bd}, for details.
\end{flushright}
institute safety reforms. The good intentions are there as is the equipment for enabling the enforcement of regulations and, when properly directed, rescuing survivors from ferry accidents.\footnote{898}{The Bangladesh Coast Guard website, \url{www.coastguard.gov.bd} provides details as does \textit{The Naval Institute Guide to Combat Fleets}, Ibid.}

Despite its possession of those attributes and assets, Bangladesh remains a very dangerous place in which to travel on ferries. As noted in Chapter 5, its economy is growing rapidly and its overall life expectancy has improved dramatically over the last three decades. It has a growing and high quality export ship building industry and a relatively reputable international airline, Biman, with new private sector competitors entering the business.\footnote{899}{Biman Bangladesh Airlines is described on its web page at \url{www.bgtest.zapways.com/corporate/}. It claims to have experienced only one accident that occurred prior to the airline commencing commercial service.} Biman is approved to fly into Europe and has not suffered a fatal accident since 1984.

If a country can operate airlines safely and build sound ships locally, it should, in theory, be capable of ferry safety reform. In Bangladesh that parallel is handicapped, though, by its unstable politics, corruption and overwhelming, self-serving bureaucracy. That bureaucracy, generally, seems to largely act as a very negative „dead hand“ in stifling reform. It illustrates clearly that it is possible to have too many regulations and too many regulators to the point that they just get in the way of reform. Its press is only partly free and the country would best be described as a "limited" democracy. Unfortunately, its tourist industry is practically non-existent so it cannot be used as a lever to introduce reform.

Bangladesh is in some ways similar to the Philippines in that it has proved that it can operate airlines safely. From its own resources assisted by foreign companies and NGOs, with apparently little or no government involvement, it has very impressively managed to make dramatic improvements to the life expectancy of its people.\footnote{900}{Described in Chapter 5.} It has dramatically reduced its former health problems. It has shown that it is very capable of reform. If IMO were to adopt ICAO”s “no country left behind policy” and support local safety reform, Bangladesh would seem to have considerable potential to overcome its numerous handicaps.

\subsection*{9.2.5. Tanzania. Chaotic but having realistic reform potential.}

Tanzania has a most interesting history. Even more interesting is the history of Zanzibar, a semi-autonomous offshore island province of the Republic of Tanzania. While serious fatal ferry accidents have occurred on Tanzania’s Rift Valley lakes and rivers, the two most deadly recently occurred off Zanzibar. They involved the \textit{Spice Islander} and the \textit{Skagit}. The former led to about 2,976 fatalities and the latter, 293.\footnote{901}{Appendix A, Ibid.} They happened in 2011 and 2012 respectively.
The offshore archipelago of Zanzibar has its own maritime regulations that are separate from the Merchant Shipping Act that governs mainland Tanzania. This, it seems, leads to considerable confusion. Zanzibar is not a sovereign nation and, theoretically, Tanzania is responsible for Zanzibar as far as international treaties and conventions are concerned. So, Tanzania is responsible for ensuring that Zanzibar adopts legislation that accords with IMO conventions and codes. However, as Mr G. Kazi explains, in his remarkably prescient 2010 University of Oslo Masters thesis Conformity of Zanzibar Maritime Legislation with International Safety Conventions…, “…like many developing countries, many of their laws are just ink on the page hence it is not surprising that practically nothing is done”.

While the constitutional arrangements of Tanzania/Zanzibar are unusual and complex, its maritime safety regulations, as Mr Kazi commented, are treated with the same disdain that is common in all the dangerous countries discussed here. The Tanzania Ports Authority is responsible for the regulation and administration of all Tanzanian mainland ports including those on the rivers and very large lakes that surround the country. Probably inevitably, though, the President of Tanzania dissolved the board of the Ports Authority and sacked the permanent secretary of the transport ministry in December 2015. The reason for that, allegedly, was corruption.

This, perhaps, explains the inability of Tanzania/Zanzibar to regulate for ferry safety and to enforce those regulations effectively. Yet, Tanzania is a comparatively wealthy country with substantial mineral, agricultural and forestry resources. It has a large and fast growing tourist industry taking in both the mainland and the Zanzibar islands. By many measures it is economically, politically and socially more advanced than at least four of the worst ten countries for ferry fatalities.

It should be able to effectively reform its ferry safety enforcement but will obviously require assistance in that from IMO and some benevolent European nations. To better motivate it to initiate reform it would be useful for some “naming and shaming” of delinquent ferry operators to be carried out by the international travel media.

9.2.6. Myanmar is probably worse than it looks.

Myanmar's capacity for reform is difficult to effectively analyse. Having experienced its own “enlightenment” recently and become at least semi-democratic, it does appear to have some potential. However, it is still regarded as the most corrupt of all the nations examined here.
It is also difficult to accurately analyse the real extent of its ferry safety problem except to suggest that it is undoubtedly considerably worse than the BMPVA database statistics indicate. The reasons for that are due to the significant under reporting explained in Chapter 5.

The country’s overriding handicap, however, is appalling corruption which very largely prevents any kind of regulatory or enforcement reform.907

Myanmar is rich in many resources and has a very fast growing tourist industry. The economic importance of that may, again, be a lever for promoting safety reform through a “naming and shaming” campaign. Naming and shaming of Myanmar’s dictatorial political leaders appears to have made a positive contribution to the country’s “enlightenment” between about 2007 and 2010. More positive, ICAO style, support from IMO would undoubtedly be valuable as would practical help from developed Asian countries such as Singapore, Japan and Taiwan.

9.2.7. Egypt, despite its many problems, has reform potential.

Egypt is placed second of the ten worst countries for ferry fatalities on the UN Human Development Index.908 Its situation is the same for GDP per capita after China. It enjoys a large and lucrative tourist industry that involves significant aquatic tourism. That is supported by a reliable airline, Egypt Air, that is sufficiently safe as to be permitted to fly into Europe and the USA.909 Indeed, its tourism industry comprises one per cent of the world market.910 That involves significant travel on both ferries and tourist boats on the River Nile and in the Red Sea. The country cannot afford to gain a reputation for abnormally high levels of ferry fatalities.

There is an Egyptian Authority for Maritime Safety and a General Authority for River Transportation.911 Both appear to be at least adequately manned and equipped and have promoted themselves with impressive mission statements on their equally impressive websites. They are subsidiaries of the Ministry of Transport. In addition, the Egyptian Coast Guard possesses a fleet of more than 100 patrol and rescue vessels of varying shapes, sizes and seaworthiness ranging upwards from around 10 metres LOA.912 Most of them are known to have been acquired as foreign aid gifts so how well they are operated or even how many are operational is questionable.

Egypt has a significant maritime training institution and many of its more ambitious student seafarers attend foreign institutions.913

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907 See Transparency International, Myanmar, and 5.2.
908 See 5.2, Economic and cultural comparison.
909 For routes and details, refer to www.egyptair.com.
911 For details, refer to www.mts.gov.eg/en/content/30/1-107-Authority-for-Maritime-Safety/.
913 The Arab Academy for Science, Technology & Maritime Transport in Alexandria.
However, while the publicity material disseminated by the Maritime Safety Authority emphasises the word “safety”, a careful perusal of its propaganda material reveals a greater focus on Suez Canal and port operations and their profitability. That, presumably, and thanks to its enormous toll revenues, is where the Authority’s attention really lies. Egypt’s appalling ferry safety record tends to confirm that. Its adherence to IMO codes and conventions appears to be mostly “lip service”.

As for how Egypt could improve its ferry safety record, there are numerous obstacles. First, the usual problem of corruption that is endemic in all the ten worst countries. While Egypt is only mid-range (the same as Indonesia) on the Transparency International Corruption Perception Index, it is generally recognised as having significant problems in that regard. The country obviously has more than adequate maritime safety regulations and regulators. Its problem is how well those regulations are enforced. Given its disgraceful fatality record, it is quite obvious that they are far from adequately enforced.

Thanks to the vital importance of its tourist industry, Egypt is almost uniquely vulnerable to bad publicity concerning that sector. That is certainly where publicity pressure for reform could effectively be concentrated. Of course, it would be preferable if IMO were able – and willing – to support and persuade Egypt to reform its ferry safety practices on its own account. Yet again, it is a country with an airline (Egypt Air) that has proved itself capable of operating consistently to international standards. That being so, why can its maritime sector not do the same?

9.2.8. DR Congo, Haiti and Senegal will be difficult, if not impossible, to reform.

Many generally well-intentioned local and foreign individuals, organisations and governments, including the United Nations and many of its agencies, have noted the need for economic, governance, health and safety reform in those three countries and have attempted to achieve it. Sadly, they have so far met with little success.

Unfortunately, despite possessing substantial maritime bureaucracies, there is little evidence of anyone in those countries taking the implementation and enforcement of maritime regulations seriously. They are sadly, as far as this work is concerned, completely dysfunctional „failed states”, both economically and in terms of governance. Regrettably, there seems little potential for ferry safety reform in any of them in the foreseeable future. Reform efforts would be more profitably directed at the other seven countries where real potential exists.

While only the most adventurous of tourists visit such places, the international tourism media should be more thoroughly and frequently warned as to the dangers of ferry travel in those countries. Developed country „travel

914 From Table 5.2, Economic and cultural comparison.
915 See Appendix A, Ibid.
advisories” do try to publicise the dangers of ferry travel there but it would be helpful if the general travel media were able to do more.\footnote{916}

**9.2.9. The twenty worst countries for ferry fatalities and their potential for reform.**

The author has analysed the existing effectiveness of the national maritime authorities of the ten worst countries for ferry fatalities as follows:\footnote{917}

- Philippines - Slowly improving but still corrupt and inadequate.
- Bangladesh - Slowly improving but still corrupt and inadequate.
- Indonesia - Slowly improving but still corrupt and inadequate.
- China - Strong systems but corrupt. Reformable domestically.
- Egypt - Weak. Corrupt but reformable.
- Tanzania - Weak. Corrupt. Reform will be slow and difficult.
- Myanmar - Weak. Corrupt. Reform will be slow and difficult.
- Senegal - Almost non-existent. Weak and corrupt.
- DR Congo - Non-existent. Beyond realistic reform.
- Haiti - Non-existent. Beyond realistic reform.\footnote{918}

The next to worst ten countries for ferry fatalities: India, Nigeria, South Korea, Estonia, Brazil, Sierra Leone, Greece, Peru, Yemen and Somalia need to be considered differently.\footnote{919} Estonia is listed on the basis of just one accident, the Estonia sinking.\footnote{920} Greece has suffered many accidents but few recently. It is showing definite signs of improvement.\footnote{921}

Estonia and Greece have substantial maritime regulatory regimes and, very largely, the means to enforce them. The remaining eight countries continue to experience frequent fatal ferry accidents. Of them, Sierra Leone, Somalia and Yemen, given their very unstable political situations, seem unlikely to be able to be reformed in the short term. The other five nations, India, Nigeria, South Korea, Brazil and Peru, appear to have reasonable prospects for reform. So, twelve of the twenty most dangerous countries for ferry travel appear to have real potential for significant safety improvements.

**9.3.0. Enforcement deficiencies are the core problem.**

Given the preponderance of human error causes of ferry accidents it is obvious that the fundamental problems are behavioural rather than mechanical or structural. So, equally obviously, the responses to those problems must primarily be aimed at improving human behaviour.

\footnote{916}{As described more specifically in Chapter 5.}
\footnote{917}{From Table 5.3, Ibid.}
\footnote{918}{Author assessed.}
\footnote{919}{From Table 5.3, Ibid.}
\footnote{920}{For details, refer to Chapter 3, Estonia case study.}
\footnote{921}{As detailed in Appendix A, Ibid.}
In most but not all of the nations studied there is considerable regulation already in place. Arguably, in some cases there may be too much. Also, arguably, there may be too many bureaucrats charged with enforcing that regulation. As former IMO Secretary-General O’Neil pointed out, the problem lies in enforcing the regulations that already exist.\textsuperscript{922} That enforcement should involve encouragement and education just as much as penalty and punishment. Both „carrots“ and „sticks“ are required.

IMO is well equipped to assist with the carrots of persuasion and encouragement, if it chose to utilise them, but the sticks of enforcement and education must be the responsibility of national governments. Almost all of those, particularly the ten worst countries for ferry fatalities, have both marine departments and coast guards.\textsuperscript{923} The problem with those, obviously, is that they are largely ineffectual. That is mainly due to poverty and its resultant corruption. Those countries require considerable support, encouragement and, probably, hectoring to become effective.

Regulatory and, most particularly, enforcement deficiencies are clearly the core problem. Addressing them will be the key to reducing the waste of passenger lives in domestic ferry accidents. Persuading or forcing ferry owners, their crews and the bureaucrats who control them to behave better will be the most rewarding factor in ferry safety reform. That, clearly, is the role of national governments with support from IMO. Such reform is achievable as has been shown by the ICAO and oil tanker examples.\textsuperscript{924}

Notably, in its recently published \textit{Insight report on global safety challenges}, the Lloyd’s Register Foundation suggested that a potential solution to the safety challenge posed by passenger ferries is to, “Seek to influence the IMO to enforce regions to take up regulations that would make ferries safer in design and methods of use”.\textsuperscript{925}

Judging from their historical performance records, it will not be easy to motivate reform in either the IMO or any of the national governments of the worst performing countries. There is considerable inertia there. There is a disappointing absence of the will to achieve safety reform in many areas of human activity, not just in ferry travel. Inevitably, then, some substantial „naming and shaming“ will be necessary to overcome that largely cultural and economic inertia so as to initiate the necessary reform.\textsuperscript{926} That would best be supported by something similar to the „No country is left behind“ system promoted so effectively by ICAO.\textsuperscript{927}

\textsuperscript{922} O’Neil, W. A. Op cit.
\textsuperscript{923} Most have websites and the coast guards are well described in Wertheim, E. \textit{The Naval Institute Guide to COMBAT FLEETS OF THE WORLD, 16TH EDITION, THEIR SHIPS, AIRCRAFT, AND SYSTEMS}, Naval Institute Press, Annapolis, 2013.
\textsuperscript{924} Described at length in Chapter 4, 4.1.5.
\textsuperscript{926} Ibid. ICAO proved very effective at that activity.
\textsuperscript{927} For details, refer to the ICAO website \url{www.icao.int/about-icao/}. 
Indeed, to a still too limited degree, that is already happening through both formal and ad hoc arrangements. For example, the Australian Maritime Safety Authority has for some years been assisting Indonesia to improve its maritime safety.\textsuperscript{926} The same Australian department also assists other neighbouring island nations to Australia’s north.\textsuperscript{929} An NGO, the International Maritime Rescue Federation, in collaboration with the United Kingdom’s Royal National Lifeboat Institution, has conducted children’s lifesaving programmes in Tanzania.\textsuperscript{930}

There are numerous effective maritime safety improvement programmes being used in developed countries. They can or would be excellent models for developing country governments to follow. There are also commercial courses that focus on the same subject.\textsuperscript{931} IMO developed a \textit{Technical Assistance Subprogramme in Maritime Safety} for casualties on ships not covered by the provisions of international regulations. That was offered to “Member Governments wishing to enhance the safety of such ships” in 1999.\textsuperscript{932} Obviously few took up the offer.

Naming and shaming would best be undertaken by an international NGO. If carried out globally and focused on serial delinquents, it could have a significant effect, particularly if it starts to affect a country’s tourist industry. Such a campaign should be coordinated with the marine hull insurers and protection and indemnity clubs in their own best interests. If an owner is publicly criticised and cannot purchase insurance, he really has no option other than to reform. Similarly, if the tourist guides, magazines, websites and other media warn tourists against travelling with particular delinquent owners, they will eventually suffer. They will be forced to behave better.

\textbf{9.4.0. Effective regulatory and enforcement reform is possible but will require cultural and behavioural modification.}

As extensively examined and discussed in Chapter 5, there are numerous, mostly poverty caused, cultural handicaps that retard ferry safety reform.\textsuperscript{933} Democratic developed countries have very largely instituted effective safety regulations and enforce them rigorously although, mostly, with a light touch. The data show that such systems significantly minimise the risks of ferry accidents.\textsuperscript{934} Table 5.3. effectively summarises and highlights the economic

\textsuperscript{929} For example, through its support for the Asia-Pacific Heads of Maritime Safety Agencies, the Secretariat of the Pacific Community and the Regional Assistance Mission to Solomon Islands.
\textsuperscript{930} Described in a press release on \url{www.international-maritime-rescue.org/organisationseducation/}.
\textsuperscript{931} For example, the Lloyd’s Maritime Academy Diploma in Maritime Safety Policies and Regulations, Informa group, London 2017.
\textsuperscript{932} Described in MSC 72/14/2 of the IMO Maritime Safety Committee, IMO, London, 8 November 1999.
\textsuperscript{933} Examined on a country-by-country case study basis that produced largely uniform results.
\textsuperscript{934} Refer to Appendix A generally.
deficiencies that are the root cause of social and cultural problems that lead to the appallingly bad safety records of the ten worst countries.

Such problems, however, can be largely and very economically eliminated. They are not insoluble. Neither are the so-called geographic problems of archipelagic, riverine or lakeland nations that are, in reality, not problems at all. Rivers, lakes and sheltered seas provide such nations with very low cost and lightly polluting transport media. If utilised safely and sensibly, they can be significant national assets.
Chapter 10

Some possible solutions – What is to be done?

There are numerous ways in which ferry safety, particularly developing country domestic ferry safety, could be significantly improved. The aviation industry and the cruise and oil tanker sectors have shown the way.

10.1.0. Human error is the fundamental problem and IMO is currently an inadequate solution.

Wide-ranging statistical analysis of considerably more comprehensive passenger vessel accident data than has been used previously highlights the fundamental problem. The BMPVA database records 750 “known” fatal passenger vessel accidents that occurred between 1 January 1966 and 31 December 2015. There have undoubtedly been many more that are so far unrecorded.

Clearly, cruise ship and fast ferry, particularly multihull fast ferry, accidents and their resulting fatalities are statistically negligible. Cruise ship, casino ship and cargo liner accidents caused only 688 or 1.2 per cent of the 59,600 fatalities that occurred between 1966 and 2015. They were almost invariably engaged on international voyages and carrying developed country passengers. A significant proportion of those fatalities are likely to have been suicides or drunken falls.

Ferry accidents in developed countries, particularly since the Estonia sinking in 1994, have been rare and have produced few fatalities. Fast ferry accidents have been extremely rare. They have resulted in 544 (0.9%) fatalities over the fifty year period studied here. Accidents involving multihull fast ferries have been even rarer. They resulted in 69 deaths (0.1%).

Clearly, then, by far the major part of the problem lies with ferries, particularly mono-hulled or outrigger stabilised ferries of the vulnerable conventional Ro-Pax and motor banca types. More specifically, they are ferries undertaking domestic voyages in developing, largely archipelagic, lakeland and riverine countries. Some 76 per cent of ferry fatalities occurred in just ten such countries. A further 14 per cent of fatalities have occurred in an additional ten similar countries. So, 90 per cent of the world’s ferry fatalities have occurred in just ten per cent of its nations. Thirty-two per cent of the ferry fatalities from 2000 to 2015 occurred on conventional monohull Ro-Pax ferries. Ninety-three

935 The constantly evolving and growing Baird Maritime Passenger Vessel Accident database (Appendix A) is the compendium of that data.
936 All statistics referred to in paragraphs 1 and 2 are drawn from the BMPVA database, Appendix A, Ibid.
per cent of them occurred on domestic voyages. Of those fatalities, 98 per cent were clearly due to human factors. Especially vulnerable vessels such as conventional Ro-Pax and motor banca ferries simply exacerbate those human errors.

As the extent, location and reasons for the ferry safety problem have been made clear in the foregoing chapters, what then is to be done to ameliorate, if not eliminate, it?

Recognising the vital facts described above, there are numerous ways in which ferry safety, particularly domestic ferry safety, could be significantly improved. Broadly, the aviation industry and the oil tanker sector have shown the way. As, to a significant degree, have the cruise shipping sector and developed country road safety campaigners. Most of the suggested improvement techniques have already been proved in those fields of activity. They are described in more detail below but, in brief, they are:-

1. First and foremost, reduce the incidence of human errors through improved training, education, encouragement, management and operational disciplines and proper enforcement of existing regulations in all maritime nations.

2. To achieve that, reform the remote, North Atlantic centric, disengaged and disinterested IMO, rather than replacing it. Unless, that is, it refuses to be reformed. Ensure that it focuses on solving the very significant problem of developing country domestic ferry fatalities. Relocate its headquarters to a South-East Asian city other than Singapore. That should preferably be Manila or Bangkok because of their comparatively free press.

3. Encourage IMO to persuade its laggard member states to simplify and properly enforce their existing safety regulations as they affect domestic ferries.

4. Encourage IMO to develop the „will“ to practically assist, support and work „with“ developing countries without patronising them. It does not need to „interfere“ in their domestic affairs. Its ISM Code can be extended by member states to include vessels engaged on domestic voyages. The current „lip service“ from IMO is wholly inadequate. The importance of „face“ in developing countries must be recognised. IMO should expand the useful work it already does in educating developing country maritime regulators at its World Maritime University.

5. Domestic ferry travel should be equally as safe as international ferry, cruise ship, oil tanker and air travel. IMO should be responsible for both domestic and international ferry safety globally. ICAO has almost entirely achieved that with aviation. Why not IMO with ferries? Aircraft operate in three dimensions, ships in only two. It should, therefore, be easier to reform shipping safety. ICAO should be adopted as the model for IMO reform.

937 Refer to the ISM Code and EU Regulation 336/2006.
6. Revise IMO’s SOLAS Code to be simpler, more practical, economical and applicable to developing countries using its own HSC Code as a model. Implement the SOLAS/HSC and ISM codes domestically in all member nations as has more effectively been done with MARPOL and COLREGS, for example.

7. IMO should ban new construction of conventional, monohull Ro-Pax ferries. They are exceptionally dangerous in the wrong hands. Conversely, it should encourage the building of multi-compartmented, multi-hulled ferries of all sizes, construction materials and speeds. Including Ro-Pax ferries.

8. IMO should ban the sale of all second-hand conventional monohull Ro-Pax ferries to developing countries. It should rigorously enforce that ban by „naming and shaming“ delinquent companies, officers and countries.

9. IMO should focus its reforms on the twenty worst performing, most dangerous countries. It should encourage and support the reform of national maritime authorities in the twelve of those countries that have realistic potential for improvement. They are the Philippines, Indonesia, Bangladesh, Myanmar, Tanzania, Egypt, South Korea, India, Nigeria, Brazil, Peru and Russia.

10. IMO should introduce a simple, standard format accident inquiry and reporting model internationally to determine why accidents happen. It should promote its Member State Audit Scheme (MSAS) much more effectively than it does currently to the most dangerous countries.

11. IMO should establish a detailed, standardised and all-encompassing global database of official accident inquiry and media reports of serious accidents and incidents to replace its almost useless GISIS database. That database should include details of „near misses“. If its member states refuse to contribute to compiling that database, IMO should compile it itself or hire someone to do it for it.

12. Utilising that database, IMO should promote a culture of learning from major, minor and „near miss“ ferry accidents as is normal in aviation.

13. IMO should encourage and support the establishment, improvement and expansion of search and rescue services in developing countries and improve SAR co-ordination and communication between neighbouring countries.

14. IMO should acknowledge and respond, through encouraging appropriate regulation and enforcement, to the fact that inadequate vessel maintenance is a much bigger problem than design and construction deficiencies.

15. IMO should require the use of human factors specialists by ferry owners and regulators to develop and promote a safety culture.
16. IMO should encourage classification societies to be more pro-active, preferably on a *pro-bono* basis, in developing countries to assist them to promote a safety culture.

17. IMO should ban smoking aboard all vessels at all times as on aircraft.

18. The wider ferry industry should be encouraged to improve and semi-standardise vessel design, construction and equipment as in aviation. Preferably using multi-compartmented, multi-hulled vessels. All passenger vessels should be compulsorily equipped with EPIRBs and, preferably, AIS.

19. The wider maritime industry should develop simple, lighter, and less expensive evacuation systems and lifesaving equipment that is more likely to be fitted and used.

20. The wider ferry industry, IMO and national governments should be encouraged to introduce improved computerised „fool proof“ universal ticketing systems to ensure that accurate passenger manifests are created.

21. The wider ferry industry, IMO and national governments should encourage passenger behavioural reform and national „learn-to-swim“ campaigns.

22. National governments should severely punish convicted delinquent owners, officers, crews, classification societies and regulators. They should widely publicise such punishment.

23. If IMO will not or cannot be reformed, a global NGO to promote greater ferry safety should be established. It should use „naming and shaming“ techniques similar to those used by Amnesty International, Greenpeace, WWF, Transparency International and Sea Shepherd, for example, to expose the greed and negligence of bad shipowners and corrupt bureaucrats. Market forces should then encourage those shipowners to reform.

24. That NGO should be established to raise public consciousness of the dangers of bad ferries globally and to campaign for substantial safety improvements.

25. That NGO should introduce a global vetting system, similar to Rightship, for all passenger vessels, their owners, officers and crews especially those operating domestically. In co-operation with the International Union of Marine Insurers, it should encourage hull and P&I insurers to wield their considerable power for reform. It should also co-operate with the wider travel industry and its publications to ensure the travelling public are made aware of the dangers of unsafe ferries.

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938 See [www.rightship.com](http://www.rightship.com).
939 See [www.iumi.com](http://www.iumi.com).
In addition to the reforms of IMO and of national governments advocated here, there are numerous reforms and improvements that could be undertaken by ferry operators themselves. They are described in sections 10.6.0. to 10.14.0. below.

10.1.1. Reducing human errors must be the primary focus.

Human error, it has been made clear, is by far the most common and important causal factor in fatal ferry accidents. The most effective solutions, obviously, will be those that successfully address that ultimate and overriding cause of 88 per cent of ferry accidents and 98 per cent of ferry fatalities. There is much that could and should be done to reduce human errors so as to achieve a substantial reduction in the global ferry death toll. Those improvements need not be very costly if carried out sensibly. It is far more a question of collective will than of money.

Human behaviour can and has been changed for the better in aviation, public health, construction, cruise ship and oil tanker operations, mining and road safety, for example. It can be done. More and better training, education, more rigorous disciplines and punishments and human awareness campaigning are the keys.

What will be required to achieve this will be a lengthy and powerful international public relations, lobbying and media campaign to bring the problem of unnecessary ferry fatalities to the attention of the general public. Such a campaign could be inspired and organised by a reformed International Maritime Organisation or, if IMO is completely ossified as it appears to be, more likely, by the proposed Non Government Organisation described below. It is notable that IMO is mentioned in 19 of the 24 suggested improvements summarised above.

The parent body of IMO, the United Nations Organisation, has launched a campaign “Clean Seas” to rid the seas of garbage, particularly plastics. If that has been possible, why not a FerrySafe campaign led and promoted by IMO? Similarly, IMO's MARPOL and COLREGS codes have been implemented universally including domestically in all member nations, at least in theory. There seems to be no reason why the SOLAS, ISM and HSC codes could not also be so implemented.

In fairness to IMO, although the evidence of continuing fatalities condemns its lack of effectiveness, it has publicly demonstrated its consciousness of the human factors problem. Its Resolution A.947(23), adopted on 27 November 2003, titled Human Element Vision, Principles and Goals for the Organisation

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940 See Chapter 2, Figure 2.2.
941 See section 10.17.1.
943 The author has suggested that in a note to IMO Public Affairs Manager, Lee Adamson on 12 March 2017. Baird, N. W. & Adamson, L. UN Clean Seas campaign.
showed a clear awareness of the problem. Similarly, in 1999, the then Secretary-General, William O’Neil, in a presentation to IMO’s Maritime Safety Committee, urged that strong and effective action be taken with respect to Casualties on (Passenger) Ships not covered by the provisions of international conventions. Since then, a number of conferences have been held at which human factors have been considered but other than a significant reduction of the annual number of fatalities in 2013 and 2016, little has changed. In the intervening years and since, in 2017, the annual numbers of fatalities have returned to normal.

One such conference was an Asia-Pacific Heads of Maritime Safety Agencies Forum held in Busan from 12-15 April 2005. There, a representative of the U.S. Coast Guard, Commander Bryan R. Edmond, an engineer, presented a very optimistic paper Current State of International Consideration of Human Factors. Perhaps his research was handicapped by the absence of a comprehensive and readily accessible database of fatal ferry accidents at that time. Perhaps he was simply ahead of his time. Subsequent events have shown that his optimism as to potential reform was sadly premature, particularly in the context of an “Asia-Pacific” forum.

Further, IMO has, in its prescient Manila Statement on Enhancement of the Safety of Ships Carrying Passengers on Non-International Voyages, which was adopted in Manila on 24 April 2015, recommended some of the above suggested reforms. Sadly, there has been no sign of any subsequent action aimed at implementing those recommendations on the part of IMO. Intriguingly, the author and a colleague were actively and deceptively precluded from attending and participating in the conference at which those recommendations were developed. The author suspects that the Manila Conference was something of a „Show Conference” designed as a vehicle to present IMO’s thoughts on domestic ferry safety and to demonstrate its concern about the problem.

10.1.2. Simplify, improve and, above all, enforce existing regulations.

As stated by former IMO Secretary General O’Neil twenty years ago, IMO and its member states have enacted enough regulations. What they need to do now is to properly enforce, or facilitate the enforcement of those already in existence.

944 For details, refer to Resolution A.947(23) of the International Maritime Organisation, London, 27 November 2003
946 Appendix A, Ibid.
948 For the complete statement see Appendix G.
949 Revealed in correspondence among the author, Mr Justin Merrigan and IMO staff.
950 As in the sense of the Stalinist „Show trials” in the Soviet Union in the 1930s.
951 Quoted in full in 9.1.
952 Comment by IMO Secretary-General W.A. O’Neil in 9.1.
The process should start with remedying, particularly simplifying, the very obvious deficiencies in existing international and national regulations and, much more importantly, their enforcement.\textsuperscript{953} This should commence with the ten worst affected nations.\textsuperscript{954} Reforms could then be extended to all other nations starting with the next ten worst countries. Encouragement of better behaviour on the part of owners, operators and passengers would help and is entirely achievable\textsuperscript{955}. Improved vessels,\textsuperscript{956} evacuation and safety equipment and search and rescue services\textsuperscript{957} would also bring about significant improvement as would better passenger education.\textsuperscript{958}

\textbf{10.2.0. Reform of IMO would be the preferred solution.}

\textbf{10.2.1. IMO appears remote, disengaged and disinterested in developing country domestic ferry fatalities.}

The International Maritime Organisation suffers from a disappointing perception of disengagement and remoteness and an appearance of being much too North Atlantic focused. While it has made some small, tokenistic efforts in the form of organising expensive but largely unrepresentative meetings, conferences and seminars in Tanzania, Kenya, the Philippines, Indonesia and Fiji,\textsuperscript{959} among others.\textsuperscript{960} IMO’s consultative process is generally restricted to a very carefully selected audience that is unlikely to want to make changes or to “rock the IMO boat”! Such events appear to achieve very little apart from projecting an image of concern.

In its current form and with its current self-serving corporate culture, IMO has not yet and seems very unlikely to make any worthwhile contribution to the raising of safety standards in the domestic ferry sector. This is particularly so with respect to domestic ferries operating in developing countries. And they, after all, comprise the bulk of the problem. IMO and the ferry voyaging public would both benefit from wide-ranging and substantial reform of the organisation as outlined below.

IMO gives the impression of having no serious interest in the domestic ferry fatality problems of the ten nations in which 80 per cent of the world’s ferry fatalities have occurred. Nor, indeed, does it seem to have made any substantial effort in many of the ten next worst nations. It appears “Pontius Pilate” like in its desire to “wash its hands” of such problems and to transfer the blame for them to national governments. Most of the printed matter it

\textsuperscript{953} See Chapter 9 generally.
\textsuperscript{954} See Table 5.2, \textit{Passenger Vessel Fatalities} in Chapter 5.
\textsuperscript{955} See Chapter 7, generally.
\textsuperscript{956} See Chapter 6, generally.
\textsuperscript{957} See Chapter 8, generally.
\textsuperscript{958} See Chapter 7 on Human Factors.
\textsuperscript{959} Refer to Bibliography for IMO and INTERFERRY press releases. E.g. Manila, 24 April 2015.
\textsuperscript{960} See, for example, IMO press release \textit{IMO support to NEPAD Planning and Coordinating Authority (NCPA), IMO, London, 2013.}
produces on the subject of ferry safety would most accurately be described as platitudinous. The corporate culture of IMO is arrogantly and ignorantly self-satisfied and self-serving to the point of negativity. It seems to find it difficult, if not impossible, to accept questioning, criticism or even suggestions. It mostly just ignores them as the author has discovered from personal experience over many years.

IMO is invariably very slowly reactive rather than proactive. Normally, a disaster, scandals or multiple disasters are required to motivate the organisation to act. Even then, it appears much more willing to act or comment if such disasters occur in Europe. For example, the capsize of the Costa Concordia in 2012, which killed 32 people, inspired far more attention and comment from IMO than anything that has ever happened in Asia, the Pacific or Africa. In the same year there were 293 fatalities when the Skagit capsized off Zanzibar; the Rabaul Queen capsized off New Britain with 170 fatalities; an unknown ferry on the Brahmaputra River with 251; and, the Shariatpur in Bangladesh with 185. A total of 900 fatalities. And, of course, there were many other less newsworthy accidents.

In that year there were ten reported accidents in which many more people were killed than in the Costa Concordia disaster but they all happened beyond Europe and, so, went largely unreported or commented on as far as IMO was concerned. IMO tells us it „consults” widely but then, frustratingly, usually fails to act in any constructive way. It issues statements following its information sharing forums but they are devoid of commitments and timelines for action on the part of their participants.

This contrasts distinctly with the publicly expressed desire of the two most recent IMO secretaries-general, Koji Sekimizu and Ki Tack Lim, at least, to the effect that: “The public expects safety standards on domestic passenger ferries to be as strong as those on international vessels”, and “I will ensure that the utmost focus is placed on improving implementation (of rules) at a global level”. Ki Tack Lim went on to say: “But perhaps the most valuable tool we have in this respect is the Member State Audit Scheme”. This is a sadly hollow, if not actually delusional, claim as only one IMO member state, China, of the ten most dangerous countries, was a member of the MSAS at the time of going to press. IMO has a long way to go before it fulfils its laudable objectives. The

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962 Appendix A, Ibid.
964 IMO Secretary-General Koji Sekimizu speaking at a Conference on the enhancement of safety of ships carrying passengers on non-international voyages, Manila, 24 April 2015.
965 From an Address of the Secretary-General (Ki Tack Lim) at the Opening of the 103rd Session of the Legal Committee, IMO, London, 8 June 2016.
966 Ki Tack Lim, Ibid.
967 It is difficult to determine how many member states have been audited under the MSAS. However, at 6 April 2017, the only non-OECD country known to have been audited was Papua New Guinea
reality of its actions diverges dramatically from its rhetoric. It does not appear
to be short of funds, just the will or determination to properly analyse the
problem and then improve the safety of passenger vessels.

While it would be preferable if IMO were able to be reformed, if it is so ossified
as to be beyond reform or redemption, it would better be supplemented and
substantially replaced by a ferry safety focussed NGO, FerrySafe.org or
SafeFerry.org, perhaps?

10.2.2. IMO must develop the "will" to effectively support and
assist developing countries to improve their domestic
maritime safety standards by working "with" them.

While acknowledging, but not in any way accepting, the restraints placed on
IMO by its legally-prescribed inability to interfere in the internal affairs of its
sovereign member states, it could, were it to develop the will or
determination to do so, assist significantly without so interfering. It is a matter
of approach.

IMO should work "with" its sovereign member states to educate, encourage
and train them to similarly encourage, educate, train and enforce better
behaviour among their local ferry owners, operators and regulators. It should
develop a corporate sense of proportion and concentrate on curing the human
factor problems rather than the very significantly less important technical ones
that it seems to be obsessed with and on which it has spent so much money.

Its apparently substantial financial and time resources should be directed at
real problems rather than at speculated or possible ones. That should be
done in a culturally sensitive manner. A greater focus on simple human
behavioural factors and requiring fundamentally safer vessels is all that is
required. Finessing the proven inadequate existing rules using complex and
arcane naval architectural mathematical formulae seems to be an expensive
waste of time and money. Developing a global maritime safety culture should
be its primary objective. Safety, in the case of ferries, is a behavioural rather
than a technical problem.

The biggest problem hindering the reform of IMO is that it is always very
difficult to change the course of a large and well-entrenched bureaucracy.
While IMO obviously benefits from the contributions of some dedicated staff
and committee members, committee chairmen and delegates, its public face,
as observed by the author, is generally quite different. IMO"s employees
appear to be self-satisfied, self-serving people on very good salaries and
enjoying generous perquisites. As also do its consultants. They are very
comfortable and, so, unlikely to want to promote change, especially reform.
They firmly believe that they know best.

968 As described in its foundation Charter, see www.imo.org.
969 See Chapter 8, generally.
Employment by IMO appears to be something of a sinecure, right up to Secretary-General level. It should not be. Such reluctance to change or reform will be endorsed and supported by many, but fortunately not all, of IMO’s generally very self-indulgent national delegates. It will also tend to be endorsed by certain ferry owners, designers, builders, naval architecture firms and academics and national maritime administrations, particularly from Northern Europe and Scandinavia. IMO serves them well. It largely suits them exactly as it is. They know how to lobby IMO very effectively.

10.2.3. IMO HQ should move to centre of real maritime world.

IMO’s headquarters should be moved to somewhere nearer the centre of the real maritime world. It is remote from the area where it is most needed. London is too attractive a subsidised home to sinecured delegates and staff from developing countries to enable any constructive work to be done there. It is too far from where most of the problems actually occur. It is no longer the „centre of the maritime universe”. Asia undoubtedly is. It is interesting, by contrast, to note that the International Maritime Rescue Federation, a charity/NGO based in low-rent, remote Stonehaven, Scotland, has opened a regional office in Shanghai.970

10.2.4. Passengers have a right to expect domestic voyages to be equally as safe as international ones and airline flights.

Passengers should be entitled to expect that they would be equally as safe on domestic as on international voyages. Secretary-General Ki Tack Lim stated this personally.971 This is generally the case on both domestic and international flights with only a few exceptions in Africa, Latin America and the former Soviet Union.972 IMO should follow the example of its sister organisation ICAO and oversee domestic voyages just as closely as international ones, even if through a carefully supported proxy. ICAO suffers from a similarly restrictive charter as IMO but it has not allowed that to prevent it from making very significant improvements to the global aviation industry including with respect to domestic flights.973 It is apparent that ICAO is notably better led than IMO. Leadership seems to be the key to their disparity in effectiveness.

10.2.5. Reform IMO with ICAO as a model.

IMO should be reformed with ICAO as a model. It does not need to be replaced unless it refuses to be reformed. The IMO GISIS accident database, for example, must be substantially upgraded and maintained. It is wholly inadequate. If IMO is unaware of the extent of the ferry fatality problem, it is unsurprising that it is so reluctant to do anything constructive about it. If that database improvement cannot be done „in-house”, as seems likely, it should

971 Ki Tack Lim. Ibid.
972 Refer to ISTARS at www.icao.org.
973 Refer to www.icao.org and www.imo.org.
be contracted out to a free enterprise operator subject to appropriate checking and auditing.\textsuperscript{974} ICAO’s ISTARS database provides an excellent template or benchmark.\textsuperscript{975} So, too, does its associated SKYbrary database.\textsuperscript{976} Another excellent example of defining the problem with a database is the international road safety equivalent, IRTAD.\textsuperscript{977} They show what intergovernmental organisations are capable of when properly directed.

The \textit{Baird Maritime Passenger Vessel Accident database} shows what can be achieved by a private organisation with a very small fraction of the resources of IMO. It is incomparably more comprehensive and informative with respect to ferry accidents, particularly domestic ferry accidents, than is GISIS. Its content has been offered to IMO without charge but that offer was rejected.\textsuperscript{978}

The ferry and tourist boat industry and its regulators should relentlessly plagiarise from, copy and follow the aviation industry and the activities of ICAO. The oil tanker and cruise ship sectors, too, are showing the way. They all provide excellent models. Indeed, they do for the entire maritime industry.

The global ferry industry, through its industry association, INTERFERRY, should assiduously and relentlessly lobby for the reform of IMO if only to eliminate the rogue operators who give the ferry industry a bad name. This would obviously be in the best interests of legitimate operators. Even though a fatal ferry accident may occur in Bangladesh, Tanzania or the Philippines, it still harms the image of ferry operators everywhere.\textsuperscript{979}

\textbf{10.2.6. Revise IMO’s SOLAS Code to be more economical using the HSC Code as a model.}

IMO’s SOLAS Code standards are generally far too expensive and, often, inappropriate to be realistically complied with widely with respect to domestic voyages in developing countries.\textsuperscript{980} There must be room for realistic compromise. When the SOLAS requirements are unaffordable and inappropriate, they will be ignored. It is quite feasible to design and construct more affordable and appropriate vessels and evacuation and safety equipment suited to poorer and mostly warmer countries. SOLAS should be adjusted accordingly using the HSC Code as a model. That would encourage the governments of developing countries to introduce more appropriate regulations.

The extension of an appropriately modified version of the HSC Code to cover all ferries and tourist vessels everywhere, whether or not they are operating domestically or internationally, or at high speed, should be undertaken.

\textsuperscript{974} Described in detail in Section 10.17.1.
\textsuperscript{975} See ISTARS, Ibid.
\textsuperscript{976} Refer to \url{www.icao.org/SKYbrary/}
\textsuperscript{977} See \url{www.ityf-oecd.org/IRTAD/}
\textsuperscript{978} Refer to correspondence between the author and Adamson, L. of IMO.
\textsuperscript{979} Disclosure: The author is a long time member of INTERFERRY and at the time of writing served on its Domestic Ferry Safety Sub-Committee.
\textsuperscript{980} Compare the IMO SOLAS and HSC Codes available on \url{www.imo.org}.
quickly. It is very effective and has been accepted by designers, builders, classification societies, operators and regulators alike.

In both developed and developing countries very few vessels built to or operating under the HSC Code have been involved in fatal accidents. The number of fatalities thus arising have been miniscule. It works very effectively and should be an all-encompassing globally implemented rule. There is no excuse for permitting lower safety standards on domestic voyages. They simply need to be more appropriate and affordable. It is on domestic voyages, after all, that 93 per cent of ferry fatalities occur.

10.3.1. Ban new construction of conventional monohull Ro-Pax ferries.

Conventional Ro-Pax ferries, which have been involved in at least 18 per cent of known total accidents, have been responsible for at least 25 per cent of known ferry fatalities over fifty years. In the final sixteen years of this study, however, they have been involved in 16 per cent of accidents but have been responsible for 32 per cent of fatalities, almost entirely in developing countries. That is grossly disproportionate. Conventional monohull Ro-Pax ferries represent considerably fewer than 10 per cent of the total ferry population. The statistics speak for themselves. Their bow and stern doors and low, wide vehicle decks make them uniquely vulnerable to human errors, especially when inadequately manned and maintained.

Future Ro-Pax ferries should be required to have at least two hulls linked by an appropriately strong and durable bridge deck. The hulls should each have at least six watertight compartments of which none should have a volume exceeding 20 per cent of the total volume of that hull. The bridge deck and vehicle deck should be a minimum of four per cent of the waterline length of the vessel above its laden static waterline. No vehicles or passengers should be able to be stored or carried below that level. Bow doors should not be permitted. Fire prevention and extinguishment rules should not only be strict but they should be strictly enforced.

The construction of new monohull Ro-Pax ferries with bow doors to their vehicle decks should be banned. Bow doors destroy the watertight integrity of the vessel. Vehicle decks on monohull Ro-Pax ferries should be constructed to be a minimum of four percent of the vessel’s water line length above its static loaded waterline. All conventional monohull Ro-Pax ferries currently in service should be phased out as quickly as possible. The sale of second-hand conventional monohull Ro-Pax ferries should likewise be banned.

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982 For example, Bureau Veritas, GL and RINA as shown in their Rules for the Classification of High Speed Craft, Bureau Veritas, Paris, 2002.
983 Note the fast ferry, particularly multihull, statistics incorporated in Appendix A.
984 Refer to section 6.2.1. on conventional Ro-Pax ferry vulnerabilities..
985 Refer to EMSA report on Ro-Ro fires, FIRESAFE. See 6.1.3.
Unfortunately, many owners, designers and builders of conventional monohull Ro-Pax ferries have propagated the myths that their multi-hulled counterparts are fragile and expensive to build operate and maintain. That is largely because they are mostly built of aluminium and operate at high speeds. Their very effective lobbying appears to have largely convinced IMO personnel of those fallacies.

In reality, aluminium multi-hulled fast Ro-Pax ferries are significantly less expensive to build, operate and maintain than are their conventional steel counterparts of the same economical capacity. Their safety record is almost unblemished. Otherwise, obviously, in a conservative industry like shipping, few, if any, would have been sold.

Further, multihull Ro-Pax ferries do not have to operate at high speeds, nor do they have to be constructed of aluminium. Very importantly, because of their greater beam, they can enable semi-trailer trucks to turn around on board, thus obviating the need for dangerous bow doors. Steel multihull Ro-Pax ferries could be designed to operate efficiently at the low speeds common in developing countries. They would then be very economical indeed. They would also be incomparably safer than their monohull counterparts. The key to safety, aside from human factors, is stability and unsinkability. Speeds, construction materials or size are irrelevant.

10.3.2. Sales of elderly, conventional monohull Ro-Pax ferries to developing countries should be banned immediately.

The IMO facilitated and promoted Stockholm Agreement has been in force for over twenty years. It should be replaced as it only serves to protect „dinosaur“ Ro-Pax ferries and their owners, specialist designers and builders. It should be re-written so as to promote the design and construction of safer, more seaworthy vessels. It has, admittedly, proved to be effective, so far, but only in Northern Europe where it has had the unfortunate consequence of encouraging the southward export of unsafe ferries. The „grandfathering“ of rules only permits and encourages such dangerous practices.

Given that practically all ferry accidents result from human error, IMO must be persuaded that the complex mathematical naval architectural formulae that it and its Scandinavian maritime authority contributors promote will not in any way solve the problem. Conventional Ro-Pax ferries are especially vulnerable to human errors. They may be safer now, than they were, in disciplined, developed north European countries but they have continued to be very dangerous elsewhere. Indeed, the increase in the percentage of fatalities due to Ro-Pax accidents since 2000 seems largely due to this phenomenon of

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987 See General Arrangement drawing of Incat 98 metre Ro-Pax catamaran fast ferry in 6.3.3.
988 For the clearest and simplest explanation of the Stockholm Agreement on Ro-Ro/Ro-Pax stability see Ferries Ro-Ro passenger vessels: Improved safety concept for ro-ro passenger vessels, Gard, www.gard.no/web/updates/content/51837/ferries-roropassenger/
989 For example, see Al Salam Boccaccio 98 in Chapter 3, Item 18.
990 As in the SOLAS Code and the Stockholm Agreement.
southward migration. Old, poorly maintained ferries that have been dangerously modified are the main culprits.991

The on-sale of elderly North European, North American and Japanese ferries, particularly Ro-Pax, to poor countries should be banned. IMO could enforce that. Indeed, it already claims that IMO “measures” cover ship disposal so it should have already been doing that.992 Clearly, it has failed to do so. It has effectively halted the sale of unsafe and inadequate oil tankers so why not ferries?

In the interim, it is believed that the Philippines Government has, in late 2017, banned the importation of all second hand ferries.993

The international funding agencies (WB, IMF, AID, AIIB and ADB, etc.) and commercial banks should be counselled by IMO re funding for the purchase of such „clapped out“ vessels. Indeed, they should be advised to not assist with the funding of any kind of unseaworthy or unrealistically expensive vessels.

The World Bank, IMF, ADB, AIIB, USAID, JBIC, USAID and similar funding agencies should be encouraged to fund simple, seaworthy ferries rather than larger, complex ones which really only benefit naval architects and ship builders from developed countries. The completely impractical “affordable” Ro-Pax ferry concept promoted by Finnish naval architecture firm, Deltamarin, at the INTERFERRY 2016 Conference in Manila is just the sort of emotively promoted concept that such funding agencies can be regrettably easily misled into financing.994

10.4.1. Focus reform effort on most dangerous countries.

Reform efforts should initially be focused on the six of the ten most dangerous countries where they appear likely to be most successful. It should exclude China which should be capable of carrying out its own reform if shamed into it. China, incidentally and tellingly, is the only one of the ten worst countries to have been audited under the IMO’s Member State Audit Scheme. Those six countries, then, are: Bangladesh, Egypt, Indonesia, Myanmar, Philippines and Tanzania. Four Asian and two African. Regrettably, DR Congo, Senegal and Haiti appear too difficult to tackle at first. Once significant reform has been achieved in those six countries, efforts could be re-directed to the next six countries down the list.

10.4.2. National authority reform.

National authority reform should start with three or four of those countries, for example, Bangladesh, Indonesia, the Philippines and Tanzania, and then work through the list. Compare the powers and capabilities of national

991 Appendix A, Ibid.
992 Refer to Introduction to IMO, www.imo.org/en/About/Pages/.
993 So the author was advised by Mr Chet Pastrana, CEO of Fast Cat Ferries at the INTERFERRY 2017 Conference in Split in October 2017.
maritime authorities and coast guard services in statistically safe and unsafe nations. What could they achieve if assisted and supported by IMO and neighbouring developed nations?

IMO should support the improvement of the maritime authorities in terms of regulation, enforcement and search and rescue (SAR) services in such countries preferably with the assistance of nearby developed nations. For example, Australia with Indonesia, the Philippines and Papua-New Guinea, Singapore with Myanmar, New Zealand with the Pacific island nations, Japan with the Philippines, and the USA, Canada and European nations with various central and South American and African countries. This is actually happening in a limited way but with little input evident from IMO. For example, the Australian Maritime Safety Authority works with its counterparts in Indonesia, Papua New Guinea and the Pacific Islands. Comparing and benchmarking with proven effective organisations such as the United States, Canadian and Japanese coast guards, Britain’s Maritime and Coastguard Agency, and the Australian Maritime Safety Authority would be a good place to commence.

Coastguards and government SAR services must be increased and upgraded. NGOs and classification societies could donate services and hardware as part of their corporate social responsibility promotions. There are excellent models for effective, economical SAR services in many of the developed countries.

10.5.1. Introduce a standard format accident inquiry model.

IMO should implement a standard format accident inquiry model from which a standard form report should arise. It should also report on „near miss“ incidents. That then should be included in a standardised, global database of all PV accidents and incidents. So far its Casualty Investigation Code of 2010 has failed to do this except in OECD countries. Similarly, GISIS has almost completely failed to be utilised except in some OECD countries. Except for China, none of the ten worst countries have adopted it at all. It should be simplified with a “short form” version for use in developing countries.

All fatal and total hull loss accidents should be properly investigated by a legally but simply and inexpensively constituted MBOI. Causes should be determined, blame allocated and lessons learnt recorded. IMO should provide a universal template for such inquiries based on the Rabaul Queen, Marchioness and Herald of Free Enterprise inquiries. To date, IMO’s Casualty Investigation Code, London, 2010, has been largely ignored outside the OECD countries. 995 This is not because the Code is inadequate. Rather, it is the usual failure of will on the part of IMO. The Code does not require re-writing, just sensible enforcement.

The British and Australian inquiry and reporting systems are simple and effective and, importantly, prompt. In particular, the Australian Transport Safety Bureau’s Transport Safety Reports are normally published less than two years after the event. They are formulaic, well illustrated and provide an excellent single page summary of the accident and the lessons learnt from it.

10.5.2. Improve database of accidents and enquiry reports.

It is impossible to achieve reform without knowing the scope and extent of the problem. It is imperative, therefore, that detailed and accurate databases be compiled, and maintained in perpetuity, describing all significant passenger vessel accidents and “near misses”, both fatal and non-fatal, by every country. They should be combined into an international record.

The Rabaul Queen, Herald of Free Enterprise and Marchioness inquiries and reports make for excellent templates. All such reports of fatal and total constructive loss accidents should be recorded in perpetuity on a database preferably maintained by IMO. As well as documenting the findings and penalties recommended or imposed, such reports should highlight the lessons learnt from the accident and the inquiry.

They should be profusely illustrated and the names, biographical details and photographs of owner company directors and managers published as well as those of ship’s officers deemed to be responsible. These should be recorded in perpetuity and extensively cross-referenced on the database advocated above to enable passengers, potential crewmembers and insurers, for example, to make informed decisions. So should changes to owner company names such as in the case of Sulpicio Lines.

The aviation industry, again, shows the way. It has several independent safety ratings agencies that are active, responsive and effective. Two of the more notable are Airline Ratings and Skytrax Ratings. They offer good models to the ferry industry.

IMO should learn also from the model of the road safety equivalent of ICAO and itself. That body is IRTAD, the International Traffic Safety Data and Analysis Group, a permanent working group of the Joint Transport Research Centre of the OECD and the International Transport Forum. Its successes are proven and are based on high quality data and statistics that are the imperative foundation of any campaign to change human behaviour. Its efforts


997 Refer to Bibliography for details
998 Ibid.
999 Ibid.
1000 Refer to sections 1.12.2. and 10.2.4.
have led to a 42 per cent fall in road fatalities in the 14 years to 2013 in the 32 countries involved with its programme.  

10.5.3. A culture of learning from minor accidents and "near misses" should be widely promoted.

This is widespread in aviation and is encouraged by many national aviation authorities as well as by ICAO. There is even a private, non-profit, global organisation CHIRP (Confidential Hazardous Incident Reporting Programme) that originated in the United Kingdom, and which promotes “Aviation and Maritime Confidential Reporting” of minor accidents and near misses. This with the objective of promoting a culture of learning from your own and other peoples’ mistakes. While obviously well-established in the aviation industry, CHIRP would appear to have a long way to go before it is well established in the poorer countries where most ferry fatalities occur. It is, nevertheless, a very worthwhile innovation that could, in theory, contribute substantially to a useful reduction in ferry fatalities if adopted more widely.

10.6.0. Improve vessel design, construction and equipment.

10.6.1. Design, construction and equipment of vessels should be economically and climatically appropriate.

Passenger vessels and their equipment should be designed and constructed appropriately to the countries and economies in which they are to be used. Cheaper, simpler, safer and more durable, preferably multi-hulled, vessels should be the objective. Catamaran and trimaran ferries have proved to be significantly safer on both domestic and international voyages than have their monohull counterparts. As explained in Chapter 6, apart from the obvious problems with conventional monohull Ro-Pax vessels and Philippine “bancas”, that make them more than normally vulnerable, there is little wrong with vessels generally. Technical failures are the cause of negligible numbers of fatalities. That is not to say, though, that vessels cannot be improved. They can. Obviously, multi-compartmented, multi-hull vessels significantly improve the chances of passenger survival in the event of an accident.

Unseaworthy and overloaded vessels are the biggest killers. Eliminating them by regulation and enforcement will be impossible except in the very long term. Again, aid agencies and NGOs could assist here with the provision of simple, inexpensive and seaworthy craft. Inevitably, unseaworthy vessels are unlikely to be equipped with even the most basic safety equipment such as life jackets, liferafts, Carley floats, EPIRBs, strobe lights, flares and AIS. Aid organisations could also assist with this.

1002 Wegman, F. et al. Ibid.  
1003 For more information, refer to www.chirp.org.uk or www.chirpmaritime.org.  
1004 Refer to detailed data comparison in 6.2.4. Chapter 6.  
1005 See Figure 1.1.
The author has discussed ideas for safer vessels with a number of practical naval architects and ship builders. For example, Stuart Ballantyne, principal of noted naval architecture firm Sea Transport Solutions, has long advocated designing vessels that “run out of deck space long before they run out of stability or buoyancy”\textsuperscript{1006} This in an endeavour to prevent overloading. He also advocates steel-hulled craft of catamaran hull form with numerous watertight compartments in each hull and a minimum of „through-hull“ fittings. They, even if minimally maintained, should ensure seaworthiness.

Fortunately, an enterprising Filipino ship owning family has invested in at least 20 Ro-Pax catamaran ferries to Mr Ballantyne’s designs. They are currently operating successfully around the country. Unfortunately, though, even at their present rapid rate of introduction, they will take many years to replace all the old and dangerously dilapidated ferries that continue to operate in that country.

\textit{Image 10.1. One of the twenty + modern Ro-Pax catamaran ferries designed by Sea Transport Solutions that are being operated by Fast Cat Ferries in the Philippines. At least ten more such vessels are planned (FastCat Ferries).}

Leading Tasmanian based ship builder Toby Richardson of Richardson Devine Marine specialises in the construction of aluminium catamaran fast ferries which have been exported to many developing countries such as The Seychelles and Tanzania.\textsuperscript{1007} Mr Richardson also advocates catamaran hull

\textsuperscript{1006} Mr Stuart Ballantyne in numerous discussions with the author.
\textsuperscript{1007} Mr Toby Richardson in a discussion with the author. August 2015.
forms for the same reasons as Mr Ballantyne. However, Mr Richardson believes that smaller catamaran ferries (to about 15 metres long) could efficiently and economically be „rotation” moulded from HDPE as with the Carley floats mentioned above. Such craft, as can be seen in Chapter 6, could well be powered by reliable and easily maintained diesel outboard motors that would also eliminate any need for through-hull fittings. Again, the keys are simplicity and series production of very simple designs.

10.6.2. Promote standardised safe ferry types and designs.

The ferry industry should encourage a reduction in the variety of ferry types and designs. They should be more standardised as are buses and aircraft. Even berthing and loading/unloading infrastructure could be beneficially standardised. It will save money and enable more seaworthy, economical and maintainable vessels to be constructed, maintained and surveyed at more reasonable prices. They don’t all need to be built by one company just as buses and aircraft are not. Nor need they be standardised designs. They should, however, be built in uniform dimensional classes to facilitate economical building, maintenance, berthing and survey. Such standardisation need not preclude innovation and improvement.

Competition within certain fixed capacity and dimensional parameters should be encouraged. Simplicity, economy and seaworthiness are the keys. Buses and aircraft types show how that can be done. For example, Boeing 737 and Airbus A320 aircraft share essentially the same dimensions and engines and can be boarded via the same „Skybridges” at airports world-wide. So do Boeing 777 and 787 and Airbus 330 and 350 models. Buses globally are of uniform width and mostly constructed to carry 56 seated passengers.

As described above and more extensively in Chapter 6, future Ro-Pax vessels should be catamarans or trimarans of the Austal, Damen, Incat and Sea Transport Solutions types or simpler, less expensive versions of them. They do not have to be high speed. They do not necessarily have to be constructed of aluminium. They could be constructed of steel or HDPE. Any future monohull Ro-Pax vessels should not be permitted to have bow doors. Stern vehicle ramps and doors should be significantly higher above their waterlines than is current practice. They should be similar in concept to the latest (2017) Damen vessels for Canada. Existing monohull Ro-Pax vessels should be rapidly retired, very closely watched by authorities, and the voyaging public warned of their dangers. Capacity increasing, stability robbing modifications should be banned.

Even passenger only ferries would be significantly safer if they were required to be properly constructed, multi-compartmented, multi-hulled vessels. The statistics shown in Appendix A prove without doubt that such vessels are far more likely to protect their passengers and crew in the event of any imaginable kind of accident than are any alternative designs.

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1008 See 6.3.2.
1009 As shown in 6.5.1.
10.6.3. Mandate fitting of simple, inexpensive lifesaving equipment.

The development of simple, durable, easily used and inexpensive life-saving equipment should be encouraged. Pool noodles, lightweight lifeboats, cheap HDPE Carley Floats and simple, cheap, lightweight rescue boats would all be more appropriate and more likely to be fitted in warm developing countries. Inflatable equipment that requires regular and expensive maintenance and checking should be avoided. The cost, weight, complexity and maintenance of all such equipment should be significantly reduced from those required by SOLAS. It is possible. North European equipment is generally too heavy, expensive, complex and difficult to store, maintain and use in developing countries.

Essentially, the expensive, complex and heavy life saving equipment and life boats that are prescribed by IMO and national authorities in those countries are often quite inappropriate and unnecessary for poor countries. More appropriate and affordable standards need to be developed for developing countries. Ironically, in many cases, they may also even be better for rich countries. Safety specifications can too often be commercially rather than economically driven mainly for the benefit of the safety equipment manufacturers. Their products are not durable or rugged enough to survive where maintenance is unlikely and climatic conditions destructive. Simpler, cheaper, more durable devices would be more likely to be adopted where they are needed.

Carley Floats, today, are economically rotation moulded in large numbers from high-density polyethylene (HDPE) in much the same way as modern canoes, dinghies and kayaks. They are resistant to sunlight and should last fifty years with essentially no maintenance. They can be moulded in high visibility colours. If enough of an improved global standard design were to be manufactured, unit costs could be significantly reduced.

If of double-sided design, it wouldn’t matter how they are launched or landed, they would still provide useful buoyancy on and alongside them for significant numbers of survivors. HDPE floats weighing up to 50 kilograms could easily be launched by two people and could assist up to twenty people with children and the elderly able to be hoisted out of the water on to the float itself. Because most passenger vessel accidents occur in tropical waters, hypothermia would not be a significant problem with such floats.

Meanwhile, while widely fitted to ferries in developed countries, modern versions of Carley Floats are very rare in the developing countries where they would be of considerable value.

The use of simple and very inexpensive lifesaving devices should be encouraged. It is pointless to insist upon equipping vessels with rich country

\[1010\] As described in 1.14.1.
devices in regions that cannot afford them. Even the most basic of lifejackets cost USD 10 or more on the world market. That is two weeks’ income in some of the countries discussed here. Much cheaper and easier to use would, for example, be „pool noodles“ which would cost around US fifty cents each if purchased in bulk. They provide simple, long-term buoyancy and are very easy to store in convenient places aboard vessels. They are also easier to use than lifejackets.

Image 10.2. Pool noodles, would provide cheap, easy-to-use and easy-to-stow buoyancy aids that, while frowned on by rich country regulators, would save lives. They cost about USD 0.5 in developed countries.

Much the same applies with lifeboats and liferafts. Rich country mandated types are much too expensive to purchase and maintain in developing countries. They are complex and beset with rules and „use-by“ dates that appear to be primarily for the benefit of their manufacturers.

EPIRBs, while having „use by“ dates, because they are battery powered, remain a very economical SAR tool. They should be compulsorily fitted as should be AIS.

Again, those improvements could be achieved both quickly and economically, particularly if IMO could be persuaded to be rational in the application of its standards. It must take account of the economic realities applying in poorer countries. Comparatively inexpensive safety improvements in terms of vessels and their equipment are readily available.

10.6.4. Recognise that inadequate maintenance is a vastly bigger problem than bad design or construction deficiencies.

Poor maintenance is a much worse cause of fatalities than inadequate design or construction of vessels.\footnote{1011 See Appendix A, Ibid. And refer to Chapter 2 generally.} This fact should be highlighted at both the international and domestic levels. Passengers should be informed that if a ferry appears poorly maintained, it probably is. Thus it should be avoided. National governments should be encouraged to enforce sensible basic
maintenance standards while also encouraging the fitting of low maintenance safety equipment.

10.7.0. Introduce improved universal ticketing systems.

Overloading is one of the major causes of fatal ferry accidents. It is, for obvious economic reasons, a particularly prevalent problem in developing countries. IMO and national maritime authorities should introduce simple and effective ticketing systems to help prevent overloading and to ensure the production of an accurate passenger manifest.

On shorter voyages where a detailed manifest would be impractical, an accurate headcount should be taken as a minimum and recorded away from the vessel concerned. A simple hand written book at each terminal would suffice.

Even the poorest and most primitive of countries are sufficiently computer literate to operate such systems. Almost everyone, even the poorest, have access to a modern mobile telephone. Systems are being developed to book and board public transport vehicles, including ferries, using such devices. Such systems and their associated operator training could be donated by IMO or wealthier neighbouring countries. Obviously, this will first require other reforms particularly with respect to enforcement.

In any case, every passenger vessel, world-wide, should be surveyed and a safe “Personnel Limit”, including all people, both passengers and crew, determined. That limit, rather like a Plimsoll Line, should be printed and embossed. in characters at least 25 cm high, on each side and on the transom of each vessel. For example: “PL 350”. A global publicity campaign should be conducted to inform passengers of the measure. It should advise them to make their own count and not to embark on any ferry that appears overloaded.

10.8.0. Utilise human factors specialists.

Human factors specialists have contributed significantly to safety improvements in aviation, trucking, mining, construction, oil and gas, railways, manufacturing, cruise ship and other industry sectors. Their skills would be readily adaptable to ferry operations. The International Maritime Organisation must overcome its fear of “interfering in the internal affairs of sovereign member nations” and encourage the injection of such experts into the worst performing countries even if only on a consulting basis.

An extensive Web search reveals that most airlines have „human factors“ managers or similar. EasyJet, Emirates, Lufthansa, Singapore Airlines, Thai

\[^{1012}\text{For example, see www.masabi.com.}\]
Airways, Virgin and Qantas are examples. The only passenger vessel owners that seem to have similar positions are Carnival, RCCL, P&O Ferries, Thames Clipper, BC Ferries and Stena. Of smaller ferry companies, that is the few that have websites, none list the employment of such specialists. This is an important difference between aviation and shipping. Even railways in western developed countries have human factors, ergonomics and safety managers. This would seem a very effective way of raising safety consciousness within ferry companies.

A specifically nominated executive with a clearly defined brief needs to have both responsibility for and the means to carry out the safety consciousness task in every ferry owning company. Even the smallest airline companies seem to have someone carrying that job description. The website of the Chartered Institute of Ergonomics & Human Factors, the profession’s governing body, lists numerous employee and consulting practitioners. Even the smallest of ferry companies could afford to consult with such specialists if they cannot afford to employ a full time human factors executive.

It is imperative that safety consciousness be raised and appropriate safety disciplines and procedures be introduced throughout the ferry industry. Those disciplines and procedures need to be assiduously promoted and continually enforced. Thus the requirement for human factors specialists to conduct that work through training, checking, testing and ensuring simple rules are in force and, above all, enforced. The imperative of developing a safety culture among all ferry owners and regulators must be relentlessly encouraged and promoted.

Fatalism, it has been shown, is endemic, as is corruption, in most, if not all, of the poorer countries discussed. Human factors specialists would appear to be well equipped professionally to modify or eliminate these significant behavioural faults. However, poverty, and its close relative, malnutrition, obviously, make such necessary reforms difficult.

10.9.0. Encourage classification societies to assist on a pro bono basis.

Do we really need classification societies? They originated through a requirement to determine whether vessels were insurable. Aviation doesn’t have them despite their best efforts to move into that sector. Insurers should be able to estimate risks for themselves. They are well aware of the data that is available and of the risks that they highlight.

Classification societies don’t yet seem to contribute anything obviously constructive in the domestic sector in developing countries. Developing country governments and vessel owners cannot afford to retain them.

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1013 Each of them has an Occupational Health and Safety department or equivalent. Some have separate Flight or Aviation Safety departments.
1014 See the Institute’s website www.ergonomics.org.uk.
1015 As described in 7.6.1.
1016 Described extensively in Chapter 5.
They could, however, use much of the excellent and valuable research and technology they have developed in and for developed countries – which have already paid for it – and make it available to developing countries at little or no cost. It could lead to the saving of many lives and would have a valuable public relations or corporate social responsibility (CSR) benefit for the classification societies.

To vessel owners and governments in developing countries, classification societies seem like very expensive auditors, rather like the „Big four“ accounting firms that so often overlook frauds and mismanagement. Indeed, the Sewol Inquiry revealed collusion between ship owner and the Korean classification society.

It is encouraging, however, to note that the Lloyd’s Register Foundation in its *insight report on global safety challenges* for 2017, mentions passenger ferries as a safety challenge and urges that IMO be influenced, “to enforce regions to take up regulations that would make ferries safer in design and methods of use”.

10.10.0. Encourage passenger behavioural reform.

10.10.1. Consumer education of ferry passengers should be widely promoted.

Consumer education of ferry passengers should be promoted everywhere. If a vessel looks overloaded or poorly maintained don’t go aboard, could be a starting theme. As in aviation, ferry passengers should be educated and disciplined to listen to and obey the instructions of the crew. They should be required to pay attention to safety briefings. This can be achieved.

The author has travelled widely by aircraft in China since the early 1990s. Passengers then were unruly, undisciplined and dangerous, with cigarette smoking widespread. By the early 2000s this behaviour had been completely eradicated. Badly behaved passengers were simply removed from aircraft and usually severely fined, if not imprisoned. That proved to be an effective method of enforcing good behaviour.

Bad passenger behaviour is not countenanced in developed countries. Why should it be in developing ones? The aviation industry has proved that

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1017 Noted by the author following numerous discussions with ferry operators in South-East Asia.
1020 Anon. *Insight report on global safety challenges*. Ibid.
behaviour can be controlled. It must similarly be controlled on ferries and
tourist boats in those countries.

10.10.2. Aviation-like seating rules should apply to smaller
and fast ferries.

Passengers on certain, smaller and less stable ferry types should have to
remain seated while berthing and unberthing as in aircraft when landing and
taking off and in turbulence. They should have to remain seated until mooring
lines are secure and the vessel safe and stable alongside. This was
suggested to the author by Torleif Stokke, managing director of Servogear AS
of Norway following observations from a few days spent in the Philippines.1021
They should also be required to wear effective life jackets at all times aboard
small, open ferries. A stark example of this problem is the list developed by
Hong Kong’s venerable and comparatively substantial Star Ferries as
passengers rush to disembark.1022 Passengers on smaller high speed ferries
should be required to wear seat belts in the same way and at the same times
as on aircraft.

10.10.3. NO SMOKING rules should be as rigorously enforced
at sea as in aviation.

The problem of smoking on board and the complete disdain for NO SMOKING
signs is common in most developing countries. Smoking has been the cause
of numerous fatalities.1023 It used to be a problem in the aviation industry,
particularly smoking in aircraft toilets. Now, thanks to substantial penalties, it
simply does not happen. Similarly, there should be no smoking on any vessel
at any time.

The airlines, ICAO and IATA, collectively, have ensured that massive
penalties apply to those caught breaking the rules and warnings are routinely
given before and after take-off as part of the safety briefings given on all
flights. Cabin crews are trained to be vigilant in such matters and electronic
warning systems direct any smoke detections to the aircraft commander in the
cockpit. Ferry owners should be required to do the same.

Canada’s BC Ferries, for example, in December 2017 banned smoking on all
its ferries and in all its buildings. It is hoped that other owners will soon follow
that excellent example.

1021 Suggested personally to the author during the Interferry 2016 Conference in Manila.
1022 Noted frequently by the author.
1023 Appendix A. Ibid.
10.11.0. Encourage owner, officer and crew behavioural reform.

10.11.1. Basic officer and crew training, education and behaviour must be improved.

There are numerous aspects of seamanship, navigation, pilotage, safety consciousness, situational awareness and organisational discipline that require careful attention in all the unsafe countries. They are common to all and are very obvious even to untrained outside observers. Unless they can be eradicated, there is little hope of achieving any of the necessary reforms. Perhaps acknowledged nautical safety promotional organisations such as The Nautical Institute could be supported by and work on behalf of IMO to effect better training of officers and crew in developing countries. The NI has proved to be very effective in developed countries. There is no reason why its methods could not be adopted in developing ones.

For example, all masters and officers should be required to undergo strict and substantial training in the proper use of barometers. Many, currently, are not so trained. The former Chief of Staff of the Philippine Coastguard, Galtiero Dela Cruz, described this to the author as a factor in the propensity of Filipino captains to sail into the face of typhoons. They simply do not understand the relationship between rapidly falling barometric pressure and the likelihood of severe storms. That is if they even check their ship’s barometer at all.

All masters and watchkeeping officers should be trained and re-trained, throughout their careers, to „look out the window“, to frequently check the barometer and not be mesmerised by electronic instruments. The author has discussed this problem with many experienced ship masters and senior Coast Guard officers such as Carlos Agustin, the first Commandante and founder of the Philippine Coast Guard, and the one time master of the cruise ship Silverseas Discoverer. All complained of electronic distractions and even the use of electronic games on the bridge.

Much more discipline would appear to be required generally in this respect. Crews should also be trained in the use, maintenance, proper storage and location of the safety equipment carried aboard their vessels. They should be made much more aware of the connection between cigarette smoking and fires aboard vessels.

Owners, too, should be educated to the effect that: “if you think safety”s expensive, try a disaster”! Again, all ferry owners should be encouraged to see the value in developing and promoting a safety culture within their organisations. The marine insurance industry could assist with this.

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1024 Discussed personally with the author in Manila in October 2016.
1025 Discussed personally with the author in Siberia in July 2014.
10.11.2. Delinquent owners, masters and officers should be severely punished.

Owners, masters and watch keeping officers, particularly serial offenders, of delinquent vessels should be very severely punished when fairly found guilty of significant transgressions. Such punishments should be widely publicised. Negligence, overloading, inadequate stability and poor lookout equate with manslaughter and should be punished appropriately and publicised widely.

Changing social standards and expectations of their leaders by citizens will increase demand for higher standards of regulation and enforcement. The callous response to the Sewol sinking by South Korean President Park Geun-hye did not help her attract sympathy when she was impeached for corruption in 2016. IMO should respond to such demands.

Callous, unscrupulous owners, particularly repeat or serial offenders such as the Go family’s Sulpicio Lines, Townsend Thoresen, Al Salam Maritime Transport, Rabaul Shipping, Aboitiz Shipping, Negros Navigation, Minoan Flying Dolphins, and numerous others, should be publicly named, shamed and severely punished to discourage them from causing further fatalities. Serial offenders should be banned by IMO.

Modern communication and news dissemination capabilities, especially those provided by the Internet, make a global “naming and shaming” campaign feasible at minimal cost. Defamation laws will largely be impotent in the face of such a campaign. A public interest defence will be difficult for perpetrators to overcome, particularly for serial offenders. Poorly behaved car manufacturers, investment advisors, insurers and airlines, among others, have recently been forced to improve their behaviour or have been driven out of business by public opinion enhanced and assisted by the Internet.

10.11.3. Problem of fatalism must be rectified.

The cultural problem of fatalism, largely resulting from malnutrition, is a significant factor in causing the human errors that lead to fatal ferry accidents in the poorest countries. This is graphically illustrated in many of the reports on such accidents, particularly in Tanzania, Bangladesh, DR Congo, Haiti and Myanmar. The YouTube videos of the Bangladeshi accidents in Appendix F show this starkly, particularly in the case of the collision where the larger ferry stands on after the collision as though nothing had happened. Its crew and passengers do nothing to help. They do not even throw one of the several readily available life rings to survivors in the water.

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1027 Appendix A, Ibid, and Tables 1.6., 1.7. and 1.12.2.
1028 Such as those listed in 1.12.2.
1029 Appendix F. Video footage of ferry collision and capsize in Bangladesh.
This is a very significant human factor problem which must be eradicated through education and encouragement but, probably most realistically, by a reduction of poverty. Unfortunately, and obviously, that will be a long time coming.

10.11.4. Withhold insurance from proven bad owners.

To a large extent this already happens through the normal workings of the global marine insurance market. Obviously, rational marine insurers are not going to risk their company’s funds on proven bad owners or operators. Nevertheless, further efforts could be made in this area by encouraging insurers to only provide cover to owners and ships that have been objectively vetted by a specialised agency such as Rightship (See 10.13.2.), SafeFerry, perhaps.

Insurers, both of hulls and protection and indemnity, have real power, except in the poorest countries, to encourage safety improvements. They have done so very effectively in developed countries. They need to spread their knowledge and influence to developing countries. Commercial and public opinion pressures on insurers and classification societies could motivate them as suggested by Philippe Boisson.\textsuperscript{1030} It is in their own best interests to do so.

10.12.0. Improve evacuation, search, rescue and recovery.

When all else goes wrong, we turn to improvements in search and rescue services and equipment. As has been seen, these are practically non-existent in most of the countries with the highest accident and death tolls. Indeed, they are still inadequate in many richer countries as we saw with the \textit{Estonia} sinking, as described in Chapter 3 (3.13). Such services are very expensive and, in reality, unlikely to exist except in the rich world.

Radio and satellite communications (Satcom) distress communications and AIS should be better organised on a global basis, preferably by IMO. While EPIRB distress alerts are generally very effective, VHF radio automatic distress signals should be on the same channel worldwide and it should, as well as distress calling be the operating channel during SAR operations. At the same time, strong radio operational disciplines must be enforced. The various Satcom suppliers should be co-ordinated in a similar manner. The communications difficulties experienced by the \textit{Heraklion} and \textit{Estonia} and during their subsequent SAR operations starkly illustrate such problems\textsuperscript{1031}. The author is unaware of any subsequent improvements being made in that regard.

Beyond the OECD countries, evacuation, lifesaving and SAR knowledge, facilities, equipment and services are scarce at best and non-existent at worst. Developing nations require considerable assistance in creating and expanding these important components of their maritime activity. The IMO,

\textsuperscript{1030} Boisson, P. Op cit.
\textsuperscript{1031} Described in their case studies in Chapter 3.
richer nations and their institutions such as SAR organisations, classification societies and maritime industry associations could do much more to contribute and assist in this regard.

10.13.0. Raise public consciousness of the safety problem.


A „rogue”s gallery“ describing unsafe ferries and their owners could be drawn from the database suggested in 10.9.1, above, and economically published to „name and shame“ them on the Internet. Serial or even repeat offenders such as those listed in Tables 1.6. and 1.7. in Chapter 1 should be publicly vilified with their names distributed to all government and commercial travel advisory media. This, again, would be best undertaken by IMO if it were prepared to or capable of maintaining a comprehensive and accurate database of maritime accidents. It cannot rely on its sovereign member states for assistance in compiling such a database. That database should be global and should contain a cross-referenced list of owning companies and their directors, owners and managers to warn potential voyagers about the negligent ones. Naming and shaming of bad operators would be very effective.

Should IMO be unwilling or unable to maintain such a database, it would probably be better undertaken by a specialised and focused, private, non-profit organisation or NGO. That organisation could, again, be partially funded by the classification societies as part of their CSR duty. They could be assisted by subscriptions paid by responsible ferry operators wishing to promote their safety consciousness. Further funding could come from IMO and development banks, for example. Intending or potential passengers should be able to go to an easily accessible online database to determine the risks of their intended voyage.

The International Maritime Bureau Anti-Piracy Centre offers an excellent model for such an organisation. Transparency International also has much to offer. So, too, does the International Maritime Rescue Federation. The dramatic improvement in life expectancy achieved in Bangladesh described in Chapter 5 showed what could be done by NGOs and companies working together without government involvement.

Well-funded philanthropic institutions such as the Gates, Moore, Packard, Pew, Nippon, Lloyd’s, Paul Allen, Commonwealth of Learning and Clinton foundations should be encouraged to support a global public education/advertising campaign to promote safe ferry awareness.

A global public inquiry led by a passionate and powerful politician such as former Australian Transport Minister, the Hon. Peter Morris undertook with his

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1033 See [www.transparency.org](http://www.transparency.org).
1034 Refer to IMRF in 10.5.
1035 Described in 5.5.4.
“Ships of Shame” Inquiry in 1992 should be instituted. That inquiry exposed the appalling behaviour of many bulk ship owners and charterers that cost the lives of many of their crew members. It resulted in significant improvements to the global operations and safety of bulk ships. It was a very effective “naming and shaming” operation that could well be emulated with the ferry industry.

A global Ferry Safety promotional organisation should be established to manage and promote this. Sea Safety? SafeFerry? Safe Seas? Safe at Sea? FerrySafe.com? This should be non-profit and could be based on the information presented in this thesis and subsequently continuously updated. The Worldwide Ferry Safety Association, based in New York, works very constructively in this field but suffers from a lack of funding and, consequently, personnel. It could well be incorporated into such an organisation.

As well as advocating reform, it could maintain and further develop the BMPVA database, perhaps combined with an improved GISIS as well as an App to enable intending ferry passengers to check by mobile phone on the safety record of any ferry, or its owner, that they may be considering travelling with. Bad owners and bad ships should be named and shamed. Conversely, good owners and safe ships should be praised and highlighted. This has been very effectively achieved in the aviation industry with its independent safety rating organisations such as Airline Ratings and Skytrax ratings.

10.13.2. Implement a global “vetting” system for passenger vessels.

A global vetting system for passenger vessels similar to that operated by Rightship in the oil tanker/bulker sectors could be implemented and managed by the global ferry safety promotion organisation mentioned above. Tanker and bulker operators who are devoid of a positive Rightship vetting are increasingly finding themselves “beyond the pale”. In a number of cases such as with Steamship Mutual, the P&I club, insurers are refusing to cover them. A SafeFerry version of Rightship would be a logical development. Another possibility would be the Vessel Risk Rating system released in July 2017 by the German vessel tracking website www.fleetmon.com in association with the London based International Marine Risk Rating Agency.


A large number of ferry fatalities have occurred because many passengers and some crews were simply unable to swim. This is an unfortunate fact of life.

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1037 See www.ferrysafety.org.
in many developing countries even, perhaps surprisingly, in archipelagic countries such as the Philippines and Indonesia.

Swimming lessons and water safety education should be encouraged in all countries. Public education campaigns such as have existed in Australasia and much of Europe and North America for generations should be established globally. Even in Muslim countries, girls should be particularly encouraged to learn to swim, if necessary in gender segregated classes. Women and girls seem to die in disproportionately large numbers in ferry accidents.

The richer world, through its charities and NGOs, should encourage the establishment of simple learn-to-swim programmes in the coastal and riverine regions of developing countries. Already, the WFSA and Interferry have participated in the WHO’s Global Report on Drowning. An inability to swim is mostly a result of poverty although it can be due to religious beliefs. The death tolls arising from many of the accidents studied in this thesis would have been significantly lower had more of the victims possessed even rudimentary swimming ability.

10.15.0. Conclusion.

The dramatic and continuing success of the aviation industry in improving its safety record in the thirty years to 2010 shows what could be achieved by the global ferry and tourist boat industry and its regulators. So too do the successes of the road safety authorities in most developed countries. Even the Philippines which, for decades had one of the worst records for ferry safety, now appears to be achieving worthwhile improvements. Thanks to the guidance provided by the aviation industry, road safety, cruise and tanker sector examples, the ferry and tourist boat industry should be able to reform itself in considerably less than three decades. It has the valuable benefit of aviation’s pioneering efforts to work with in the form of proven techniques and benchmarks.

Developed country ferry owners and their industry association INTERFERRY should, in their own best reputational interests, be assisting with greater efforts to make domestic ferry travel safer in developing countries. INTERFERRY does have an active domestic ferry safety sub-committee and, through his own personal experience, its CEO is exceptionally safety conscious. In fairness, it has contributed significantly to the efforts of the WFSA. INTERFERRY is, as it should be, generally, promoting the benefits of safer ferry travel globally.

Similarly, there are many examples and lessons to be gained or copied from the very successful road safety improvement, “Learn-to Swim”, anti-smoking and health improvement campaigns that have been carried out in most of the developed countries. Most of those can be readily adapted to the ferry and tourist boat industry.

\[1041\] Indeed to zero fatalities in 2017 on commercial jet aircraft.
\[1042\] Refer to 7.5.4.
The United Nations’ Clean Seas global campaign on marine litter, announced on 23 February 2017, provides IMO with a very impressive „in house“ example of what it could do were it to have the will to do so. 1043

Nevertheless, the outlook is positive if the International Maritime Organisation could be inspired, persuaded or forced to reform itself from being a self-satisfied and self-serving bureaucracy to a well led, proactive agent of change and reform such as is its aviation counterpart ICAO. It should very actively work “with” its needy member states to achieve comprehensive global ferry safety reform. ICAO provides a near perfect model of what the IMO should be.

Even if IMO is really so moribund that it cannot or will not be so moved, it is still possible that a global private organisation or NGO, „FerrySafe“ or „SafeFerry“, perhaps, using effective „naming and shaming“ publicity techniques similar to those utilised by environmental NGOs, could drive substantial improvement.

The implementation of any and, preferably, all of the above recommendations would undoubtedly lead to significant reductions in the annual global ferry accident death toll.

Despite all the obvious problems and roadblocks described, it is very encouraging to note the significant reduction in the number of fatalities in 2016. At 473 recorded and approximately 710 estimated, it was significantly better than the previous best year ever, 2013, where the figures were 615 recorded and, probably, 900 actual. 1044 Why was this so, apart from a general media led consciousness raising? Or, was it simply good fortune? While 2017 started badly with 40+ fatalities in Indonesia on January 1, and a total of 742 „known“ and probably 1,100 actual for the full year, at least 2016 showed that significant improvements are achievable.

During 2016 and 2017 there was considerable speculation globally about the prospects for „driverless“ cars and „autonomous“ ships. It seems likely that such developments will eventually come to pass. However, while autonomous bulkers, tankers and container ships, for example, are possibly feasible, the prospect of „autonomous ferries“ seems remote, except over very short distances in very calm water. There are simply too many humans involved with their operations for the human element to be eliminated.

There is a gross and tragic attitudinal, cultural and operational dichotomy between the aviation and ferry industries and their international and domestic regulators with respect to their approaches to passenger safety. That illogical division can and must be eliminated. It is hoped that this work will go some way towards achieving that.

1043 See Clean Seas global campaign on marine litter, Ibid.
1044 Appendix A, Ibid.
Appendices

A. Baird Maritime Passenger Vessel Accident database. Database of passenger vessel accidents, their locations, causes and number of deaths resulting. Compiled by the author and assistants employed by Baird Publications, Melbourne. (Attached in electronic pdf form.)

B. List of countries by road traffic related death rate. World Health Organisation statistics.

C. Personal email letter from Commodore (Retd) Gualterio Dela Cruz, former Chief of Staff of the Philippines Coast Guard, 7 October 2016.

D. Letter to the editor of Work Boat World magazine from Captain Peter Sharp, managing director of Rabaul Shipping, owner of the Rabaul Queen.


F. Two YouTube videos of Bangladeshi fatal ferry accidents.


**Appendix B.** List of countries by road traffic related death rate. World Health Organisation statistics.

<table>
<thead>
<tr>
<th>Country</th>
<th>Road fatalities per 100,000 inhabitants per year</th>
<th>Road fatalities per 100,000 motor vehicles</th>
<th>Road fatalities per 1 billion vehicle-km</th>
<th>Total fatalities latest year (adjusted/estimated figures by WHO report)</th>
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Appendix C

Email to the author from Commodore Gualterio Dela Cruz, PCG (Retd) former commanding officer of the Philippine Coast Guard on October 7, 2016

I wish to share with you, some information on the sinking of a RORO-Passenger/Cargo vessel, MV Princess of the Orient, which happened sometime in Sept 1998. Some details of the vessel and the synopsis of the incident can be found by browsing on the computer, pertaining to this incident.

After my retirement from the Navy in 1996 and for the next couple of years, I found myself in the golf course, most of the time. Among my golfing buddies then, were the senior executives of Negros Navigation, one of the leading domestic shipping companies. Most of the ships are the RORO-Passenger types and operates from Manila to Southern ports of the country. When my golfing buddies with Negros Navigation (or NN) gave me ships tickets, when they knew I was going to Iloilo City, a southern city in Visayas. In turn, my friends with Negros Navigation asked me to take note of the things on board the vessel, which, to me, would need refinements or revisions. I took the ship ride. By the way, the names of the NN vessels, then were named after “Saints”, such as “St Peter de Apostle”, etc.

While on board the ship and underway enroute from Iloilo City to Manila, somebody has informed the Ships Captain of my presence, and invited me for breakfast at the Captain's table. During our casual conversation, he mentioned of the sinking of MV Princess of the Orient on that fateful day in Sept 1998, They way he recalled the events, seems vivid in his mind.

In his statements, on the day of the incident, he was the Master of one of the vessels of NN fleet and scheduled to depart from Port of Manila to Iloilo City. As part of his routine activities, prior to leaving port, was to check on the loading status of the vessel and prevailing weather condition. He took note of the path of the incoming typhoon and strength of the gusty winds, but since his ship was a 13,500 GRT vessel, by regulations, his vessel is cleared to sail.

While steaming inside Manila Bay, the sea condition was tolerable, hence continued his voyage. The nautical distance from the Port of Manila to the mouth of Manila Bay, facing the West Philippine Sea, is about 35 nautical miles or some three hours travel time. Based on his statements during our conversation, as soon as his ship passed the mouth of Manila Bay, the sea conditions was noted to be getting rough and the distance between wave highest, seems to get higher and longer. Perhaps, after evaluating the path of the incoming typhoon and his responsibility to the owners of the ship on his control, to include passengers and cargoes, he decided to turn around and return back to Port of Manila.

On his return sailing route, northwards to Manila, he meet the MV Princess of Oreint heading on his southern route. Upon seeing the MV Princess of the Orient, proceeding on the southern route, the passengers on board the NN vessel, demanded an explanation from the ships officers on why their NN ship was returning back to Port of Manila. To most of the ships passengers, for the vessel to return back to Port of Manila, would mean additional expenses, plus some changes in their planned trips. In turn, and as related by the ship captain, he has to secure the ship's navigational areas and engine spaces, and ships offices for security reasons. The passengers were getting restless and shouting was everywhere.

After a couple hours after the ship has change course back to Manila, the ship radio communications systems has intercepted calls for assistance to rescue a commercial ship, sinking off between Batangas and Mindoro, sea area. From then on, the maritime communications traffic was heavy on exchanging messages for assistance. At the time, the said NN ship was inside Manila Bay and relatively far to render assistance. Upon reaching Port of Manila, the vessel just drop anchor and waited for the inclement weather to subside.

When the vessel was at anchor already, almost all of the passengers, went to see the ship's Captain and expressed their deep gratitude for his hard and wise decision to cancel his trip
and returned back to Port. The passengers were all praises to the ship's captain.

When I related the story to my friends at the NN management, they too have a regard for the said ship captain. According to my friends with NN, then, the said ship captain is from Iloilo and has good grades in school. As noted, the said ship captain was ahead of his contemporaries and has been noted to diligent in his assigned tasks. His wife is a school teacher in one of the local public schools in Iloilo. He finished his nautical course in the local private school, but has noted to assumed responsibility in his junior billets on board different ships. At this writing, I don't know his present assignment and lost track of him.

As mentioned earlier, the vessels of NN are mostly named after "Saints".

In my experience in the corporate world, to cancel a trip of a vessel as big as the NN vessel in this incident, would entail additional expenses for the shipowners, and delays in the schedules of the passengers and cargo on board. The ship captain has placed his profession and reputation, on the line. In the words of James Michiner, in one of his books entitled, "The Bridges of Tokori", when he said, "Where do we get such men".
Appendix D
Email from Captain Peter Sharp, owner of the Rabaul Queen, to the editor of Work Boat World magazine, February 2015

Editor
I presume that the lack of any disclaimers on your columnist’s articles means that your publication agrees with the content of the columnist’s statements.
I have for comment an article by Mr Ballantyne November 2012 which has just come to my notice and another July 2014.
Forgetting his asinine comments on whistles I have concerns about a lot of that article starting with Para 7. The most industrious and perfect seafarers were without doubt the Vikings and that is perhaps as true today as it was in the times Ballantyne was discussing. Except for the high figure head forward which was for reasons other than buoyancy the Viking long ships were completely different from the tubs Columbus wandered around in not knowing where he was heading. Those tubs had high bits each end not because of anything to do with sea keeping but as their names suggest Foreward castle and after castle later changed to poop. They were raised above the main deck to give an advantage to the bowmen, spearmen and finally the assault troops. The higher the structure the better the advantage of raining missiles on the other side. The latter clippers had lower bows and the raised poop so that the sailing Master and the Captain had a good view of the trim of the sails and more spacious accommodation. Nothing to do with G/T or stability.
Paragraph 13 is where the idiocy starts. New Caledonia is a narrow island at about latitude 20° S to 22.5° S and it does run NW/SE. Being at that latitude many of the cyclones that develop and run their course have a profound effect on the weather of that island. The current cyclone Ola is travelling down the west coast of New Caledonia right now.
Papua New Guinea is a huge set of islands very much like the Philippines and Japan and there is no one direction. In most cases SW Pacific cyclones develop in and around the shallow waters of PNG and the Solomons in the Coral Sea as the shallow waters heat and give energy to the developing Low pressure system. Very seldom do cyclones actually pass over PNG or make land fall. There are exceptions but they are exceptions.
What works in New Caledonia is totally different except perhaps in the Papuan Gulf and the South Coast of Papua where there are no barriers or obstruction to the long fetch and reach of the SE trades which are incidentally increased with every passing Typhoon in the NW/Pacific. The Havana may have been adequate at 60 meters but perhaps a 30 meters vessel designed on the characteristics of a Japanese fishing boat may have been more see kindly and therefore easier on the passengers. And the Steamships vessel are obviously built with the SE trades hammering onto the exposed coastline but I suggest the cargo they had to carry and the river they had to negotiate and the berths that needed to use all had an important part to play in the ships design not just the length. And they are barges. Not ferries.
Now from the 15th Para is where your Mr Ballantyne starts to make his preposterous and perhaps defamatory statements.
The Rabaul Queen rarely headed SE. Of course she did at times head SE but it wasn’t her predominant heading.
What did the water line length have to do with her sinking? We trade a number of vessels on that route from 22 to 47 meters long and none have sunk running into the SE.
And how did her Gross tonnage being under 500 G/T cause the sinking? Your correspondent is implying that we purchased a ship under 500 G/T to escape the, as he says “myriad of rules, regulations and costs”. I presume he is referring to the IMO SOLAS rules and regulations. If so your correspondent should read the
preambles to SOLAS. SOLAS applies to vessels over 500 G/T (generally) on international voyages. As our vessels and the Rabaul Queen was are coastal vessels not engaged in International voyages she had to comply with PNG rules which she did. SOLAS is not enforceable on a coastal vessel unless the administration deems it to be.

Para 17. Rabaul Queen was in fact overwhelmed by at least 3 large waves but she wasn’t heading SE nor was she heading into a SE sea or swell or winds. The comment by your correspondent is ill informed and defamatory.

There were not 142 passengers deceased. 5 bodies have been recovered. Anyone else is missing.

The weights proposed by your correspondent for 80 passengers is incorrect.

At no time was the ship overloaded under the PNG Merchant Shipping Act. A mistake made by your correspondent and others.

The vessel did not have an enclosed bulwark area on the forecastle which would hold 18 tons of water even if the ship was heading into a SE which it wasn’t another defamatory error by our correspondent.

“The owner, who knows better than putting costs over prudent seamanship and vessel safety, is still negligent” I need a clarification of this statement.

Despite your correspondents platitudes and misinformation one of his references, the PNG NM$A, has from the beginning of 2015 changed from Length to G/t in assessing costs and fees. Does your correspondent agree that the NM$A has made a mistake?
### Known Fatal Fast Ferry Accidents 1966-2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Deaths</th>
<th>Vessel name</th>
<th>Vessel type</th>
<th>Material</th>
<th>Tonnage</th>
<th>Length (m)</th>
<th>Year built</th>
<th>Builder</th>
<th>Owner</th>
<th>Claimed cause</th>
<th>Author assessed cause</th>
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<tr>
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<td>Alum</td>
<td>25</td>
<td>27</td>
<td>1982</td>
<td>Almaz</td>
<td>Unknown</td>
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<td>Human error/Poor lookout</td>
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<td>Alum</td>
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<td>42</td>
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<td>Hong Kong Macau Hydrofoil</td>
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<td>Human error/Negligence</td>
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<td>Unknown</td>
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<td>Unknown</td>
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<td>Unknown</td>
<td>Collision with sampan</td>
<td>Human error/Poor lookout</td>
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<td>Fylkesbaatene i Sogn og Fjordane</td>
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<td>France</td>
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<td>Condor Vitesse</td>
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<td>87</td>
<td>1997</td>
<td>Incat, Australia</td>
<td>Condor Ferries</td>
<td>Ferry ran down trailer</td>
<td>Human error/Poor lookout</td>
</tr>
<tr>
<td>2011</td>
<td>Australia</td>
<td>15</td>
<td>Unknown</td>
<td>Fast hydrofoil ferry</td>
<td>Alum</td>
<td>220</td>
<td>40</td>
<td>2011</td>
<td>Austal Shipyard, Russia</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Juke breakdown, collision</td>
</tr>
<tr>
<td>2012</td>
<td>UK</td>
<td>1</td>
<td>Condor Rapide</td>
<td>Fast catamaran ferry</td>
<td>Alum</td>
<td>5,000</td>
<td>87</td>
<td>1997</td>
<td>Incat, Australia</td>
<td>Condor Ferries</td>
<td>Person overboard</td>
<td>Suicide/Accident</td>
</tr>
<tr>
<td>2012</td>
<td>Tanzania</td>
<td>293</td>
<td>Skagit</td>
<td>Fast monohull ferry</td>
<td>Alum</td>
<td>95</td>
<td>34</td>
<td>1989</td>
<td>Keller Marine, USA</td>
<td>Seagull Transport Company</td>
<td>Bad weather</td>
<td>Human error/Overloaded</td>
</tr>
<tr>
<td>2014</td>
<td>Tanzania</td>
<td>25</td>
<td>Kilimajaro II</td>
<td>Fast catamaran ferry</td>
<td>Alum</td>
<td>320</td>
<td>37</td>
<td>2011</td>
<td>Richardson Devine Marine, Az</td>
<td>Azam Marine Company</td>
<td>Nosedived into wave</td>
<td>Human error/Poor lookout</td>
</tr>
<tr>
<td>2014</td>
<td>Turkey</td>
<td>1</td>
<td>Serkici-Harem Ferry</td>
<td>Fast catamaran ferry</td>
<td>Alum</td>
<td>5,200</td>
<td>88</td>
<td>2007</td>
<td>Austal, Australia</td>
<td>Istanbul Fast Ferries (O.O)</td>
<td>Car overrun loading ramp</td>
<td>Human error/Negligence</td>
</tr>
<tr>
<td>2015</td>
<td>Indonesia</td>
<td>120</td>
<td>Marina Banu 2</td>
<td>Fast monohull ferry</td>
<td>FRP</td>
<td>150</td>
<td>30</td>
<td>1998</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Capsized and sank in choppy sea</td>
<td>Human error/Unseaworthy</td>
</tr>
</tbody>
</table>

**Appendix E**

**554 Known Fatal Fast Ferry Accidents 1966-2015**
Appendix F

Digital files available upon request
Appendix G

Available to download from (http://www.imo.org/en/About/Events/Documents/manila%20statement%20unedited%20advance%20copy%202015.pdf)
### Appendix H

List of known fatal conventional monohull Ro-Pax Ferry Accidents 1966-2015 compiled from Appendix A, BMPVA database.

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Deaths</th>
<th>Vessel name</th>
<th>Tonnage (kW)</th>
<th>Length (m)</th>
<th>Year built</th>
<th>Builder</th>
<th>Owner</th>
<th>Claimed cause</th>
<th>Author assessed cause</th>
</tr>
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<tbody>
<tr>
<td>1992</td>
<td>Kenya</td>
<td>2</td>
<td>Mombasa One</td>
<td>Unknown</td>
<td>138</td>
<td>1976</td>
<td>Union Naval de Levante, Esp</td>
<td>Transmediterranea</td>
<td>Collided with cargo ship</td>
<td>Human error/Poor seamanship</td>
</tr>
<tr>
<td>1983</td>
<td>Greece</td>
<td>28</td>
<td>Chrysis Avg</td>
<td>736</td>
<td>91</td>
<td>1976</td>
<td>Minoan Flying Dolphins</td>
<td>Unknown</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
</tr>
<tr>
<td>1983</td>
<td>Greece</td>
<td>194</td>
<td>Doña Josefina</td>
<td>991</td>
<td>72</td>
<td>1968</td>
<td>Carlos A Gotthong Lines</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>Belgium</td>
<td>193</td>
<td>Herald of Free Enterprise</td>
<td>7,951</td>
<td>132</td>
<td>1960</td>
<td>Schichau Unterweser, Germ</td>
<td>Townsend Thoresen</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
</tr>
<tr>
<td>1983</td>
<td>Philippines</td>
<td>5</td>
<td>Doña Conchita</td>
<td>1,442</td>
<td>96</td>
<td>1969</td>
<td>Carlos A Gotthong Lines</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>Denmark</td>
<td>159</td>
<td>Scandnavian Star</td>
<td>10,513</td>
<td>142</td>
<td>1971</td>
<td>Dubigeon-Normandie, Fr</td>
<td>Scandnavian World Cruises</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
</tr>
<tr>
<td>1983</td>
<td>UK</td>
<td>1</td>
<td>Noroma</td>
<td>12,519</td>
<td>132</td>
<td>1973</td>
<td>Nobelskruger, Germany</td>
<td>Smyll Lines</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
</tr>
<tr>
<td>1983</td>
<td>UK</td>
<td>2</td>
<td>Keine Mathilde</td>
<td>5,464</td>
<td>120</td>
<td>1970</td>
<td>Schiffbau Gesellschaft, Ger</td>
<td>Britanicy Ferries</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<tr>
<td>1983</td>
<td>Italy</td>
<td>14</td>
<td>Expresso Trapani</td>
<td>2,719</td>
<td>113</td>
<td>1983</td>
<td>Hisos de J Barreras, Spain</td>
<td>CONATIR</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<tr>
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<td>143</td>
<td>Moby Prince</td>
<td>6,187</td>
<td>131</td>
<td>1968</td>
<td>Cammill Laird, UK</td>
<td>NavigazioneArchipago Madd</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>Salem Express</td>
<td>4,771</td>
<td>110</td>
<td>1966</td>
<td>Const. Nav, et Indust, deMed</td>
<td>Sametour Shipping Co</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
</tr>
<tr>
<td>1983</td>
<td>UK</td>
<td>1</td>
<td>Norse</td>
<td>31,785</td>
<td>179</td>
<td>1987</td>
<td>Govan Shipbuilders, UK</td>
<td>P&amp;O European Ferries</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
</tr>
<tr>
<td>1983</td>
<td>France</td>
<td>1</td>
<td>Quiberon</td>
<td>11,813</td>
<td>129</td>
<td>1975</td>
<td>Werfl Nobiskgurk, Germany</td>
<td>B.A.I. S.A.Britanny Ferries</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<tr>
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<td>Kenya</td>
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<td>Mombasa One</td>
<td>Unknown</td>
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<td>1976</td>
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<td>Collion with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>21</td>
<td>Al Salam El Sa'di El Mar</td>
<td>7,697</td>
<td>125</td>
<td>1970</td>
<td>Ca Na del Terrino e Reuniti</td>
<td>Khalil Ali Fouda</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>Falster Link</td>
<td>5,493</td>
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<td>F-L Shipping</td>
<td>Unknown</td>
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<td>Human error/Poor seamanship</td>
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<td>Philippines</td>
<td>122</td>
<td>Viva Antipolo VII</td>
<td>108</td>
<td>33</td>
<td>1985</td>
<td>Local yard, Philippines</td>
<td>Viva Antipolo Shipping</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<tr>
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<td>Philippines</td>
<td>54</td>
<td>Kimelody Cristy</td>
<td>492</td>
<td>63</td>
<td>1972</td>
<td>Kaanawa Dockyard, Japan</td>
<td>Moreta Shipping Lines</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>Indonesia</td>
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<td>Sultta</td>
<td>178</td>
<td>1986</td>
<td>Unknown</td>
<td>Indonesia</td>
<td>Government of Indonesia</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>Pegasus</td>
<td>12,578</td>
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<td>1975</td>
<td>Dubigeon-Normandie, Sa, L</td>
<td>Enrotil Lines</td>
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<td>Human error/Poor seamanship</td>
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<td>1976</td>
<td>State Dockyard, Australia</td>
<td>Strinics Lines</td>
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<td>China</td>
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<td>Guorun</td>
<td>13,614</td>
<td>196</td>
<td>1974</td>
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<td>Ulian Marine Corp</td>
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<td>Princess of the Orient</td>
<td>13,614</td>
<td>196</td>
<td>1974</td>
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<td>Suphios Lines</td>
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<td>Human error/Poor seamanship</td>
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<tr>
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<td>Sweden</td>
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<td>Finnsnesse ragnhd</td>
<td>35,855</td>
<td>170</td>
<td>1981</td>
<td>Holwaldstwerke Deschwe Ze</td>
<td>Color Line</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>Rosalia</td>
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<td>Collision with Ro-Pax</td>
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<td>China</td>
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<td>Human error/Poor seamanship</td>
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<td>14</td>
<td>Superfast 3</td>
<td>28,800</td>
<td>194</td>
<td>1998</td>
<td>Kweenier Masa yarns, Finla</td>
<td>Attica Lines</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>Yande Ferry Co</td>
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<td>1972</td>
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<td>Fincantieri Palermo, Italy</td>
<td>Adriatica di Navigazione</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>Philippines</td>
<td>52</td>
<td>Our Lady of Mediatrix</td>
<td>202</td>
<td>Unknown</td>
<td>Daiva Shipping Lines</td>
<td>Bombs in luggage exploded</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
<td></td>
</tr>
<tr>
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<td>Indonesia</td>
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<td>Cahaya Bahari</td>
<td>568</td>
<td>27</td>
<td>1990</td>
<td>Unknown yard, Japan</td>
<td>Kawasaki</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<tr>
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<td>Firla</td>
<td>230</td>
<td>30</td>
<td>1965</td>
<td>Ferguson Alska, UK</td>
<td>Shetland Islands Council</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>Ciudad de Ceuta</td>
<td>5,468</td>
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<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
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<td>4,179</td>
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<td>Nuovi Cantieri Apuania, Italy</td>
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<td>Human error/Poor seamanship</td>
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<td>1</td>
<td>Ciudad de Palma</td>
<td>11,513</td>
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<td>1978</td>
<td>Union Naval de Levante, Esp</td>
<td>Transmediterranea</td>
<td>Collision with Ro-Pax</td>
<td>Human error/Poor seamanship</td>
</tr>
<tr>
<td>Year</td>
<td>Country</td>
<td>Name</td>
<td>Location</td>
<td>Tonnage</td>
<td>Company</td>
<td>Event</td>
<td>Reason</td>
<td>Outcome</td>
<td></td>
<td></td>
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<td>Canada</td>
<td>Spirit of Vancouver Island</td>
<td>18,747</td>
<td></td>
<td>BC Ferries</td>
<td>Launch turned in front of ferry</td>
<td>Human error</td>
<td>Poor lookout</td>
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<td>4,555</td>
<td>1966</td>
<td>Ch. De L'Atlantique, France</td>
<td>Minoan Flying Dolphins</td>
<td>Officers not on bridge</td>
<td>Human error</td>
<td>Negligence</td>
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<td>Koningin Beatrix</td>
<td>31,910</td>
<td>1986</td>
<td>Van der Giessen de Noord, N. Ister Line</td>
<td>Minoan Flying Dolphins</td>
<td>Man overboard</td>
<td>Human error</td>
<td>Negligence</td>
<td></td>
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<td>Venosa Palace</td>
<td>3,000</td>
<td>2001</td>
<td>Fincantieri, Italy</td>
<td>Minoan Flying Dolphins</td>
<td>Crewman overboard</td>
<td>Suicide</td>
<td>Accident</td>
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<td>Aalborg Vaerft, Denmark</td>
<td>Minoan Flying Dolphins</td>
<td>Mooring line in propeller</td>
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<td>Negligence</td>
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<td>Unknown</td>
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<td>Unknown</td>
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<td>Human error</td>
<td>Negligence</td>
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<tr>
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<td>Duta Banten</td>
<td>Unknown</td>
<td>Indonesia</td>
<td>PT ASDP Goyt Co</td>
<td>Crew ignored car roll back</td>
<td>Human error</td>
<td>Poor lookout</td>
<td></td>
<td></td>
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<td>Maris Carmela</td>
<td>880</td>
<td>55</td>
<td>Unknown, Japan</td>
<td>Montenegro Shipping Lines</td>
<td>Fire on vehicle deck</td>
<td>Human error</td>
<td>Unseaworthiness</td>
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<td>Negligence</td>
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<td>1970</td>
<td>Fukuoka Shipbuilding, Japan</td>
<td>Sulpicio Lines</td>
<td>Collison with barge</td>
<td>Human error</td>
<td>Poor lookout</td>
<td></td>
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<td>Philippines</td>
<td>Yaboban Princess</td>
<td>3,079</td>
<td>1970</td>
<td>Fukuoka Shipbuilding, Japan</td>
<td>Sulpicio Lines</td>
<td>Air tank explosion/Fire</td>
<td>Human error</td>
<td>Negligence</td>
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<td>Unknown</td>
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<td>Le Joola</td>
<td>2,087</td>
<td>1990</td>
<td>Germerstein Schiffswerft Senegal Government</td>
<td>Gross overloading</td>
<td>Human error</td>
<td>Overloaded</td>
<td></td>
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<tr>
<td>2007</td>
<td>Australia</td>
<td>Mercury II</td>
<td>3,990</td>
<td>1969</td>
<td>USSR Gasplan Shipping Co</td>
<td>Cargo shift/Charge loaded</td>
<td>Human error</td>
<td>Negligence</td>
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<td>2008</td>
<td>Philippines</td>
<td>Filippina Princess</td>
<td>13,700</td>
<td>1973</td>
<td>Kanda Shipbuilding, Japan</td>
<td>Sulpicio Lines</td>
<td>Passenger murdered crew</td>
<td>Murder</td>
<td></td>
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<tr>
<td>2009</td>
<td>China</td>
<td>Laodux 7</td>
<td>1,324</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Pax died of hypothermia</td>
<td>Human error</td>
<td>Unseaworthiness</td>
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<tr>
<td>2010</td>
<td>Greece</td>
<td>Blue Star Paros</td>
<td>10,435</td>
<td>2002</td>
<td>Daewoo Shipbuilding, S.Korea</td>
<td>Blue Star Lines</td>
<td>Man overboard in rough sea</td>
<td>Suicide</td>
<td>Accident</td>
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<td>2011</td>
<td>Philippines</td>
<td>Superferry 12</td>
<td>11,914</td>
<td>1984</td>
<td>Kanda Shipbuilding, Japan</td>
<td>WGA, Superferry, Aboliz, Spain</td>
<td>Collision with San Nicolas</td>
<td>Human error</td>
<td>Poor lookout</td>
<td></td>
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<tr>
<td>2012</td>
<td>France</td>
<td>Danielle Casanova</td>
<td>41,447</td>
<td>2002</td>
<td>Fincantieri, Italy</td>
<td>SNCM</td>
<td>Berthing ship rammed</td>
<td>Human error</td>
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<td>2013</td>
<td>Indonesia</td>
<td>Wimala Dharma</td>
<td>Unknown</td>
<td>Indonesia</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Sank rapidly in calm seas</td>
<td>Human error</td>
<td>Overloaded</td>
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<tr>
<td>2014</td>
<td>Cambodia</td>
<td>Known</td>
<td>8,257</td>
<td>2003</td>
<td>Unknown, Japan</td>
<td>Unknown</td>
<td>Boarding truck capsized</td>
<td>Human error</td>
<td>Unseaworthiness</td>
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<tr>
<td>2015</td>
<td>Indonesia</td>
<td>Mandiri Nusantara</td>
<td>8,257</td>
<td>2003</td>
<td>Unknown, Indonesia</td>
<td>Primavista</td>
<td>Collision with cargo ship</td>
<td>Human error</td>
<td>Poor lookout</td>
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<tr>
<td>2016</td>
<td>Netherlands</td>
<td>Superferry 14</td>
<td>10,181</td>
<td>1981</td>
<td>Hayashikane, Shimonsukei</td>
<td>WGA, Superferry, Aboliz, Spain</td>
<td>Terrorist/Abu Sayeff</td>
<td>Human error</td>
<td>Negligence</td>
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<tr>
<td>2017</td>
<td>China</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Sank soon after leaving berth</td>
<td>Human error</td>
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<tr>
<td>2018</td>
<td>New Zealand</td>
<td>Santa Regina</td>
<td>14,588</td>
<td>1985</td>
<td>Ateliers et Chantiers du Havre</td>
<td>Strals Shipping/Bluebridge</td>
<td>Collision with small boat</td>
<td>Human error</td>
<td>Poor lookout</td>
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<td>2019</td>
<td>Egypt</td>
<td>Pride of Al Salam 95</td>
<td>15,903</td>
<td>1972</td>
<td>IHC 'Gusto' Schiedam,Neth</td>
<td>Al Salam Maritime Transport</td>
<td>Rammed by cargo ship</td>
<td>Human error</td>
<td>Poor lookout</td>
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<tr>
<td>2020</td>
<td>Thailand</td>
<td>1,026 Al Salam Boccaccio 88</td>
<td>17,903</td>
<td>1970</td>
<td>Italiani Monte, Falcone, Italy</td>
<td>Al Salam Maritime Transport</td>
<td>Fire broke out below deck</td>
<td>Human error</td>
<td>Poor lookout</td>
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<tr>
<td>2021</td>
<td>Bangladesh</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Vehicular ferry sank</td>
<td>Human error</td>
<td>Overloaded</td>
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<tr>
<td>2022</td>
<td>Canada</td>
<td>Queen of the North</td>
<td>8,897</td>
<td>1969</td>
<td>Wessel Seebeck, Bremerhaven</td>
<td>BC Ferries</td>
<td>Inadequate bridge management</td>
<td>Human error</td>
<td>Negligence</td>
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<tr>
<td>2023</td>
<td>Philippines</td>
<td>Princess 29</td>
<td>13,705</td>
<td>1973</td>
<td>Kanda Shipbuilding, Japan</td>
<td>Sulpicio Lines</td>
<td>Lost control in storm</td>
<td>Human error</td>
<td>Unseaworthiness</td>
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<tr>
<td>2024</td>
<td>France</td>
<td>Pagasa Urba</td>
<td>29,171</td>
<td>1994</td>
<td>ACH Construction Navale, France</td>
<td>Minoan Flying Dolphins</td>
<td>Car bumped overboard</td>
<td>Human error</td>
<td>Negligence</td>
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<td>2025</td>
<td>UK</td>
<td>Pride of Bilbao</td>
<td>37,500</td>
<td>1986</td>
<td>Wartistsi Perno, Finland</td>
<td>Irish Continental Group</td>
<td>Collision with yacht ignarded</td>
<td>Human error</td>
<td>Poor lookout</td>
<td></td>
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<tr>
<td>2027</td>
<td>Japan</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Japan</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Towed ferry capsized in typhoon</td>
<td>Human error</td>
<td>Unseaworthiness</td>
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<tr>
<td>2028</td>
<td>Indonesia</td>
<td>Trista 1</td>
<td>Unknown</td>
<td>Indonesia</td>
<td>Unknown</td>
<td>Unknown</td>
<td>&quot;Slaughtered by giant wave&quot;</td>
<td>Human error</td>
<td>Poor seaworthship</td>
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<td>2029</td>
<td>Indonesia</td>
<td>Senopai Nusantara</td>
<td>2,718</td>
<td>1967</td>
<td>Taguma Shipbuilding, Japan</td>
<td>Prima Vista</td>
<td>Bad weather/Storm</td>
<td>Human error</td>
<td>Poor seaworthship</td>
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<tr>
<td>2030</td>
<td>Canada</td>
<td>Quinca</td>
<td>1,459</td>
<td>1982</td>
<td>Vancouver Shipyards, Canada</td>
<td>Sulpicio Lines</td>
<td>Ferry departed/No warning</td>
<td>Human error</td>
<td>Negligence</td>
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<tr>
<td>2031</td>
<td>Indonesia</td>
<td>Leviina</td>
<td>1,800</td>
<td>1981</td>
<td>Unknown, Indonesia</td>
<td>Praga Jaya Seniosa</td>
<td>Truck fire below deck</td>
<td>Human error</td>
<td>Poor seaworthship</td>
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<tr>
<td>2032</td>
<td>Philippines</td>
<td>Butuan Bay</td>
<td>3,864</td>
<td>1989</td>
<td>Iwag Zosen, Japan</td>
<td>Carlos A Gothong Lines</td>
<td>Possible terrorism</td>
<td>Human error</td>
<td>Negligence</td>
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<tr>
<td>2033</td>
<td>Philippines</td>
<td>Blue Water Princess</td>
<td>492</td>
<td>1969</td>
<td>Unknown, Philippines</td>
<td>Sulpicio Lines</td>
<td>Cargo shift in face of typhoon</td>
<td>Human error</td>
<td>Overloaded</td>
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<tr>
<td>2034</td>
<td>Ireland</td>
<td>Dublin Viking</td>
<td>1,800</td>
<td>1981</td>
<td>Unknown, Ireland</td>
<td>Praga Jaya Seniosa</td>
<td>Truck fire below deck</td>
<td>Human error</td>
<td>Overloaded</td>
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<tr>
<td>2035</td>
<td>Turkey</td>
<td>Ankara</td>
<td>10,670</td>
<td>1983</td>
<td>Unknown, Turkey</td>
<td>Denizciler Turizm Denizcilik</td>
<td>Mooring line snapped</td>
<td>Human error</td>
<td>Negligence</td>
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<tr>
<td>2036</td>
<td>Israel</td>
<td>Salamis Glory</td>
<td>10,392</td>
<td>1982</td>
<td>Uljanik Shipyard, Croatia</td>
<td>Salamis Yors Holdings</td>
<td>Collided with anchored ship</td>
<td>Human error</td>
<td>Overloaded</td>
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<td>2038</td>
<td>Tanzania</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Overloaded barge sank</td>
<td>Human error</td>
<td>Overloaded</td>
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<tr>
<td>2039</td>
<td>Philippines</td>
<td>Nostalgia of the Stars</td>
<td>23,842</td>
<td>1984</td>
<td>Wuyi Tairou, Nan Jep</td>
<td>Sulpicio Lines</td>
<td>Went in sea in typhoon</td>
<td>Human error</td>
<td>Poor seaworthship</td>
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<td>Turkey</td>
<td>Hayat-N</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Turkey</td>
<td>Marhaba N Denizcilik Ferry</td>
<td>Cargo shift</td>
<td>Human error</td>
<td>Negligence</td>
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<td>2041</td>
<td>Philippines</td>
<td>Filipina Princess</td>
<td>13,700</td>
<td>1973</td>
<td>Kanda Shipbuilding, Japan</td>
<td>Sulpicio Lines</td>
<td>Rain fell on welder</td>
<td>Human error</td>
<td>Negligence</td>
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<tr>
<td>Year</td>
<td>Ship Name / Port</td>
<td>Ship Type</td>
<td>Location</td>
<td>Type</td>
<td>Cause</td>
<td>Notes</td>
<td></td>
<td></td>
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<tr>
<td>1980</td>
<td>Pride of Rotterdam</td>
<td>1</td>
<td>Netherlands</td>
<td>Fire</td>
<td>Engine room fire</td>
<td>Suicide/Accident</td>
<td></td>
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<tr>
<td>2006</td>
<td>Fincantieri, Italy</td>
<td>1</td>
<td>P&amp;O North Sea Ferries</td>
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<tr>
<td>2009</td>
<td>Jon Battuta</td>
<td>1</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td></td>
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<td></td>
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<tr>
<td>2009</td>
<td>Mandiri Nusantara</td>
<td>5</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
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<td>1972</td>
<td>Princess Ashika</td>
<td>197</td>
<td>Shinkoku Dockyard, Japan</td>
<td>Shipping Corp of Popynesia</td>
<td>Capsized/Sank swiftly</td>
<td>Human error/Negligence</td>
<td></td>
<td></td>
<td></td>
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<td>1986</td>
<td>SuperFerry 9</td>
<td>72</td>
<td>Usuki Dokkotsu, Japan</td>
<td>W&amp;O, SuperFerry, Abolts</td>
<td>Vehicle shift on car deck</td>
<td>Human error/Negligence</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1984</td>
<td>Baleno II</td>
<td>53</td>
<td>Unknown</td>
<td>Philippines</td>
<td>Besta Shipping Lines</td>
<td>Water through bow ramp</td>
<td>Human error/Negligence</td>
<td></td>
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<tr>
<td>2009</td>
<td>Scottish Viking</td>
<td>1</td>
<td>Unknown</td>
<td>Scotland</td>
<td>Collision with fishing boat</td>
<td>Human error/Poor lookout</td>
<td></td>
<td></td>
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<td>2010</td>
<td>Moby Line</td>
<td>2</td>
<td>Fincantieri, Italy</td>
<td>Moby Lines</td>
<td>Ship struck from ramp</td>
<td>Human error/Negligence</td>
<td></td>
<td></td>
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<td>2011</td>
<td>Laut Teguh 2</td>
<td>33</td>
<td>Unknown</td>
<td>Germany</td>
<td>ROS Indopatama</td>
<td>Cigarette on car deck</td>
<td>Human error/Negligence</td>
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<td>1985</td>
<td>Silja Festival</td>
<td>1</td>
<td>Unknown</td>
<td>Wartsila Helsinki, Finland</td>
<td>Tallink Group</td>
<td>Drunk/Suicide</td>
<td>Suicide/Accident</td>
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<td>1982</td>
<td>Trisha Kerstin</td>
<td>380</td>
<td>Unknown</td>
<td>Philippines</td>
<td>Aeson Shipping Lines</td>
<td>Person overboard</td>
<td>Suicide/Accident</td>
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<td>1992</td>
<td>Egypt</td>
<td>22</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Egypt</td>
<td>Bus rollover</td>
<td>Human error/Negligence</td>
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<td>1967</td>
<td>Spice Islander 1</td>
<td>836</td>
<td>Unknown</td>
<td>Greece</td>
<td>Makame Hassanu</td>
<td>Engine failed/Overspeed</td>
<td>Human error/Overloaded</td>
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<td>1994</td>
<td>Nordlys</td>
<td>11,204</td>
<td>Unknown</td>
<td>Germany</td>
<td>Trinco Fyffes/Hurtigruten</td>
<td>Engine room fire</td>
<td>Human error/Panic</td>
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<td>1983</td>
<td>Ankara/Reina 1</td>
<td>10,870</td>
<td>Unknown</td>
<td>Poland</td>
<td>Denizciert Tuzum Denizcilik</td>
<td>Ferry, cargo ship collided</td>
<td>Human error/Poor lookout</td>
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<td>1983</td>
<td>Pella</td>
<td>10,675</td>
<td>Unknown</td>
<td>Greece</td>
<td>Arab Bridge Maritime Co</td>
<td>Fire in luggage store</td>
<td>Human error/Negligence</td>
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<td>1971</td>
<td>Superferry 3</td>
<td>9,857</td>
<td>Unknown</td>
<td>Hawaii/Truckyard, Japan</td>
<td>W&amp;O, Superferry, Abolts</td>
<td>Ferry ramped trailer</td>
<td>Human error/Poor look out</td>
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<td>2000</td>
<td>China</td>
<td>12</td>
<td>Unknown</td>
<td>Unknown</td>
<td>China</td>
<td>Ferry sink</td>
<td>Human error/Unseaworthiness</td>
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<td>1982</td>
<td>Bahuga Jaya</td>
<td>1,459</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Collision with gas tanker</td>
<td>Human error/Poor look out</td>
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<td>1982</td>
<td>Quinam</td>
<td>1,459</td>
<td>Unknown</td>
<td>Vancouver Shipping Co</td>
<td>Car drove off ramp</td>
<td>Suicide/Accident</td>
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<td>1973</td>
<td>Lady of Mount Carmel</td>
<td>98</td>
<td>Unknown</td>
<td>Japan</td>
<td>Medallion Transport</td>
<td>Engine failure/Weather</td>
<td>Human error/Overloaded</td>
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<td>1980</td>
<td>Unknown</td>
<td>12</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Iran</td>
<td>Vehicle ferry capsized</td>
<td>Human error/Overloaded</td>
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<td>1973</td>
<td>St Thomas of Aquinas</td>
<td>11,408</td>
<td>Unknown</td>
<td>ZGO, formerly Negros Navig</td>
<td>Collision with cargo ship</td>
<td>Human error/Poor look out</td>
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<td>1988</td>
<td>Munuwar</td>
<td>3</td>
<td>Unknown</td>
<td>Indonesia</td>
<td>Indonesia</td>
<td>Leaking sink</td>
<td>Human error/Overloaded</td>
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<td>1994</td>
<td>Banjul-Barra ferry</td>
<td>5</td>
<td>Unknown</td>
<td>Europe</td>
<td>Gambia Ports Authority</td>
<td>Ship moved before loading</td>
<td>Human error/Negligence</td>
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<td>1994</td>
<td>Shwe</td>
<td>6,825</td>
<td>Unknown</td>
<td>Japan</td>
<td>Chiyoda Marine</td>
<td>Capsized in sharp turn</td>
<td>Human error/Overloaded</td>
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<td>1989</td>
<td>Makarika II</td>
<td>8</td>
<td>Unknown</td>
<td>Philippines</td>
<td>Philippines</td>
<td>Engine failed in storm</td>
<td>Human error/Negligence</td>
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<td>2009</td>
<td>Norman Atlantic</td>
<td>26,904</td>
<td>Cantiere Navale Visentini, It</td>
<td>ANEK Visentini Group</td>
<td>Car deck fire</td>
<td>Human error/Negligence</td>
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<td>1965</td>
<td>Cape Verde</td>
<td>22</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Yushan Marine</td>
<td>Sinking/Weather</td>
<td>Human error/Overloaded</td>
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<td>1970</td>
<td>Aung Tagon 3</td>
<td>1,300</td>
<td>Unknown</td>
<td>Myanmar</td>
<td>Myanmar</td>
<td>Overboard unstable boat sank</td>
<td>Human error/Overloaded</td>
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<td>2005</td>
<td>Highspeed 5</td>
<td>4,900</td>
<td>Unknown</td>
<td>Australia</td>
<td>Hellenic Seaways/MinoanF</td>
<td>Electrical fire</td>
<td>Human error/Negligence</td>
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<td>2001</td>
<td>Sunflower Daisetsu</td>
<td>11,401</td>
<td>Unknown</td>
<td>Japan</td>
<td>MOL Ferry Co</td>
<td>Truck fire on cargo deck</td>
<td>Human error/Negligence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>Wihan Senaptra</td>
<td>9,796</td>
<td>Unknown</td>
<td>Japan</td>
<td>Trinmti Samudra, Surabaja</td>
<td>Grounded, capsized, sank</td>
<td>Human error/Unseaworthiness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>Rafella 2</td>
<td>999</td>
<td>Unknown</td>
<td>Japan</td>
<td>Namu Bahari Utawa</td>
<td>Leaked, capsized in calm sea</td>
<td>Human error/Unseaworthiness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>Sansovino</td>
<td>10,677</td>
<td>Unknown</td>
<td>Italy</td>
<td>Siremar</td>
<td>Crew gassed while tank cleaning</td>
<td>Human error/Negligence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>Starlette Atlantic</td>
<td>1,497</td>
<td>Unknown</td>
<td>Japan</td>
<td>Wakamatsu Shipyblding</td>
<td>Capsized and sank in typhoon</td>
<td>Human error/Poor seaman ship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>Mutiara Sentosa I</td>
<td>12,368</td>
<td>Unknown</td>
<td>Japan</td>
<td>Mitsubishi Jukogyo, Japan</td>
<td>Fire broke out on car deck</td>
<td>Human error/Negligence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>Wiraglory</td>
<td>1658</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Passenger went berserk</td>
<td>Accident/Suicide</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>Aalborg Vaerft, Denmark</td>
<td>2,720</td>
<td>Unknown</td>
<td>Aalborg Vaerft, Denmark</td>
<td>Krystalands Damparks</td>
<td>Capsized, sank in heavy sea</td>
<td>Human error/Overloaded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1966</td>
<td>Wahine</td>
<td>8,948</td>
<td>Unknown</td>
<td>Hawaii</td>
<td>Union S.S. Co, NZ</td>
<td>Navigation error in bad storm</td>
<td>Human error/Poor seaman ship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>Drumling Margaretha II</td>
<td>10,850</td>
<td>Unknown</td>
<td>Netherlands</td>
<td>OSR Rederi</td>
<td>Collision</td>
<td>Human error/Poor lookout</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>Jan Hewelluz</td>
<td>3,018</td>
<td>Unknown</td>
<td>Poland</td>
<td>Polish Ocean Lines</td>
<td>Bad weather/Force 12</td>
<td>Human error/Unseaworthiness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>Avala</td>
<td>13,621</td>
<td>Unknown</td>
<td>Netherlands</td>
<td>Trazz Rail</td>
<td>Premature release of pin</td>
<td>Human error/Negligence</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Since the mid-nineteenth century numerous enquiries and studies have looked into the reasons why maritime accidents continue to occur with such frequency and deadliness. In Britain, Samuel Plimsoll was the most noted and most successful of the early campaigners for improvements in maritime safety.

Plimsoll’s campaigns are well described in *The Plimsoll Sensation*, Jones, N. 2006. Plimsoll, a product of the Enlightenment, in an effort to improve safety at sea, lobbied for controls on loading of ships. Thus the Load Line or Plimsoll Line was compulsorily introduced in Britain. It soon became universal and is still in use today.

Thirty years later, the „Titanic“ disaster was quickly followed by what was, until then, the most intensive legal inquiry into an accident, (Eaton, J. & Harris, C. 1987). That led, ultimately, to the international Safety of Life at Sea (SOLAS) convention that specified minimum standards for life saving equipment that had to be carried by ships. SOLAS has been continually updated since and is effectively the foundation of the International Maritime Organisation (IMO).

These, obviously, were British initiatives, which is unsurprising as Britain was then the world’s leading maritime nation. The British moves were soon followed in other developed countries in Europe, North America and Australasia.

**Compiling the data – the problem of excessive North Atlantic focus**

This is undoubtedly why so much of the literature, until very recently, has been British-centric or, at least, north Atlantic in focus. The result of that focus is that very little useful material has been produced to record and describe the many accidents and deaths that have occurred in the poor and hot tropical regions that are the major focus of this thesis. Very notably, SOLAS barely, if at all, applies in poorer countries. The excuse for this lack of application is that SOLAS only applies to international voyages. It does not apply to domestic voyages and IMO is loathe to: “interfere in the internal affairs of its sovereign member states” and, indeed, is legally precluded from doing so.

Some useful directories of passenger vessel accidents have been compiled, mainly in the United Kingdom. They have been very much focused on the north Atlantic region although some of the major disasters in Asia are listed. Books such as *Sea Disasters – The Truth Behind the Tragedies*, by Keith Eastlake; *A Dictionary of Passenger Ship Disasters*, by David L Williams; *Modern Shipping Disasters 1963-1987*; and *Maritime Casualties 1963-1996*,
both by Norman Hooke, have provided useful information about most of the major disasters that have occurred until 1996. There have been no similar compendia published since and the lists presented on the Web, such as by Wikipedia, are far from comprehensive. However, Google has generally proved to be by far the best source of information about maritime and other transport disasters including road, rail and aviation. Google derived information has very effectively supplemented the directories mentioned above and the, often brief, news reports used by the author in compiling the *Baird Maritime Passenger Vessel Accident database* (Appendix A).

The major commercial databases including the Lloyd”s Casualty Reports, IUMI, and IHS Fairplay proved to be useful but are also far from comprehensive. They are restricted as to vessel size and, to a degree, geographically. The International Maritime Organization”s GISIS database provided no information that was unattainable elsewhere. Indeed, it was disappointingly deficient overall. Similarly, a thorough search of all the many databases available through the University of Wollongong Library failed to uncover any additional data. The two most comprehensive and useful databases of passenger vessel accidents by far have proved to be the BMPVA database and that of the Worldwide Ferry Safety Association. Perhaps unsurprisingly, there is very little general interest in developing country transport accidents evinced by the media and academia in developed countries.

Interestingly, and very significantly, the prestigious *Oxford Encyclopedia of Maritime History*, (2007) comprising vignettes contributed by many of the world”s leading academic maritime historians, fails to mention any fatal passenger vessel accidents beyond the *Titanic* and three Ro-Pax accidents that occurred in the North and Baltic seas in the nineteen-eighties and nineties. From reading it, you would think that the countries where 96 per cent of ferry fatalities occur never experience such accidents. It is a very disappointing publication in many respects.

**Cruise sector over-represented in literature**

Numerous „popular“ books have been published that describe the dangers of cruise ship travel, for example, Mark Gaouette”s *Cruising for Trouble*, and Brian Bruns” *Cruise Confidential*. However, as the author”s BMPVA database makes clear, the reality is that cruise lines are very safe. The author, after completing and thoroughly analysing his database, significantly changed his mind about the dangers of cruising. Ferries are, and always have been, where the real dangers lie. At least 91% of passenger vessel accidents have involved ferries as have 95% of the resulting fatalities. Domestic voyages accounted for 93% of those ferry accidents.

The cruise sector has been the subject of incomparably more literary efforts than has the ferry sector. Cruise ships tend to be larger and more glamorous than ferries and their passengers generally much wealthier.
There are, considering the number of fatalities involved, very few books available on the specific subject of fatal ferry accidents. The author has had to rely much more on press reports, press releases, inquiry reports and conference papers from which to compile both data and comment. They, too, have been disappointingly scarce, particularly until use of the Internet became widespread around the year 2000. Fortunately, the aviation, tanker and bulk shipping, railway and road traffic sectors have compiled considerable amounts of safety data and published widely on that basis. This has provided many useful comparisons and ideas that are applicable to the passenger vessel safety problem. The aviation industry and its IMO counterpart, ICAO have proved to be particularly useful sources of ideas and comparable data.

It has become obvious, too, that some Marine Boards of Inquiry and similar tribunals are structured to search more for a scapegoat than for a cure that might prevent future similar accidents. As Joseph Conrad stated in his novel *Lord Jim* (1902), MBOIs are far more interested in “the how than the why” of accidents. In poorer countries they are unlikely to report at all, and, when they do, rarely have an objective of prevention of future occurrences. In a rather “half-hearted” way, IMO claims to encourage member nations to enquire into and report on serious maritime accidents but most continue to fail to do so as a search of IMO’s GISIS database reveals.

**Scarce and scapegoat seeking MBOI reports**

Even in developed countries evidence and “expert” witnesses seem to be more focused on technical than behavioural analysis. A blatant example of that was the inquiry into the *Estonia* sinking in 1994, Bjorkman (1998) and Eastlake (1998). Interestingly, Bjorkman’s analytical abilities and objectivity have been found wanting following the capsize and sinking of the *Al Salam Boccaccio 98* with which he was involved professionally.

Transnational inquiries are inevitably subject to conflicts of interest in that it is easier to lay blame on foreigners than locals. Despite their many and obvious inadequacies, it is probably still preferable to have some form of inquiry whereby evidence is recorded and publicised than to not have them at all. Unfortunately, in the poorer, hotter regions where most of accidents described in this thesis occur, few inquiries are actually made. When they are, they tend to be perfunctory and rarely publicised or even adequately documented.

There have, however, been examples of truly thorough inquiries that have been recorded in developed countries where all factors in an accident have been purely local. The outstanding example of that is the United Kingdom inquiry *Marchioness/Bowbelle: Formal Investigation under the Merchant Shipping Act 1995*, Clarke (2001). It provides an excellent model for Marine Boards of Inquiry everywhere but, unfortunately, would be far too expensive to be feasible except in the richest countries.

An exception to that general experience was the exceptionally thorough and very revealing Commission of Inquiry into the sinking of the *Rabaul Queen*. The report of that inquiry, which was commissioned by the Government of
Papua New Guinea, was concise, simply and clearly put and devastating to the culprits. At the time of writing, they were being tried for various crimes including manslaughter, corruption and negligence.

The British inquiry into the Herald of Free Enterprise capsize and the South Korean inquiry into that of the Sewol were also impressively thorough, comprehensive, fair, informative and educational.

Until the use of the Internet became widespread during the first decade of the twenty-first century, very few fatal marine accidents that occurred in less developed regions were even recorded in the outside world. Despite this, the Baird Maritime Passenger Vessel Accident database (Appendix A) shows that 80% of the fatalities arising from those accidents occurred in just 10 countries and 90% in twenty countries. Sixty per cent of them occurred in just five countries! However, Marine Boards of Inquiry and their transcripts or reports describing such accidents have been extremely scarce.

Hence, the BMPVA database (Appendix A) that provides the data and statistics upon which this thesis is based, contains details of far fewer accidents and their resulting fatalities (179) in the 35 years prior to 2000 than in the 15 years since (573). Indeed, by searching all the known databases available in books such as Great Ship Disasters, Bonner, C & K. 2003 and Maritime Casualties 1963 – 1996, Hooke, N. 1997; the Lloyd's List Casualty Reports; and on the Internet such as www.maritimatedata.com, www.ferrysafety.org, and www.eurotestmobility.eu/wp-content/uploads/2014/07/Chronology-FINAL.pdf, there still is a paucity of information about accidents in the less-developed regions of the world. The author estimates that ferry accidents and fatalities are under-reported by at least 33 per cent.

This scarcity of accident data was remarked upon by Ralph Nader in his important and influential book Unsafe At Any Speed in the context of road accidents. That book was first published in 1965. As a result, in developed countries at least, there is now, if anything, a surfeit of road accident data. Boisson (1999) made similar comments about maritime accidents but they have, so far, failed to lead to the same improvements experienced with developed country road accident data.

Disappointingly, the International Maritime Organisation’s GISIS database of shipping accidents is compiled by the individual sovereign state members of IMO. Most of those, particularly those with the worst maritime safety records, have been particularly dilatory in their approach to that task. Indeed, for the purposes of this thesis, the GISIS database is practically useless.

Careful statistical analysis of the data that does exist, however, has been very revealing. For example the disproportionate 32% of fatalities that have arisen from accidents involving Ro-Pax ferries revealed in the BMPVA data. That is a devastating reality that needs to be immediately addressed by IMO. Encouragingly and importantly, that same data highlights the significantly
better safety record of modern catamaran and trimaran ferries, except for bancas.

**Scarce pre-2000 data**

This, obviously, makes the compilation and analysis of statistics covering the period prior to 31 December 1999 comparatively difficult. International news agencies such as Agence France Presse, Associated Press, Reuters, the BBC, CNN, Bloomberg and similar possess good archives but often fail to record accidents in out-of-the-way places. They, too, presumably thanks to the Internet, have widened and improved their coverage more recently. Also, the fact that 90 per cent of fatalities have occurred in twenty countries enables the attempts at a cure to be more economically and practically confined to just those countries. For the purpose of effective reform, the more comprehensive and accurate data that has been compiled since 2000 is quite sufficient.

As can be seen from Appendix A, the author's BMPVA database, many of the reports have been gleaned from many local newspapers in the places where accidents occurred as well as from the home-town media of tourist victims and a variety of web news sites. Something of a "jig-saw" process then ensues in an endeavour to verify the content of those reports.

It is difficult to believe, therefore, that the frequency and deadliness of passenger vessel accidents has increased so dramatically since the year 2000. It can only be concluded that their approximate seven-fold increase is due to better reporting facilitated by the widespread use of the Internet. This has also been enhanced by the development of "open access" databases although those, of course, need to be separately verified where possible. They are, in any case, far from comprehensive. This phenomenon has been commented on by Girija Shetter in an article in IHS-Fairplay on 1 December 2015 under the heading “EU maritime casualty rise „due to improved reporting”.

Newspaper and magazine reports are equally in need of independent verification but that is often impossible. A reasonable judgement of the veracity of such reports can usually be made based on the reputation of the publication concerned and by comparing them with reports in competing outlets. Sometimes, though, there are no other options. The BMPVA database has been made available in its entirety to many people in the ferry industry who have expressed an interest in its content. None have suggested any corrections.

The case studies presented in Chapter 3 have required in-depth research through reference to existing files of newspaper and Internet clippings; a number of printed databases; MBOI reports, where available; and, extensive Google searching. It was a most interesting and illuminating process that revealed some impressive surprises such as the report of the Commission of Inquiry into the sinking of the Rabaul Queen, mentioned above.
Given recent improvements in safety consciousness, enforcement, search and rescue services and survivability, it seems probable that rather than the frequency and deadliness of accidents increasing over the last 15 years, that they may have declined slightly. On the data available, that is probably so but it appears that because of inadequate reporting the frequency of fatal accidents prior to 31 December 1999 may have been considerably worse.

Numerous pamphlets, monographs, essays and journal and magazine articles have been published on all aspects of the subject. Some, such as Hetherington (2006), Weng (2015) and Low (2006) are cited in the thesis. Those on behavioural and cultural causes have been constructive and, generally, more relevant than those on structural or mechanical causes. Some very constructive recent books by Boisson (1999), Grech (2015), Trafford (2009), Talley (2008), Chauvel (1997), Kletz (2007) and Whittingham (2004) have been very helpful on human factors in accidents.

One of the most comprehensive, positive and useful government reports on the subject of human element factors in shipping accidents was published by the UK Maritime and Coastguard Agency in 2010. It is The Human Element – A Guide to Human Behaviour in the Shipping Industry.

The scarcity of doctoral and masters theses on the general subject was both notable and disappointing. A wide search of databases such as Google, SCOPUS, Research Gate, Science Direct, World Maritime University, Royal Institution of Naval Architects, Society of Naval Architects and Marine Engineers, Elsevier and the University of Wollongong Library generally failed to find anything of consequence under the various .key words. applicable to this thesis that has not been cited in it.

Those works that were uncovered are appropriately cited. An exception was a series of papers produced by students and academics associated with the School of Naval Architecture at the University of Strathclyde in the early to mid-1990s. They mostly seemed prejudiced towards maintaining the status quo with respect to North European Ro-Pax ferries following the Estonia and similar preceding disasters. In this writer’s opinion, many of those took an unprofessional approach that verged on the unethical. There was little to be found concerning accidents in developing countries.

What has been discovered from this work, though, is that this project is very multidisciplinary. It incorporates aspects of psychology, sociology, economics, ergonomics, education, political science, law, naval architecture, meteorology, demographics, geography, and history.

**Badly behaved ship owners**

The behaviour of shipowners, some of whom have been responsible for numerous fatal accidents, has come under close scrutiny in newspaper articles such as Ferry disaster is 5th tragedy for Philippine firm www.inquirer.net, (2013). Indeed, the Go family, the subject of that article, has
seen more than 6,000 of its customers die in accidents that befell its ships over a twenty year period.

Other owners such as the Carnival Corporation and Royal Caribbean Cruise Lines which, between them, control more than 60% of the world’s cruise ship tonnage, have been the subject of numerous books that describe their many failings. Bruns (2008) and Butcher (2006) are typical examples of the genre. However, to be fair, those companies carry hundreds of thousands, if not millions, of passengers annually and, while some may be inconvenienced by accidents, very few have died. Of those, most deaths could be construed as self-inflicted due to drunkenness or suicide. More deaths have occurred among their crews than their passengers. Again, the main cause appears to be suicide. That is a separate subject.

Useful literature on human factors

Some very useful texts have been published recently on human factors in maritime accidents. Grech et al (2008) is a fine example as is Talley (2008). Reference to the aviation industry as a good model for improvement and benchmarking is made extensively in The Nautical Institute’s Human Performance and Limitation for Mariners (2015).

More recently, the Nautical Institute published Navigation Accidents and Their Causes which strongly supports the thesis that most maritime accidents are caused by human error. With its brief case studies or vignettes, it illustrates clearly how such accidents occur. More positively, the book makes numerous suggestions as to how such human errors might be avoided.

While little has been published on fatal ferry accidents in developing countries generally, even less has been published on their human error causes. IMO has published some brief, un-researched statements of concern, or even alarm, and researchers such as Bhattacharya, Y. (2015) have looked at the difficulty in trying to instil a safety culture in Indian ships officers. Two studies of similar problems in Taiwan by Lu, C. S. et al are interesting but Taiwan could now hardly be described as “developing”.

Anne Ala-Pollanen, in 2014 in Helsinki, studied Cultural factors in maritime accidents, but her findings were more to do with gender acculturation than culture in the sense discussed here. Norwegian researchers Rumawax, V. and Ashjornslett, B. E., did refer to the specific problems of human error in ferry accidents in developing countries in their paper on Survivability of ships at sea. Their paper is, unfortunately, too dependent on mathematical modelling to be related to reality. Spouge, J. R. in his 1991 paper Passenger ferry safety in the Philippines came closest to the author’s thesis. His comment: “However, the most important underlying cause of the (Philippine ferry) accident record is poverty and therefore the most effective solution is not naval architectural but lies in economic and political development”, was prescient, particularly almost thirty years ago. The problems of poverty induced malnutrition and its resulting fatalism and carelessness are, regrettably, still with us. So too are the fundamentally unsafe bancas and
elderly monohull Ro-Pax ferries that are still widely used in the Philippines, Indonesia and parts of Africa.

The problems of poverty and the “failed state” have been widely canvassed. One positive report and commentary was written by Pryke (2017). It described the remarkable success of the Regional assistance Mission to the Solomon Islands.

Apart from a handful of conference papers and monographs such as those by Golden (2014) and Ballantyne (2013), and various editorials and articles published by the author and Michael Grey MBE over the years, little has been presented describing the extent of the problem in developing countries. This deficiency will, hopefully, be corrected, at least partially, with this thesis.

**Government failure**

The related problem of lack of local, national and international government action in poorer countries has been confirmed and well described by Boisson in his important and very useful *Safety at Sea; Policies, Regulations & International Law* which explains well the inadequacies of the International Maritime Organisation (IMO). He even makes some worthwhile suggestions as to how those inadequacies might be remedied.

Poorer country governments generally have “bigger fish to fry” than to be able to worry about ferry safety. Without widespread pressure from outside, they are unlikely to respond to the problem unless their tourism industry is threatened.

**The excellent aviation model**

Comparisons with other passenger carrying sectors, particularly aviation and road transport (as described in Chapter 4) have made very interesting reading. The lack of positive action on the part of the International Maritime Organisation (IMO) contrasts strikingly with the very effective and ongoing industry reform efforts of its United Nations sister body, the International Civil Aviation Organisation (ICAO) and its European counterpart, the European Maritime Safety Authority (EMSA). While IMO states that it, “Cannot interfere in the internal affairs of sovereign member states”, ICAO does so actively and positively on the basis that “no country is left behind” in the matter of air safety. So too does EMSA. The web sites of the three bodies, [www.imo.org](http://www.imo.org), [www.emsa.europa.eu](http://www.emsa.europa.eu) and [www.icao.int](http://www.icao.int), make for fascinating and very revealing reading. ICAO provides an excellent model as to how IMO could be reformed and so made significantly more effective. The IMO’s GISIS accident database is disgracefully deficient. The reasons for that deficiency are even more disgraceful as the author’s correspondence with IMO makes clear.

The ICAO website offers a very extensive and comprehensive overview of how that organisation implements and encourages the adoption of
developments aimed at improving aviation safety. It also „names and shames“, in a positive way, the countries where aviation safety is inadequate.

Successful behavioural improvement campaign models

Most developed countries have made very strenuous efforts to reduce the number of road accidents and the resulting fatalities that occur in their jurisdictions. Lengthy and costly public awareness campaigns have been combined with rigorous enforcement and stiff penalties in an endeavour to improve driver behaviour. These very successful campaigns are well described on most countries’ road safety authority websites. Most contain numerous examples of activities that could well be adapted to passenger vessels. For example, the Australian state of Victoria has met with considerable success, see www.vicroads.vic.gov.au and www.towardszero.vic.gov.au.

There have been similarly effective campaigns directed towards improving occupational health and safety in most developed countries. The literature generally disseminated as part of such campaigns is an excellent source of ideas. Some of the anti-smoking campaigns, too, have ideas that could well be transferred to passenger vessel safety campaigns. So also could the various „Learn to Swim“ campaigns that have been conducted in Australia and elsewhere. Even IMO contributed very effectively to a global campaign to improve oil tanker safety. That, however, had environmental rather than human safety origins.

The psychology profession has done extensive work on this aspect of public safety. It is very well described in Vera, E. M. et al. The Oxford Handbook of Prevention in Counseling Psychology.

Starting with the ten worst performing countries

Chapter five examines the ten worst performing countries in terms of ferry fatalities. While there are some signs of hope, little improvement has yet been achieved. Research into other causes of premature death in those countries offers some cause for optimism.

A public health improvement campaign that was very effective in Bangladesh is well described in The Lancet and in an Irin News report. It described the forty per cent improvement in Bangladeshi life expectancy that was achieved in the thirty years from 1980. It offers some hope in the form of techniques that could be adopted in the quest for improvements in ferry safety. Similarly, the success of the Regional Assistance Mission to the Solomon Islands, described by Pryke (2017), offers hope for reform of so-called „failed states“.

Much the same applies to suggestions for reducing the frequency and deadliness of accidents in poorer countries. Other than the quite rational suggestion of „teach „em to swim“ very few practical and affordable suggestions have been noticed. Perhaps the now widespread use of the
Internet will better highlight the deficiencies of some owners and operators and their national governments and, so, encourage better behaviour.

Travel guides are media where more could be done to warn tourists of the dangers of ferry travel in certain countries. It has been interesting to compare and contrast the 2015 Lonely Planet Guide to the Philippines with the website www.tripadvisor.com and its advice to travellers in Tanzania. The Lonely Planet guide includes two warnings about the dangers of Philippine ferry travel while Trip Advisor totally ignores the very real dangers of Tanzanian ferries. It prefers to discuss the schedule reliability of various ferry services in that country.

However, most developed country governments maintain websites offering travel warnings to those of their citizens who may be travelling overseas. Those of Australia, Canada, France, New Zealand and the United States have been reviewed. The information proffered is all fairly similar and the warnings starker than those contained in most commercial travel guides. They uniformly contain warnings about marine travel in the countries where the majority of the passenger vessel fatalities have occurred.

Similarly, local media could be persuaded to expose the dangers of ferry travel to their readers. Such public education could, if maintained permanently, have a significant effect in warning domestic travellers of the dangers of ferry travel. Media pressure has been effective in achieving reforms in developed countries.

In Chapter 5, statistics drawn from the World Bank, OECD, UNODP, Transparency International, Infoplease, and other sources have been widely drawn on to provide the economic, geographic, cultural and behavioural backgrounds to the study of the five worst nations for passenger vessel fatalities. Maps provided by the University of Texas proved to be very useful in that regard. A number of papers published in academic journals have been useful in compiling Chapter 5. They cover ferry accidents in Bangladesh, Indonesia and Tanzania. They offer some locally compiled statistics as well as some well thought out ideas for improvements in marine safety.

**The all-important human factors**

Chapters 5, 7 and 8 inspired the perusal of the LinkedIn website to determine the availability of human factors or human error consultants or managers. It seems there are thousands of them. Every known airline and most railways, major mining and oil and gas companies as well as manufacturers and governments employ or, at least, consult them. As do the largest developed country cruise and ferry owning companies.

The author has contacted many of them and has made contact with the Chartered Institute of Ergonomics & Human Factors (www.ergonomics.org.uk), the CEO of which has been particularly helpful. Indeed, the author has produced a paper that was published in the Institute’s monthly magazine. It has become obvious that much more extensive use of such experts should be
made by ferry operators and regulators. They have undeniably contributed much to improvements in aviation, road, rail and industrial safety.

There are, of course, many books on human factors or human error of which some are mentioned above or listed in the bibliography and cited through the thesis. However, the existence of so many experts who are focused on the subject in their daily work proves that such expertise has been very beneficial to travel safety. Increasingly, there are manufacturers and suppliers of marine safety equipment who distribute brochures and press releases that offer ideas and solutions. The same applies to „Human Factors“ consultants. Many government bodies also distribute press releases, brochures and pamphlets to encourage various aspects of safety consciousness.

IMO, too, publishes considerably in an effort to encourage maritime safety but, alas, it rarely seems to be read or noticed by those who could most benefit from it. Its database of passenger vessel accidents (GISIS) is wholly inadequate, particularly with respect to those accidents occurring in developing countries. It also fails to take any obviously serious interest in the problem of domestic ferry safety in poorer countries. It falls back on the excuse that it is “unable to interfere in the internal affairs of sovereign member nations”. Strictly legally, that claim is correct but given its published mandate, it is exceedingly disappointing that IMO has been unable to imagine ways in which it could work with its poorer member nations to assist them to improve the safety of their domestic ferries.

No doubt more information will be uncovered as a result of further and more intensive reading but this is a broad overview of the literature examined over the three years of this project.
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