

# Some Aspects of Water Transport Accident and Injury Problems in Bangladesh

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**ABSTRACT:** *The inland water transport system of Bangladesh provides naturally suitable and relatively cheaper means of transportation and is being considered as one of the most popular modes for carrying passengers and commodities in the country. However, recent launch accidents resulting in several thousands of injuries (both fatal and non fatal) have created a huge socio-economic impact. In view of the growing concern, a study has been undertaken to collect previous accident and injury data, statistically analyse the injury trends and characteristics and discern an overall situation of water transport accidents and injuries in Bangladesh. It has been found that the numbers of water transport accidents and injuries are increasing quite steadily during the past few years. It was also observed that the fatal injuries constitute a significantly higher percentage of total casualties. The study reveals that passenger vessels and cargo vessels are generating casualties at high rate in comparison to other types of vessels. The annual & hourly distributions of fatalities have also been revealed. In the end the paper highlights the issues regarding the barriers of learning from failure and the need for accident research.*

**Keywords:** Accident, Injury, Pattern analysis, Learning from failure and Accident research

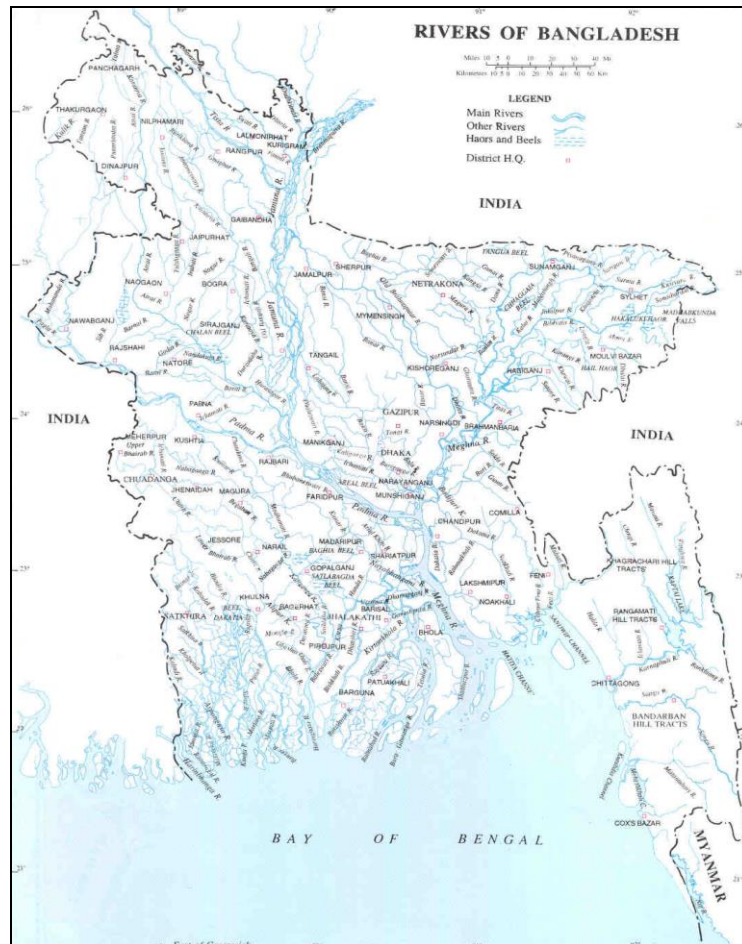
## INTRODUCTION

Bangladesh lies at the apex of the Bay of Bengal and has rivers that come down from the surrounding countries and flow through it. Nearly the whole area of the country consists of low and plain lands. According to Banglapedia (2008) about 7% surface of the country is covered by a dense 24,000-km long network of inland waterways. Three major river systems and their confluence form the world's largest delta here. Bangladesh has about 9,000 sq km of territorial waters with a 720-km long coast line and 20,000 sq km of Economic Resources Zone (ERZ) in the sea. About two-thirds of the land is vulnerable to flooding. Most areas remain under water for two to five months a year. As a result, costs of development and maintenance of roads and railways are high. On the other hand, inland water transport has always been a natural and relatively cheap means of transport in Bangladesh. In certain areas, it is the only mode of transport. Including the country's unclassified routes, the total length of its waterway (700 rivers) is about 13,000 km. Of this, 8,433 km is navigable by larger vessels in the rainy season (5,968 km of which is classified for navigation) while in the dry season about 4,800 km is navigable (classified 3,865 km). Figure 1 illustrates the river network of Bangladesh.

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**Figure 1.** Waterway Network of Bangladesh

The inland shipping industry plays a very significant role in Bangladesh for carrying passengers and goods. It provides naturally suitable and relatively cheaper means of transportation and is being considered as one of the most popular modes for carrying passengers and commodities particularly in the southern districts of the country. In Bangladesh the water transport network is both extensive and well-connected with the rest of the transport system. In terms of traffic intensity, the inland waterway network generates about one and half million passenger-kilometres per route-kilometre of waterway (Bangladesh Economic Review, 2004). The density of inland ports and terminals is high with approximately three and half berthing facilities per one hundred route-kilometres. The density of passenger facilities on the inland waterways is also high at around forty per one hundred route-km. The Government of Bangladesh, therefore, considers inland water transportation as an essential mode of transportation for building a balanced multimodal transport system to confront the upcoming development challenges. However, with the increase in population and the growing economy of the country, the waterways are getting congested as the inland waterways are not expanding significantly. Therefore, problems relating to maritime safety are emerging with new dimensions every day. Like many other countries such as Canada, USA and UK (Marine Occurrences, 2005; Marine Accidents, 2007 and Wang et al, 2005) maritime safety has become a severe issue in Bangladesh when a number of passenger launch accidents killed several thousands of people within the past few years. In response to such emergencies, the government took some remedial measures which by some degree provided noticeable improvement to the safety situation. However, the fact is that accidents are still taking place and often appear to be devastatingly fatal. The

extent of damage and loss of property are tremendously expensive which severely puts substantial amount of burden on the national economy. There yet remain numerous deficiencies on maritime safety and the scope for improvements in this aspect is a contemporary demand.

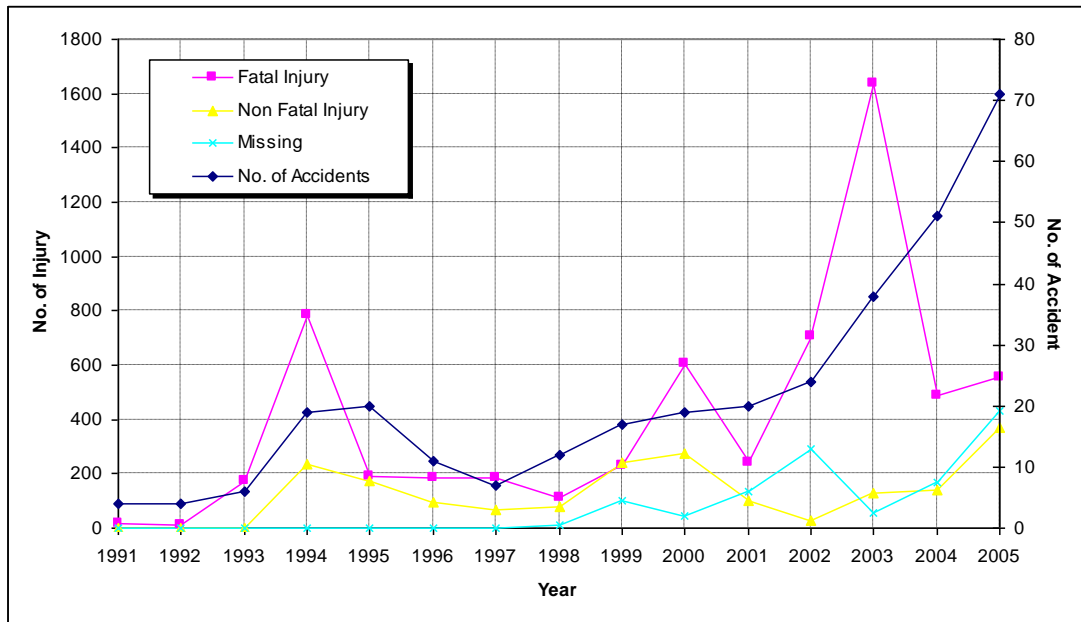
It was observed that due to deficiency in accident data very few studies have so far been conducted on identification of the accident characteristics in a general perspective which could have provided an overall picture of the maritime safety situation. For example, some statistical analysis has been published by Awal, Islam & Hoque (2006) dealt with sixty seven accident cases (passenger ships only) brought some interesting findings to light. It was ominous to note that fifty six percent of the passenger vessel accidents in Bangladesh end up in collision due to human error. The second largest cause was the loss of stability due to Nor'wester and overloading (21%). However, the results were still inconclusive because of insufficient accident data. Similarly another investigation by Awal (2007) in an attempt to identify the accident characteristics dealing with 197 accidents (passenger and cargo ships) showed that majority of the accidents in the inland waterways of Bangladesh occur due to the effect of overloading and/or cyclone (43% of total accidents). However, the conducted research had to deal with very limited amount of data available in usable format. Thereby, the actual number of accidents was much higher than the studied number of accidents.

## **DATA COLLECTION**

The fundamental sources of the accident and injury data were the national daily news papers. Other sources such as reports of Department of Shipping (DOS) and Bangladesh Inland Water Transport Authority (BIWTA) also contributed towards this endeavour. Factual information on accidents and injuries has been extracted from the published reports and subsequent matching with different sources of individual accidents. In this study 327 accidents cases were considered and it was observed from the data sources that DOS and BIWTA store accident data essentially for legal purposes and give more emphasis on the parameters related to legal issues. Therefore, extractions of scientific data from these reports are very much cumbersome, time consuming and in most of the cases impossible. The problem even amplifies in the case of news paper reports which naturally put emphasis of the subjective matters rather than the technical parameters. Therefore, compilation of the database takes a pain staking cross matching with different sources of individual accidents in order to fill in a complete individual accident report.

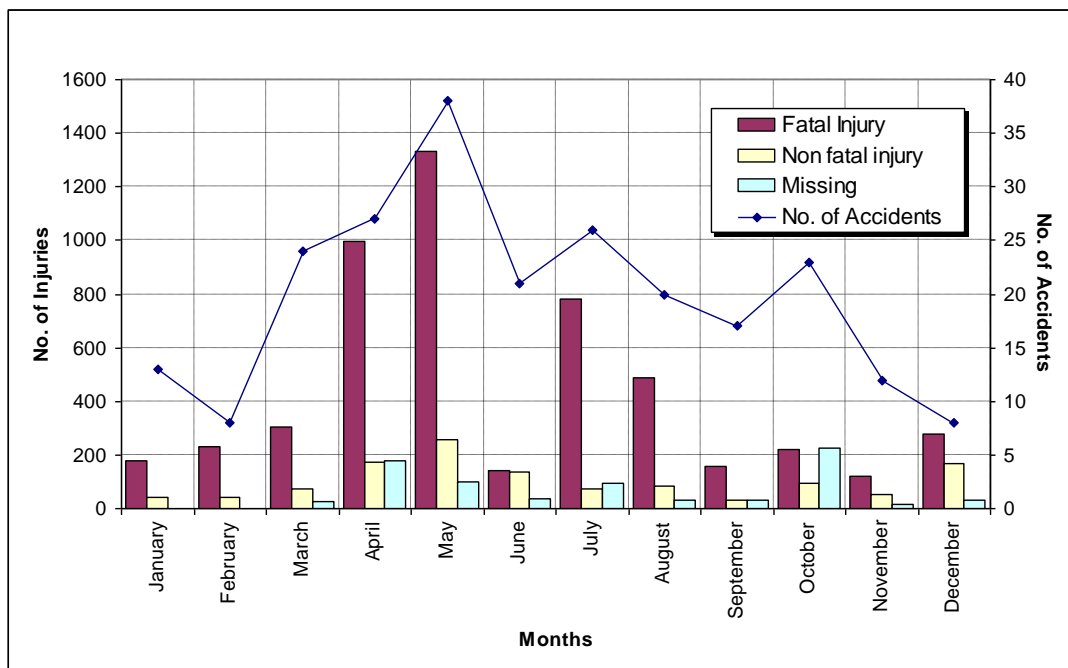
## **ANALYSIS OF ACCIDENTS**

The annual distribution of accidents suggest that the number of accidents have increased significantly over the recent years despite the fact that the annual number of fatal injury fluctuates considerably during the stated period (as shown in Figure 2). During the years 2001 to 2005 the increase on fatal injury and number of accidents are dramatic but non fatal injury and missing remain steady. It is important to mention that these curves represent injury and accident resulting from both formal sector and informal sector. The term formal sector indicates the registered vessels which operate are under the governmental regulations and the informal sector indicates those types of vessels which are not covered by the legislations.



**Figure 2.** Yearly distribution of accidents and injuries

It was observed in this study that the fatal injuries share a significantly higher percentage in the total casualties. Figure 3 reveals the monthly distribution of accidents and injuries occurred in between the years of 1991 to 2005. It is observed that during March to August the accidents and injuries occur at a higher rate than any other months of the years. To state in particular, the fatality is quite high during the months from April & May indicating that the accidents occurred during this period resulted in the highest amount of fatality. Table 1 reveals the quarterly distribution of accidents annually from year 1991 to year 2005. The table shows both number of fatalities and their respective percentages of particular years in four quarters. The 1<sup>st</sup> Quarter is from January to March, 2<sup>nd</sup> Quarter is from April to June, 3<sup>rd</sup> Quarter is from July to September and 4<sup>th</sup> Quarter is from October to December.



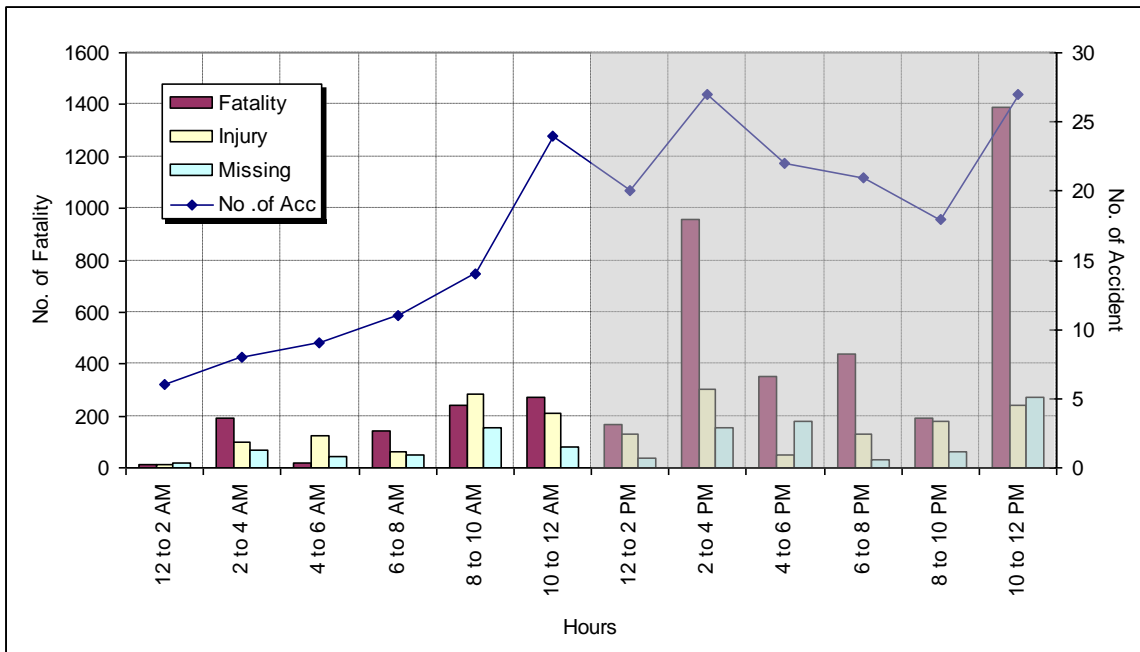
**Figure 3.** Monthly distribution of accidents and injuries

**Table 1. Quarterly distribution of accidents**

Year	1st QUARTER (Jan-Mar)		2nd QUARTER (Apr-Jun)		3rd QUARTER (Jul-Sep)		4th QUARTER (Oct-Dec)		Total	
	Fatality	Percent	Fatality	Percent	Fatality	Percent	Fatality	Percent	Fatality	Percent
1991	13	72.2	0	0.0	4	22.2	1	5.6	18	0.3
1992	0	0.0	2	22.2	7	77.8	0	0.0	9	0.1
1993	82	46.6	0	0.0	0	0.0	94	53.4	176	2.9
1994	0	0.0	37	4.7	474	60.5	272	34.7	783	12.7
1995	5	2.8	49	27.5	112	62.9	12	6.7	178	2.9
1996	110	52.6	46	22.0	53	25.4	0	0.0	209	3.4
1997	0	0.0	24	13.0	160	87.0	0	0.0	184	3.0
1998	60	48.4	47	37.9	0	0.0	17	13.7	124	2.0
1999	22	9.6	90	39.3	18	7.9	99	43.2	229	3.7
2000	46	7.5	366	60.0	17	2.8	181	29.7	610	9.9
2001	29	11.9	81	33.3	11	4.5	122	50.2	243	3.9
2002	10	1.4	679	95.8	17	2.4	3	0.4	709	11.5
2003	135	8.2	839	51.2	656	40.0	8	0.5	1638	26.5
2004	37	7.4	307	61.6	112	22.5	42	8.4	498	8.1
2005	177	31.3	243	43.0	76	13.5	69	12.2	565	9.2
<b>Total</b>	<b>726</b>	<b>11.8</b>	<b>2810</b>	<b>45.5</b>	<b>1717</b>	<b>27.8</b>	<b>920</b>	<b>14.9</b>	<b>6173</b>	<b>100</b>

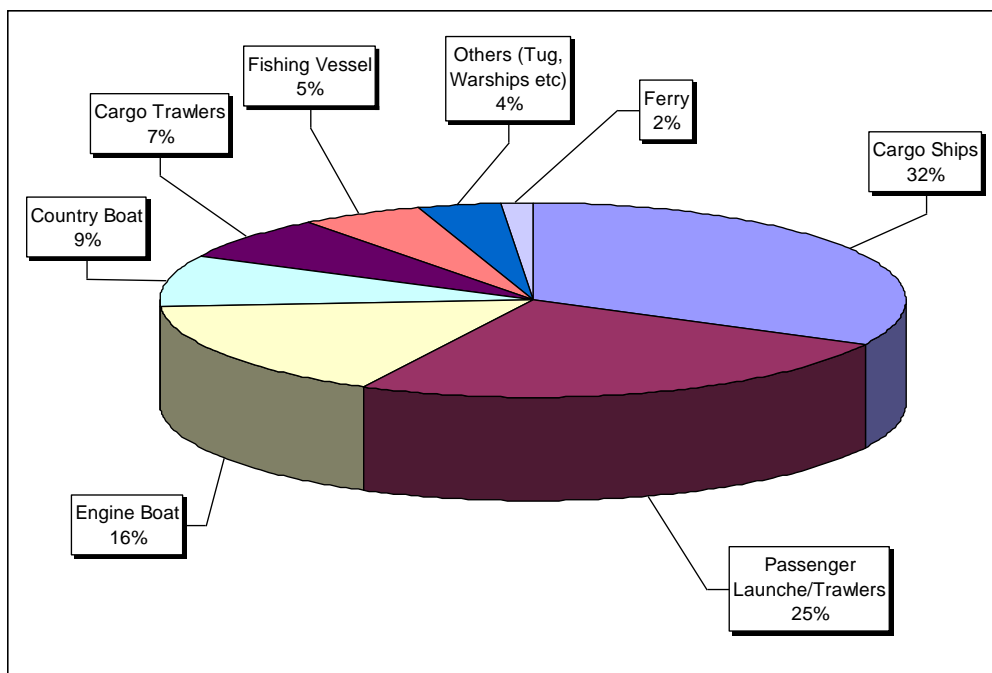
The study on the annual pattern suggests that accidents were occurring at random order during the years 1991 to the years around 2000. Therefore, specific pattern couldn't be established for the stated period. However, in recent years particularly from the year 2002 it is observed that accidents are clustering at particular quarters. During the years 2002 to 2004 over ninety percent of the fatalities have occurred in the 2<sup>nd</sup> and 3<sup>rd</sup> quarter and of these more than fifty percent took place in the 2<sup>nd</sup> quarter alone. However, in 2005, more than 70 percent of the fatalities took place in the 1<sup>st</sup> and 2<sup>nd</sup> quarter. The overall analysis suggests that around 12 percent fatalities occurred in the 1<sup>st</sup> quarter, 45 percent in the 2<sup>nd</sup> quarter, 28 percent in the 3<sup>rd</sup> quarter and 15 percent in the 4<sup>th</sup> quarter.

Further analysis on hourly distribution of accidents suggests that more accidents are taking place during the Post Meridien (PM) period than the Ante Meridien (AM) period. Figure 4 reveals the hourly pattern of the accidents which shows a rising curve of accidents as the day progresses. The figure also reveals two distinct picks of fatalities at 2 to 4 PM and 10 to 12 PM respectively.



**Figure 4.** Hourly distribution of accidents and injuries.

Analysis of vessel involvement in fatalities suggests that passenger vessels and cargo vessels contributing significantly to the total number of fatalities (around 57 percent of the total fatalities). It is indeed very much frightful to notice that cargo vessels are contributing the highest percentage of human casualties where this type of vessels are suppose to transport mostly cargoes and very limited amount of passengers. Therefore, a high percentage of fatality resulting from this type of vessel is indeed a mater of concern. It is important to mention that these cargo ships, passenger launches and others fall under the formal sector and whereas the country boats and the engine boats fall under the category of informal sector. The informal sector is contributing twenty five percent of the total fatalities as shown in the figure.



**Figure 5:** Vessel involvement in fatalities

## **DISCUSSION**

Considering the importance of water transportation system in the context of Bangladesh, pragmatic actions and cost-effective scientific approaches should be taken with due urgency in order to reduce the number injuries and accidents. More in-depth research is fundamentally important in this regard to explore detailed insights into the causation factors and regulatory as well as operational aspects of accidents and injuries for safety improvements. Indeed, it is absolutely vital that necessary lessons are learnt from the failures and being applied appropriately. However, there are certain barriers, which act against learning from the failures, to overcome which are discussed here along with the need for accident research.

### **Barriers to learning from failure**

Accidents often arouse powerful emotions, particularly where they have resulted in death or serious injury. On the positive side, this means everyone's attention can be focused on improving prevention. On the negative side however the same emotions can also cause organisations and individuals to become highly defensive. This is natural and understandable but needs to be addressed positively if a culture of openness and confidence is to be engendered to support a mature approach to learning from accidents and incidents. The most important thing to establish about accidents is not just how they happened but why they were not prevented. Because ultimately everyone at work has some degree of responsibility for safety, a totally 'blame free' approach may not be realistic. Nevertheless, organisations should endeavour to create 'fair' and 'just' cultures in which individuals are not blamed for organisational safety failures over which they have had no control. Some of the major pitfalls in accident investigation include:

- Lack of reporting of accidents and 'near misses' (often due to employee fear of consequences).
- Deficiency in clear procedures for investigation including the absence of professional workforce involvement (e.g. accident specialists, transport specialists, technical personnel and others).
- Failure to gather all the relevant facts (particularly as a result of inadequate approaches to witness interview).
- No use of structured methods to integrate evidence.
- Simply focusing on the errors of individuals and concluding the investigation too early (not going far enough);
- No search for 'root causes'. In that context, no examination of safety management system failures.
- Poor communication of 'lessons learned' and failure to secure closure on resulting recommendations.

### **The need for accident research**

- Accidents are extremely costly in both human and financial terms but, if investigated correctly, they also represent highly valuable safety learning opportunities.
- Effective accident investigations can provide a 'window on reality' (providing a means of discovering what was really going on).

- All relevant organisations need to develop a strong capability to ‘dig deep’ following accidents in order to develop a clear understanding of their immediate and underlying causes.
- Good investigations can provide unique opportunities for achieving, learning and change in the system as well as yielding important lessons which can help prevent recurrence of accidents and incidents

## CONCLUSION

Based on the current research work the following concluding remarks may be drawn:

- Water transport accidents in Bangladesh are taking place recurrently and resulting frightful number of fatalities particularly in the recent years.
- Analyses suggest that fatalities occurring in a clustered pattern at particular months, time of the day and specific type of vessels.
- In order to prevent accidents and injuries cost effectively it is very urgent that lessons learnt from the previous failures are utilised properly.
- Both the government and the concerned industries should recognise and support accident research and utilise the gathered knowledge because accidents are not just “accidents”, rather these are failures of the systems resulting from causes which could be explained scientifically and hence have engineering, technological and behavioural solutions which are could be applied cost effectively to prevent these accidents and fatalities.

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