

ISSUES RELATED TO SAFETY ONBOARD PASSENGER SHIPS

¹VARSA MI ANASTASIA ELENA, ²POPESCU CORINA,
³HANZU-PAZARA RADU IOAN, ⁴DUMITRACHE RAMONA

^{1,2,3,4}Constanta Maritime University, Romania

ABSTRACT

Passenger vessels are the ones that possess the highest risk for the loss of life from all merchant ships sailing every day all over the world. Masters of large passenger vessels have a great responsibility and deserve to be provided with a ship that is 'fit for purpose', one that is able to carry passengers and crew from the point of departure to the destination safely and without damage to the marine environment, and that also includes a well-trained crew from the safety matter point of view.

In this paper, we are trying to develop the subject of crew training and to show that it has an important role in saving passengers' lives and other crew members' lives. We shall also try to draw the attention towards the fact that if something really bad happens to a passenger ship, there are going to be problems in rescuing people on board and here we refer mainly to the passengers because they are the ones completely out of loop in these cases.

Keywords: *passenger ship, safety, crew, training, rescue*

1. INTRODUCTION

The increase in size of large passenger vessels has resulted in a considerable concern being expressed with respect to their watertight integrity and fire fighting protection. In addition, concern has been expressed with respect to the adequacy of life-saving appliances, and the quality and quantity of crews and their training and experience in operating these vessels and dealing with emergency situations, including evacuation.

The structural change in the employment of crews on passenger vessels, largely from agencies, raises serious questions over the ability to fight fire and ensure an orderly evacuation of passengers. While a core crew in both deck and engine, including the officers, are trained to a high level, the bulk of the catering department receive minimalist training, which in our opinion is not enough for a proper reaction in case of an emergency on board.

2. SAFETY ON BOARD PASSENGER SHIPS

Recent development of passenger ships has led to larger and larger vessels with an increasing capacity for carrying people. Modern cruise liners have the capacity of carrying several thousand people on board and even though accidents involving such large passenger ships are rare, if a serious accident should occur, its consequences could be disastrous.

The safety of large passenger ships is thus an increasingly important issue. Some previous catastrophes involving a large number of fatalities on passenger ships are the collision of the Admiral Nakhimov in 1986 (425 fatalities), the capsizing of the Herald of Free Enterprise in 1987 (193 fatalities), the collision and subsequent fire and sinking of the Dona Paz in 1987 (4386 fatalities), the fire on the Scandinavia Star in 1990 (158 fatalities), the foundering of the Estonia in 1994 (852 fatalities) and the fire and subsequent sinking of the Dashun in 1999 (282 fatalities). These are just some examples of major

accidents involving passenger ships, and although all the accidents are characterized by a set of very particular circumstances that lead to the catastrophe, they serve as good examples of the grave consequences that might result from passenger ship accidents.

Safety on board passenger ships is an issue that has been discussed over and over again and it is going to be dealt with even more as these ships have a tendency of becoming larger and larger every day.

Inspections on board these particular ships focus on structural fire safety, proper functioning of all safety systems and equipment including fire fighting systems, lifesaving equipment and other safety systems such as the lifeboats, life rafts and lifejackets in addition to crew training and competence. Additionally, special attention is given to fire and abandon ship drills conducted by the ships' crew, and requires satisfactory operational tests of key equipment such as steering systems, fire pumps and bilge pumps.

All passenger ships have life boats, life rafts and life preservers for every person on board with additional capacity in accordance with international regulation. Safety of Life At Sea Convention (SOLAS) requires that lifeboats be capable of being loaded, launched and manoeuvred away from the ship within 30 minutes of the Master's signal to abandon ship.

Even if all the passengers and seafarers are evacuated from the ship and accommodated in life boats and life rafts, there is still a need to ensure that search and rescue facilities and other vessels that come to their aid are able to assist them. It is therefore suggested that there is a need to establish a maximum number of persons who can be carried on a ship at any time, including passengers and crew, and that the maximum number should depend on operational area and the available search and rescue facilities.

For some time it has been understood that life boats should not be placed more than 14 metres above the water. Most cruise ships delivered in the last few years have been designed in that way. The problems associated

with high sided vessels are well known and were graphically demonstrated during the ESTONIA disaster in 1994.

MS *Estonia* was a cruise ferry built in 1979/80 in Germany. The ship sank in 1994 in the Baltic Sea in one of the worst maritime disasters of the 20th century. It is the deadliest shipwreck disaster to have occurred in the Baltic Sea in peacetime, costing 852 lives. She was carrying 989 people: 803 passengers and 186 crew. Most of the passengers were Scandinavian, while most of the crew members were Estonian. The ship was fully loaded, and was listing slightly to port because of poor cargo distribution.

The casualties had an immense impact on the world concept of ferry safety and led to changes in safety regulations and life raft design much as the *Titanic* disaster did in 1912. However "If you are out to sea, the best lifeboat is the ship itself." New designs, the "citadel concept", once again influenced by *Estonia*, aim to ensure damaged ships have sufficient buoyancy to remain afloat though cost will determine if any are built. SOLAS 90 which came into effect in 2010 specifies existing passenger ships stability requirements and those in North West Europe must also be able to survive 50 centimetres (20 in) of water on the car deck.

Therefore, experience has cast doubt on the adequacy of existing life saving appliances. The current equipment, especially life boats and life rafts, has proved to be inadequate when confronted with high sea states and attention should be given to investigating how modern technology and new designs could improve the survivability of those forced to abandon ship in all sea states.

3. PREVENTING DISASTERS

The key issues associated with large passenger vessels are: collisions and grounding; fire protection; stability and watertight integrity; life-saving appliances, including abandonment and crew training.

In order to analyse the possibility to prevent any collision or grounding situation that may occur we should first admit that in spite of being a significant hazard, construction of these vessels affords better protection than most other ship types. However, this raises significant issues concerning the quality and training and the adequacy of manning, both on the bridge and in the engine room. One solution in this case would be a campaign for adequate manning of bridge and engine room, including at least two officers on duty both on the bridge and in the engine room at all times while the vessel is at sea. And the key aspect here is "at least".

Such vessels are in essence small towns and as such need sufficient operational crew not only to meet routine operational requirements, but also to be able to meet the demands associated with intensive operations. This requires adequate manning levels, not only to prevent fatigue, but also to deal with routine and non-routine operation of the vessel, by responding to emergency situations.

When it comes to stability and watertight integrity, the extrapolation of the rules of construction with respect to large passenger vessels has raised significant

questions over their safety. In particular, on vessels which have been constructed with a shallow draft in order to improve port access and increased number of decks to provide leisure facilities including swimming pools, so reducing the GM. The effects need to be addressed, particularly in adverse weather conditions and when a vessel is turning. The existing standards of the stability and watertight integrity should be maintained and where necessary increased.

In order to provide a proper fire protection the parties involved should take into account the fact that the increased size of compartments, including shopping malls and atriums, increases the potential for the spread of fire. While effective automated systems may reduce the risk of spreading the fire, there is a need for consideration of compartmental size and the adequacy of current fire-fighting arrangements. Research into existing fire protection systems and adequacy of current protection measures should also be encouraged.

Further on, Life-Saving Appliances and Abandonment should be taken into consideration. Lifeboats have increased in size and mass evacuation systems have been developed to meet the increasing number of passengers carried. While regulatory requirements have been met, the adequacy of such systems has increasingly been questioned.

While occasional reference has been made to innovative systems, i.e. escape modules, the lifeboat and life raft have remained unchanged as the main means of evacuation and survival. In this case, research into innovative systems for abandonment adequacy of existing evacuation systems and the compatibility of life-saving appliances and equipment is important as well.

Last but not least, crew training (the human element) plays a very important part from our point of view if not the most important for providing safety onboard passenger ships. And the best solution in this cases it to seek additional training requirement for all personnel on large passenger vessels.

In order to exemplify such preventing measures we should take a look into the latest most discussed by the media and controversial case of *Costa Concordia* passenger ship which sank on 13 January 2012, in calm seas and overcast weather, under command of Captain Francesco Schettino. *Costa Concordia* struck a rock in the Tyrrhenian Sea just off the eastern shore of Isola del Giglio, off the western coast of Italy about 100 km (62 mi) northwest of Rome. This tore a 50 m (160 ft) gash on the port (left) side of her hull, which almost immediately flooded parts of the engine room and caused loss of power to her propulsion and electrical systems.

At its ninety-first session, the Maritime Safety Committee noted with appreciation the progress reports on the ongoing investigation into the loss of the **Costa Concordia** presented by the Government of Italy (MSC 91/7/5 and MSC 91/7/7). The Committee also considered document MSC 91/WP.12 (Secretary-General) which addressed the most urgent management and operational issues upon which the Secretary-General considered the Organization already had enough information to take action.

The following recommendations have been made, notwithstanding that issues related to the human element are at the root of the loss of the Costa Concordia. Nevertheless, following the investigation, Italy considers it appropriate to bring to the notice of the international maritime community its views regarding the growing size of passenger cruise ships and its belief that investigation of issues relating to: mitigating the human contribution factor with education, training and technology; improving day by day the standards of construction, through modern technology; and the need for the maritime community to make the maximum contribution to the related study and consequent technical research should be a priority.

4. CREW TRAINING

The human element (crew members) aspects are essential to the safety of passenger vessels. Therefore, on board these particular vessels there should be an adequate number of suitably qualified and medically fit seafarers who are familiar with their duties and the layout of the particular vessel, who share a common working language (Maritime English) and are adequately rested and not impaired by fatigue. The seafarers should also be able to communicate with the passengers and be able to assist them in emergency situations. The seafarers also should be familiar with the company's safety management policy.

Although used in a slightly different context, a phrase from some British propaganda during World War II neatly sums up the dangers of ineffective communications: 'Careless talk costs lives'. That may be over-dramatic in most cases where communications between seafarers or between ship and shore go awry but it does illustrate the importance of effective communications and the real dangers if they go badly wrong. Communication difficulties often occur in these areas due in part to cultural differences but also due to language 'barriers'. Some examples illustrate these problems.

Such an example is the case of the Scandinavian Star passenger ship fire. A small fire in some bedding spread throughout the ship and 158 people lost their lives. Escape routes were filled with smoke and those unfamiliar with the ship needed the assistance of crew and signage to find their way. The signs were not in a language familiar to those who were passengers on board so proved an ineffective means of providing safety instructions. The officers and many of the crew did not share a common language and the language of the crew was not the same as most of the passengers. Although the fire was not related to poor communications between officers and crew, the poor safety organization on board coupled with the inability of the officers to communicate with all of the crew and the inability of the crew to communicate with the passengers exacerbated the loss of life.

The ship was not under-manned and the officers possessed the necessary qualification and certificates but authorities found that the navigation officers should have had better training in safety matters. They also found that there was a language problem in that many of the

Portuguese had little or no knowledge of English. However the most serious criticism made of the crew is that they never acted as an organised unit and that no real attempt was made to fight the fire. Furthermore it was found that the alarm was only sounded for a short period of time.

The current trend within the industry is for new cruise ships to be larger and to carry an increasing number of passengers, with a larger ship's compliment to cater for their needs. The 1995 SOLAS Conference suggested that the recommendatory time for the evacuation of a Ro-Ro passenger vessel should be within 60 minutes from the abandon-ship signal being given (Conference Resolution No. 4). It is suggested that 30 minutes is more realistic but that means that the crew should be well trained in order to achieve this because they also have to help the passengers who barely know the way around the ship, not to mention the evacuation exits. Also, the crew has to be well trained as far as lowering the life saving equipment is concerned and launching them into the sea.

We, as authors, believe that one of the main problems on board this kind of ships is represented by the crew's training regarding their own and the passengers' safety. In case of an emergency there are only few crew members who will still have a proper training and fast enough reaction and who will try and succeed to assist the passengers.

On board these ships the only well trained crew is represented by the one belonging to the Deck Department. All the others have to learn from somebody belonging to this department (mainly the Safety Officer). He is the one who should properly train the auxiliary crew. This training is mainly done during the first week of the new crew's embarkation. Among this crew there are a lot of people who do not speak or understand English so it is impossible for them to fully understand their responsibilities during an emergency situation as it has been assigned by their Muster List Number. The main thing that they have to understand is that they are responsible not only for their lives but also for the passengers' lives.

Tragic passenger ships disasters in the past have shown the need for improved safety-standards in the cruising industry. Because of the huge numbers of passengers carried on ships at the same time and the unforgivable environment they mostly sail in, small accidents can quickly result in big casualty numbers. An effective crew training and evacuation-procedure should therefore be mandatory.

IMO says that the safety of passenger ships would be improved by increasing surveys and inspections and urges Administrations to conduct or arrange for the conduct of unscheduled inspections of passenger ships in addition to renewal and periodical surveys. It recommends that these inspections should, in particular, address aspects of an operational nature such as familiarization of crew members with their effectiveness in regard to safety procedures, emergency procedures, maintenance, safe manning, working practices, passenger safety, and so on.

In addition, SOLAS amended to require a working language to be established on passenger ships to ensure

effective crew performance in safety matters. Each crew member must be able to understand and, where appropriate, give orders in that language (it is easy to understand that this language should be English). A proper English language used on board passenger ships can also reduce the barriers of good communication between crew members and passengers in case of an emergency, but this is going to happen only if we assume that all the passengers can understand English.

As it is well known, most of the maritime accidents happen due to human errors, these occur especially because of a bad communication as a result of not using the standard maritime English that should be well known by all the crew members of a ship.

Also, IMO states that large passenger ships should be crewed, equipped and have arrangements to ensure the safety of persons on board for survival in the area of operation, taking into account climatic conditions and the availability of SAR functions; large passenger ships should be crewed and equipped to ensure the health safety, medical care and security of persons on board until more specialized assistance is available.

Therefore, on board a passenger ship there should be an emergency plan easy to understand by the crew members who do not have a maritime training and experience and this plan should be easy to explain by the person who does the training. Moreover, the drills should be well conducted and an individual training should also be performed for those who cannot demonstrate proper knowledge of their way around the ship.

The main problem is that the passengers know nothing about a ship and that they have to be guided during an emergency situation by a crew member, so this is why the crew should also be trained to deal with people in such cases. It is well known from previous cases that usually the crew members go into panic too and they completely forget the fact that they also have a responsibility towards the passengers. During an emergency situation on board a large passenger ship, it is very likely that the crew members would try to save their own lives and completely forget about the passengers that they have to take care of.

It is very important that the Safety Officer makes the crew aware about the importance of the drills and trainings. Also, another important matter is that trainings done on board represent the main maritime training that the auxiliary crew has. This is not quite right as far as safety is concerned because in this case the crew members will not have proper maritime safety training and they will not know how to react in case of an emergency. Even if, at the end of the training done by the Safety Officer, in order to pass the exam the crew members have to take a test, this is not a real proof of their training.

If something bad happens to a passenger ship in the middle of the ocean, and an Abandon Ship signal is going to be given, there is also a matter of who is going to rescue almost 3000 people or even more. So, the entire rescue operation lies in the hands of the crew members but with only one condition: first they should have real maritime safety training and last but not least a crowd and crisis management training.

One of the current problems within the cruise ship industry is the high turnover of seafarers. It is not uncommon for the average turnover rate to be between 25% and 35% per year and this has considerable implications for the implementation of the International Safety Management Code (ISM Code) and therefore the safety of the passenger vessel. Special consideration should therefore be given to measures which will make the industry more attractive and thereby reduce such unacceptably high turnover rates. One such measure would undoubtedly be to professionalize many of the positions and functions through the adoption of formal qualifications and certification requirements.

5. CONCLUSIONS

Because passenger ships are larger every year, everybody from the maritime cruise business admits the fact that rescuing people in proper time from a passenger ship that sinks in the middle of the ocean is a problem that has no solution. There is not enough rescuing equipment to react in sufficient time in order to save all the people on board, so the crew members are the ones that have to take care of the passengers until the rescue teams arrive. In order to do that, the crew has to have knowledge about safety on board their ship: emergency exits, lowering life boats and life rafts, position of main Muster Stations and alternative Muster Stations in case the main ones cannot be used, Survival Techniques, Crowd and Crisis Management and so on.

All these can be known only if the crew members pass the exams for Seaman's Book in their native country or they get the training on board their ship. Either way, they have to know what to do in case of an emergency. Otherwise, if a passenger ship is in trouble, we, as authors believe that there will be a lot of casualties, a scenario that can be avoided if the crew members are well and properly trained.

7. REFERENCES

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