

Assessment of Ro-Ro Transportation Services in Ozamiz City, Philippines

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Abstract

Ozamiz City is regarded as the center of commerce and transportation in the province of Misamis Occidental, Northern Mindanao. With the increasing number of operating Ro-Ro in the Port of Ozamiz City, it is important to identify any gap in service quality. Little is known about the five Ro-Ro ferries that sail from Ozamiz City to Mukas in the Municipality of Kolambugan, Lanao del Norte. This paper is an attempt to assess the transportation services of these ferries. A survey questionnaire was administered to 200 adult passengers. The overall findings revealed that the adequacy, schedule adherence, service speed, staff assistance and passenger accessibility, reliability, safety and security, functionality, availability of information, and accommodation are good. However, specific technical dimensions of service quality such as accessibility, cleanliness, and adequacy of toilets, the functionality of walk-through metal detectors, and availability of ferry information online are only average. Schedule adherence is good, but there are instances when delays in departure and arrival time are observed that could be attributed to the use of low-speed old ferries or their repair. The information may serve as input for continuous service improvement to ensure that passengers are well-served.

Keywords: ferries, passengers, safety, shipping, toilet

Introduction

In marine transportation, Ro-Ro is short for “Roll-on Roll-off” ferry, designed to carry wheeled cargoes that are rolled on and off the ferry (Cruz, 2011). As distinguished from the Lo-Lo (Load-on, Load-off), Ro-Ro has cargo ramps and car decks where goods are not lifted by cranes. The Ro-Ro passengers sit on the deck above while the trucks with the cargo are driven into and out of the hold using the ramp. This transport system is a time- and cost-efficient way of moving both the passengers and cargoes (Priadi et al., 2012; Castro, 2011; Boquet, 2012; Danesi et al., 2010).

As an archipelagic country of 7,107 islands, the Philippines has taken advantage of this inter-island transport system allowing quick and less expensive transfer of commodities from one locality to a nearby destination. Basilio (2008) considers the Ro-Ro shipping as a means of linking the islands of the Philippines via the so-called “moving bridges across the oceans”. Due to the country’s geography, maritime transport has been the primary mechanism that moves cargoes between islands (Odchimar & Hanaoka, 2015). From the 2013 data of the National Statistics Office (NSO) on commodity flow, 99.80% commodity trade between regions is made by water and the remaining by air transport (Odchimar & Hanaoka, 2015).

Ro-Ro has been used in the country since the 1970’s, the very first was Millenium Uno from Japan in 1973 that still is sailing the Liloan (Southern Leyte) to Lipata (Surigao) route (Baylon, 2015). The Ro-Ro service was first introduced in the Pan-Philippine Highway established at that time on the eastern side of the archipelago. Pan-Philippine Highway, also known as Maharlika highway, is a network of roads, bridges, ferry services connecting the islands of Luzon, Samar, Leyte, and Mindanao (Odchimar & Hanaoka, 2015).

The government issued the Executive Order (EO) 170 in 2003 to extensively use the Ro-Ro shipping with reduced cost and high efficiency (Asian Development Bank [ADB], 2010). On the same year, the Road-RoRo Terminal System (RRTS) was created. The RRTS is a network of terminals all over the country linked by Ro-Ro to establish connectivity among the various Philippine “island economies”. The

Philippine Ro-Ro network then has three main nautical highways – the Western, Central, and Eastern. The system together with the much older Pan-Philippine Highway is known as the Strong Republic Nautical Highway (ADB, 2010).

Today's Philippine Ro-Ro network differs from the old system regarding user's requirements. There are no cargo handling and wharfage charges, and no anti-carnapping clearance required. The freight is based on lane meter instead of commodity classification (ADB, 2010; Odchimar & Hanaoka, 2015). Changes in the policy also led to the creation of lanes to ensure efficiency at the terminals, covered passenger terminal and waiting areas in the port for safety and comfort of passengers. There is also a quick method available for determining the appropriate lane meter classification of rolling vehicles and cargoes.

The 2005 amendment to the Ro-Ro policy allowed the conversion of private non-commercial ports into commercial ports under the RRTS to expand the country's port system, and to encourage greater opportunity for the private sectors to participate in the system (ADB, 2010). The amendment results in greater competition, reduced costs, improved logistics efficiency, and enhanced regional trade. Both Maritime Industry Authority (MARINA) and Philippine Port Authority govern the country's Ro-Ro system with the majority of regulations defining Ro-Ro operations are issued by them. They are under the Department of Transportation and Communications.

In an impact study of the Ro-Ro network by ADB in 2010, passenger mobility shows that Ro-Ro network has provided its patrons with a highly efficient means of transport. The Ro-Ro shipping lines have been classified based on the criterion of their substitutability to road transport and their role in sustainable transport development (Kotowska, 2015). Impact on cargo mobility shows a rapid growth in cargo volumes in Ro-Ro network. Another advantage of Ro-Ro transport is the high frequency of trips which allows logistics managers to schedule trips daily with little lead time required. Ro-Ro has also reduced the cost logistics with the removal of cargo handling costs and wharfage (Odchimar & Hanaoka, 2015). Moreover, Ro-Ro transport has a good economic impact in places with Ro-Ro capable ports that serve as gateways to facilitate the flow of goods and people. This development

could result in increased investments, production, employment, income, consumption, savings, and more tax revenues for the local government units (ADB, 2010).

However, the impact assessment was mostly done in Western Nautical Highway from 2003 to 2008, and little is known about the Ro-Ro transportation in Mindanao. In particular, there was no assessment of the service quality of five Ro-Ro ferries that sail from 4:00 am to 9:00 pm daily in Ozamiz-Mukas route in Panguil Bay of Misamis Occidental. People choose Ro-Ro to traverse the Northern Mindanao Region in 30 minute-trip from the Port of Ozamiz City to the Port of Mukas in Kolombugan of Lanao Del Norte rather than taking the long-hour land travel. It is therefore paramount to conduct the assessment since Ozamiz City is regarded as the center of commerce, health, education, and transportation (Atienza, 2014) and cargo or passenger traffic is observed.

With the increasing number of operating ferries in the Port of Ozamiz City, it is important to enhance their safety requirements (Papanikolaou & Vassalos, 2001). Aside from safety, the satisfaction with Ro-Ro transport emphasizes technical dimensions of service quality, such as timing and reliability of service (Zuniga et al., 2013). As observed, there are still problems in the Ro-Ro of Ozamiz City with the delays in the transport of cargoes. Miremadi et al. (2011) stressed that any gap in service quality need to be identified as commercial success of a Ro-Ro depends largely on passengers subjective preferences. Passenger satisfaction is, therefore, a key issue (Karayannis et al., 2000).

This paper is an attempt to assess the Ro-Ro transportation services in Ozamiz City with regards to adequacy, schedule adherence, service speed, staff assistance and passenger accessibility, reliability, safety and security, functionality, availability of information, and accommodation. The findings of this study may help the port authority and shipping owners become better informed concerning the service quality of the ferries. The information may serve as input for continuous service improvement to ensure that passengers are well-served.

Materials and Methods

The study utilized the descriptive research design and survey method with the questionnaire as the tool for data gathering. Consent was secured first from the PPA in Ozamiz City and the shipping line that owns the five Ro-Ro ferries. The Port of Ozamiz City is located in the Southern part of the city, nestled at the entrance of the rich Panguil Bay in Northwestern Mindanao. The port has an anchorage depth of 7.1 – 9.1 meters, cargo per depth of 4.9 – 6.1 meters and is regarded as an Open Roadstead Harbor type (Figure 1). Ro-Ro from the Port of Mukas in the Municipality of Kolambugan, Lanao del Norte docks at the arrival area and eventually moves to the departure area when all the passengers and cargoes are disembarked. The port has a ferry terminal near the departure area where passengers going to Mukas wait. The PPA and the Philippine Coast Guard offices are found inside the port. The docking area for ships from Manila and Cebu is different and located adjacent to the departure area of Ro-Ro.

The survey was done in five Ro-Ro ferries sailing from the Port of Ozamiz City to the Port of Mukas with a total of 200 randomly selected respondents (100 men, 100 women) from 425 target population. They are Ro-Ro passengers for at least over a month, which ensures that they have been able to observe the ferry services a couple of times. The sample size was computed using the Raosoft, Inc survey software available online (Raosoft, Inc., 2004) at 95% confidence level, while the total population was based on the estimated average of 85 adult passengers per trip in five one-way trips. The time interval pattern for sampling is 6:00 - 6:30 am, 9:30 - 10:00 am, 11:30 am - 12:00 noon, 3:00 - 3:30 pm and 5:00 - 5:30 pm, respectively for the five ferries. The peak hours observed in the Port of Ozamiz City was considered in the time pattern for sampling.



Figure 1. Map showing the Port of Ozamiz City (with pictures of the port - Source of pictures: google.com – modified by authors) and Port of Mukas in the Municipality of Kolambugan.

The questionnaire used for the survey was developed with inputs from the standards set by the International Maritime Organization (IMO), round-table discussion with the PPA personnel, and from the study of Pantouvakis (2006). The survey questionnaire has a total of 34 items that are regarded as indicators of technical dimensions of service quality. These dimensions are grouped into six sections. Part 1 consists of three indicators of the adequacy, schedule adherence, and service speed. Part 2 has seven indicators of staff assistance and passenger accessibility. Part 3 consists of nine indicators of reliability, safety, and security. Part 4 consists of six indicators of functionality. Part 5 has five indicators of availability of information. Part 6 has four indicators of Ro-Ro accommodation.

The questionnaire was given first to 10 adult passengers within the 17-50 years old age bracket who agreed to do the pretest to determine the external validity of the tool. While completing the survey instrument, the passengers were asked what they think about the questionnaire. They were also observed while answering the survey taking notes which part they would feel hesitant to answer or could commit an error. The results of the presurvey did not indicate any revision to carry out in the questionnaire which means that the items were clear to them and the options in answering were available. The internal validity of the questionnaire was also determined. The Cronbach's alpha was 0.961 indicating an excellent internal consistency.

The respondents were informed of the purpose and scope of the study as well as the anonymity of their identity and responses. The questionnaire was distributed to adult passengers who agreed to participate in the study. Interview with the passengers was also carried out during data gathering.

The responses in the questionnaire were categorized using the five-point Likert scale as follows: 1 – Poor; 2 – Fair; 3 – Average; 4 – Good; 5 – Excellent. The Average Weighted Value (AWV) was computed and interpreted as follows: Excellent (4.20 – 5.00); Good (3.40 – 4.19); Average (2.60 – 3.39); Fair (1.80 – 2.59); Poor (1.00 – 1.79). The corrected sample standard deviation (SD) was computed to determine the coefficient of variation (CV) which was interpreted as the percentage of variability of the responses. The

standard value is at most 10% which assures that the responses are comparable.

Results and Discussion

Adequacy, schedule adherence, and service speed of Ro-Ro

The adequacy, schedule adherence, service speed of Ro-Ro is good (Table 1). The responses of the passengers are comparable. The results imply that the Ro-Ro transportation has met the essential service elements of ferries which include market adequacy, frequency, capacity, adherence to schedule, and service speed (Lorenzo, 1998). The ferry speed is important to determine the success of short-sea shipping lines. In the study of Martell et al. (2014), high performance and speed of Ro-Ro ferries could compete with “all-by-road” transport. Shorter travel time by Ro-Ro, for example, may push the shippers to prefer sea transport over land-travel. The Ro-Ro shipping lines are considered for their substitutability to road transport (Kotowska, 2015).

Table 1. Adequacy, schedule adherence, and service speed of Ro-Ro.

Indicators	Weighted mean	Interpretation
1. Adequacy in the number of Ro-Ro voyaging from Ozamiz to Mukas and Vice-versa	3.70	Good
2. Time departure and arrival of Ro-Ro in the port	3.46	Good
3. Speed of Ro-Ro voyaging from Ozamiz to Mukas and vice versa	3.50	Good
Average Weighted Mean	3.55	Good
SD	0.1286	
CV	3.62%	

When looking into each indicator, the adequacy in the number of Ro-Ro is good allowing people and cargoes from places in Misamis Occidental and other nearby municipalities to cross the Panguil Bay and reach the Lanao area or beyond. In the report of Renwick et al. (2012), the regular operations of Ro-Ro in the Philippines provide the inter-island transport not only of passengers but also cargoes particularly the agricultural commodities. Since Ro-Ro began operations in the

Philippines, the agricultural network has been linking the food chains from production centers of Mindanao to the consumer markets of Luzon (ADB, 2010). The Ro-Ro could be important to the economic and social prosperity of a remote island like Ozamiz City which is also a coastal area as Laird (2012) emphasized. However, effective and efficient intraregional transport remains an issue to address that require a policy review (Renwick et al., 2012). There are still times when the long line of vehicles in the Port of Ozamiz City is observed due to cargo congestion particularly during the peak hours from noon to 2 pm. Hence, more ferries are needed to avoid transport delay. A similar situation has prompted the port authority in Tacloban to call for more ferries to transport hundreds of vehicles that have formed more than a kilometer-long queue (Calleja, 2013).

Also, the departure and arrival time of Ro-Ro in the Port of Ozamiz City was rated good. The findings may indicate that the ferry schedules offer wide options for commuters to travel at their most convenient time. Few passengers would catch up the first trip at 4:00 am to transact business at early hours in Cagayan de Oro City so they could still catch up the 9:00 pm last trip and be able to arrive home on the same day. With the schedule of Ro-Ro ferries, commuter students from Lanao and nearby places also could still catch their early classes in Ozamiz City and go home on the same day. There are residents in the city who work in Lanao, and the Ro-Ro early trip helps them sustain their jobs. According to Laird (2012), the hours of operation in ferries should not be reduced below that of the working day. However, there are instances when delays in departure and arrival time are observed that could be attributed to the use of low-speed old ferries or their repair.

The time interval for Ro-Ro to depart from the Port of Ozamiz City is 30 minutes giving time for the passengers to move in and out, and for the cargoes to roll on or roll off. Ro-Ro ferries are regarded as the most convenient ships to be used in short sea shipping because they have smaller dwell times in port (Morales-Fusco et al., 2010). However, in a study in India, the waiting period for the next Ro-Ro service is a major constraint hindering the trailer operators in using the ferry (Andrews, 2015). As noted in this study, the interval time between trips

sometimes could go beyond the expected 30-minute period in instances of severe weather, late ferry arrival, or maintenance and repair.

The speed of Ro-Ro was also rated good. According to the Philippine Ports Authority (2008), the 20-30 minute voyage is not too long to avoid boredom among the passengers. An average of 30-minute per port passage indicates a mean speed of 40 knots which is similar to the truck travel time (Martell et al., 2014). Optimization of speed may also reduce fuel cost and environmental emissions (Hvattum et al., 2013). As observed in this present study, the old Ro-Ro ferries are relatively slower than the new ones which could attribute to delay in travel resulting in passenger congestion. The adequacy, schedule adherence, service speed of Ro-Ro ferries could still be improved by providing new high-speed ferries to accommodate more passengers and to ensure the timely departure and arrival.

Staff assistance and passenger accessibility in Ro-Ro

Based on the findings, staff assistance and passenger accessibility in Ro-Ro are good (Table 2). The ratings of the passengers were comparable. However, looking into the individual indicators, accessibility of toilets in Ro-Ro has an average rating. While the ferries comply the provision of separate comfort rooms for male and female, the passengers find it uncomfortable to walk from the waiting area to use the facility while the ferry is sailing. Kristensen and Hagemester (2011) stress that provision of toilets is a necessary service of Ro-Ro ferries and adequate space for this service that is easily accessible to passengers is essential.

According to Pantouvakis (2006), frequent travelers require more assistance and politeness from the shipping personnel. As observed during this survey, the ferry's personnel are available and willing to assist the passengers. The contact personnel are also polite. However, staff assistance has to be enhanced for people with a disability or limited mobility.

Table 2. Staff assistance and passenger accessibility in Ro-Ro.

Indicators	Weighted mean	Interpretation
1. Availability of ferry’s personnel and willingness to assist	3.36	Good
2. Promptness of services and assistance to passengers	3.62	Good
3. Politeness of ferry’s contact personnel (coast guard, port employees, etc.)	3.55	Good
4. Accessibility to the main entrance of the ferry	3.75	Good
5. Accessibility of toilets	3.34	Average
6. Quantity and quality of waiting facilities	3.49	Good
7. Quantity and quality of communication lines	3.43	Good
Average Weighted Mean	3.50	Good
SD	0.1468	
CV	4.19%	

About the passenger access to the main entrance, two sides in Ro-Ro ferries are provided with stairs where the passengers could move up to stay in the waiting area. Accessibility to the Ro-Ro ferry has to be improved by providing mechanisms for passengers in the wheelchair.

A spacious cabin with seats can accommodate the passengers who opt to wait in an air-conditioned area inside the Ro-Ro ferry. The passengers can also stay outside the cabin in natural ventilation with available seats while waiting for the ferry to reach the port. The size of passengers’ area depends on the type and length of operation. For short distance ferries like the Ro-Ro, space is similar to waiting rooms unlike the bigger cabins in cruise-like ferries (Nurwahyudy, 2014). The passengers’ area of one Ro-Ro ferry in this study is not air-conditioned which needs improvement. Regarding the communication in Ro-Ro, the ferries have an intercom system for transmitting or receiving information to ensure the safety of passengers.

Reliability, safety, and security in Ro-Ro

About the reliability, safety, and security in Ro-Ro ferries, Table 3 shows an overall good service quality but the functionality of walk-through metal detectors has an average rating only. The responses of the passengers were comparable. Based on the interview with the

passengers, there is a certain degree of doubt whether the metal detector would genuinely track down firearms or other metallic weapon carried by passengers. Despite their uncertainty, they are still willing to take the risk of the Ro-Ro transport. Ferries are potential targets for terrorist attacks and providing a functional walk-through metal detector in Ro-Ro ports before the passengers are allowed to go up the ferry helps reduce the possible risk.

Table 3. Reliability, safety, and security in Ro-Ro.

Indicators	Weighted mean	Interpretation
1. Reliability and credibility of inspection procedures	3.55	Good
2. Functionality of walk-through metal detectors	3.39	Average
3. Safety of baggage and cargoes	3.50	Good
4. Safety of passengers	3.59	Good
5. Availability of fire extinguishers and other emergency equipment	3.71	Good
6. Availability of life-saving equipment	3.76	Good
7. Availability of first aid kits	3.50	Good
8. Security and surveillance of the ferry	3.47	Good
9. Provision of amenities to people with disabilities, pregnant women, and senior citizens	3.51	Good
Average Weighted Mean	3.55	Good
SD	0.1171	
CV	3.30%	

It can be recalled that at around 4:00 o'clock on February 25, 2000, bombs exploded in two passenger buses on board the Ro-Ro few minutes before the ferry reached the Port of Ozamiz City killing many people including children (Medina, 2010). The bombings were reportedly associated with attacks of some members of a Mindanao-based terrorist group (De La Cruz, 2003). During that time, the passengers were allowed to stay inside the bus while on board the ferry. The bombing incident that time was difficult to prevent because the bombs were hidden inside the bus and the inspection was not thorough. After the incident, the passengers are no longer allowed to stay in the cargo area or inside the bus or any vehicle while on travel for safety

reason. This policy has been implemented since the Ro-Ro bomb explosions (Aravilla, 2000).

Due to that tragic incident, the inspection procedures at present are improved. Passengers are mandated to leave the bus and walk through a metal detector before they are allowed to enter the Ro-Ro ferry while the security force conducts a thorough visual inspection inside the bus giving more attention to the bags left. The finding of this present study suggests that the reliability and credibility of inspection procedures are good after amending the old procedures giving enough time for the security force to inspect the bus. The passengers would then stay in the waiting area and allowed to ride the bus when the Ro-Ro is about to dock.

According to Gundić and Frančić (2014), Ro-Ro is the most competitive type of ferry from the economic standpoint due to its capability to carry various kinds of cargoes, but there could be a fair number of problems that can occur with regards to safety and security (Papanikolaou & Eliopoulou, 2001). Hence, high standards and regulations are needed for safe and secure navigation (Gagatsia, 2007).

Ro-Ro ferry has a different design that can cause the occurrence of possible hazards (Gundić & Frančić, 2014). The large space for cargoes allows for the rapid spread of flames in case of fire and the level of complexity in fire is due to the cargoes and passengers carried onboard. The IMO recommends the implementation of the improved fire safety requirements for Ro-Ro such as providing fixed fire extinguishing system in closed spaces, smoke detection system, firehose, and using steel or equivalent material for the ferry (Nurwahyudy, 2014). In this study, fire extinguishers, fire hoses, smoke detectors in Ro-Ro were noticed.

The high superstructure also represents a challenge for the use of safety equipment (Gundić & Frančić, 2014; Nurwahyudy, 2014). There is a high risk for example when launching lifeboats from a more elevated platform. The SOLAS (Safety of Life at Sea) Convention which provides the standards for the safe navigation of ships (Wilson, 2015) requires that Ro-Ro ferry must be equipped with Fast Rescue Boat in case of rapid sinking (Gundić & Frančić, 2014). The IMO also requires the adequate number of liferafts and lifejackets for passengers

and crew (Nurwahyudy, 2014). In this study, lifeboats, rafts (inflatable and rigid type), life rings, lifeline, and other life-saving appliances are available and adequate in number. The boats are secured with wire which is used to lower the amenity when abandoning the ferry in case of emergency. Lifejackets are also placed in cabinets inside the passenger cabin and in the ship's bridge that are ready to access during emergency situations. The cabinets are labeled to make the passengers aware where to grab the lifejacket. Instructions how to use the lifejacket are visible which complies with the IMO regulations. There was an incident in one of the trips from Ozamiz City to Mukas when a passenger of a Ro-Ro ferry jumped into the sea which prompted the Major Patrol to turn the ferry around to rescue the passenger. The ferry personnel then threw a life ring for the man who eventually used it to save his life.

The IMO also requires the Ro-Ro to provide medical advice, initial medical assistance, or medical evacuation. Apart from the list of medical contents for an Emergency Medical Kit/Bag, medical considerations for the use of the kit are stipulated by the Maritime Safety Committee (International Maritime Organization [IMO], 2002). Among the guidelines, the First Aid Kit has to be portable with essential medicines and equipment to cope with the medical emergency on the spot. The kit should be kept securely, appropriately labeled, and maintained by the Major Patrol of the Ro-Ro. These ferries are not normally carrying medical doctors, but the Major Patrol can call a medical doctor present among the passengers. While waiting for the doctor to arrive, the Ro-Ro personnel must provide the first-aid care to the injured passenger. This study shows that medical kits are available in Ro-Ro ferries in compliance with the requirements of the IMO.

The IMO also stressed that spaces in Ro-Ro ferries require monitoring such as television surveillance to observe any undue movement of vehicles or cargoes in adverse weather, fire, flooding, or access by unauthorized passengers while the ferry is underway (IMO, 1997). The video surveillance or closed-circuit television (CCTV) can help detect potential threats and control adverse situations (Husain, 2014). As observed in this study, surveillance cameras were mounted inside the Ro-Ro ferries, but further technological development

can guarantee the high level of safety and security in maritime transportation (Felsenstein et al., 2013).

Also, the IMO requires the shipping companies to make available seating areas for the elderly and disabled, including space for wheelchairs (IMO, 1989). Amenities for people with disabilities, pregnant women, and senior citizens in Ro-Ro are needed because their mobility is limited by the presence of physical barriers such as stairs and narrow corridors. As observed in this study, the first row of seats in the passenger cabin is reserved for people with limited mobility. Problems may arise in the use of personal wheelchairs in Ro-Ro sailing from Ozamiz to Mukas or vice-versa because elevators are not available. There is a need to look into this issue to improve the service quality in Ro-Ro.

Functionality in Ro-Ro

The assessment rating on the functionality in Ro-Ro is shown in Table 4. This technical dimension is good, and the responses of the passengers are comparable. However, when looking into each indicator, the cleanliness and adequacy of toilets have an average rating only. One of the necessities in Ro-Ro ferries is a functional and clean toilet. This technical dimension, often, receives the low rating from costumers due to bad smell (Baylon, 2015), dirty toilet seats, floors, walls, and surfaces (Deng, 2013), nonfunctional flushes, and inadequate toiletries. Sometimes instead of automatic flush, the passenger would use the pail to fetch water to flush the toilet increasing the risk of bacterial spread when proper handwashing is not done (Sabra, 2013; De Alwis et al., 2012). These problems with toilets were also noticed in this study. Passengers would fall in line before being able to use the toilet because there is only one toilet for each gender. The shipping companies have to improve their services with toilets.

About other indicators, assistance in luggage loading and unloading could be availed from porters ready to carry heavy baggage with pay. However, it has been observed that the need for porters to do the manual labor has declined because most passengers in Ro-Ro carry small baggage while traveling.

Table 4. Functionality in Ro-Ro.

Indicators	Weighted mean	Interpretation
1. Assistance in luggage loading and unloading	3.42	Good
2. Lighting system inside the ferry	3.72	Good
3. Maintenance of cleanliness on board	3.60	Good
4. Organization and orderliness of waiting areas	3.70	Good
5. Cleanliness and adequacy of toilets	3.37	Average
6. Garbage disposal	3.71	Good
Average Weighted Mean	3.58	Good
SD	0.1554	
CV	4.33%	

The lighting system inside the ferry is good based on the result of this study. Areas of the Ro-Ro used for loading or unloading are illuminated. No broken or defective lights were observed. However, few portions of the ferries are not adequately and appropriately lighted. In ships, no operation is permitted to commence or continue if lighting is insufficient (International Labour Organization, 1996). Adequate lighting in Ro-Ro can also prevent the occurrence of accidents in sea at night. Nevertheless, the Ro-Ro ferries in this study have navigational lights that are turned on from sunset to sunrise and during daylight hours of restricted visibility. Day shapes are also visible during daytime. The port sidelight (left) is red while the starboard side (right) is green.

The maintenance of cleanliness on board is done by the janitor. Sweeping and mopping are done while the ferry is docking. Air freshener may help improve the smell of the passenger cabin which is a common issue during the last hours of the ferries schedule.

The waiting areas are organized with an adequate number of seats to accommodate all the passengers. A spacious air-conditioned cabin provides comfort to the passengers. In most Ro-Ro ferries in this study, tables are provided inside the cabin where the passengers could use when eating. The passengers can also stay outside the cabin in natural ventilation with available seats. Vendors who are usually selling peanuts and fish crackers are allowed to board on the ferry which is convenient for the passengers while waiting for the Ro-Ro to dock.

With the 30-minute voyage, passenger comfort in the waiting areas is necessary (Nurwahyudy, 2014).

Waste segregation is implemented in Ro-Ro with the use of bins with different colors for the specific types of garbage (food waste, paper, plastic). There is full compliance with the proper solid waste disposal system similar to the findings of Sarinas et al. (2014). However, compliance among passengers is another issue because they tend to throw their garbage in wrong bins as observed.

Availability of Ro-Ro information

Table 5 shows the assessment rating on the availability of information in Ro-Ro ferries. The overall rating of this dimension is good, and the responses of the passengers are comparable. However, when looking into each indicator, online availability of ferry information obtains only an average rating. The shipping line that owns the Ro-Ro ferries in Ozamiz City does not have a website for the passengers to access the ferry information online. In the age of digital economy, shipping companies can add value to clients through their websites (Fan & Tsai, 2014). Creating a website for the Ro-Ro transport can enhance travel efficiency among the passengers.

Table 5. Availability of Ro-Ro information.

Indicators	Weighted mean	Interpretation
1. Availability of ferry's signages	3.53	Good
2. Adequacy and efficiency of information signs on board	3.62	Good
3. Provision of arrival and departure information	3.64	Good
4. Promptness to inform passengers of the status of sea trip (arrival, departures, etc.)	3.54	Good
5. Availability of ferry information online	3.38	Average
Average Weighted Mean	3.54	Good
SD	0.1026	
CV	2.90%	

In this study, various signages in Ro-Ro were observed. Signages for no smoking, fire exit, fire extinguishers, life rings, emergency escape route, electrical danger or hazard, toilets, area for disabled passengers are visible. Signage is important to resolve any language barrier despite displaying information with English as the common language. Winbow (2002) documented a fire in a ship that caused loss of many lives due to ineffective means of providing safety instructions. During the incident, escape routes were filled with smoke, and most of the passengers were unfamiliar with the ship, so they needed signage to find their way. However, the signs were not in a language familiar to the passengers exacerbating the loss of life in that incident. Safety amenities such as lifejackets and life rings as observed in this present study are also labeled to determine their location for easy access in case of emergency situation. Information regarding the use of these amenities is available.

The alarm system is also installed in Ro-Ro to signal the arrival and departure of the ferries in the Port of Ozamiz City. The ferry's horn will blow three long blasts to signal the arrival of the Ro-Ro while the two long blasts signal its departure from the port. Fire alarms are also installed in Ro-Ro. The fire alarm will sound like a continuous ringing of ferry's electrical bell or continuous sounding of its horn. The different types of audible and visual alarm systems are installed in Ro-Ro especially to notify the crew on board of any dangerous situation that can arise during the voyage (Wankhede, 2014).

The crew may also broadcast announcement or instruction using the intercom system of the Ro-Ro. The language used is "Cebuano" to convey critical guidance. The communication skills of crew should be sufficient to assist passengers during emergency situations taking into account the language in which emergency announcements may be broadcast (Winbow, 2002). Hence, information schemes will greatly enhance the safe navigation.

Accommodation in Ro-Ro

The accommodation in Ro-Ro is good (Table 6) and the responses of the passengers are comparable. Seats inside and outside the cabin are adequate and comfortable. The cabin also has a refreshment store selling bread, crackers, other convenience foods,

coffee, and various cold drinks. Provision of food during the voyage is indeed a basic necessity for travelers. In India, a recommendation was emphasized for Ro-Ro ferries to provide a refreshment store to reduce the boredom of drivers for instance (Andrews, 2015). However, it was noted during the survey that the retail price of food and beverages in Ro-Ro is a way up higher than the usual price. A reasonable price may be an add-on to the service quality of Ro-Ro ferries in Ozamiz City.

Table 6. Accommodation in Ro-Ro.

Indicators	Weighted mean	Interpretation
1. Adequacy of seats	3.66	Good
2. Comfortableness of passenger seats	3.80	Good
3. Availability of food and drinks	3.77	Good
4. Availability of power source for charging gadgets	3.42	Good
Average Weighted Mean	3.66	Good
SD	0.1725	
CV	4.71%	

Ro-Ro passengers can charge their gadgets in power outlets installed inside the cabin. The ferry has a generator that supplies the electric power (Tsekouras et al., 2014; Valkeejärvi, 2006). However, the outlets are limited in number but can cater those few passengers with drained battery in their cellphones. For a short distance trip, Ro-Ro passengers need adequate and comfortable seats, food and drinks, and outlets for charging gadgets. The air-conditioned cabin may also have provided comfort to passengers.

Overall assessment of Ro-Ro transportation services

The passengers have the highest rating for accommodation suggesting a better satisfaction on this dimension among other services (Figure 2). The passengers gave the lowest rating to staff assistance and passenger accessibility. The functionality in the ferries is rated second to accommodation. The respondents have similar ratings for adequacy, adherence schedule, service speed, reliability, safety, and security.

Their rating for availability of information is relatively higher than the dimension with the lowest rating.

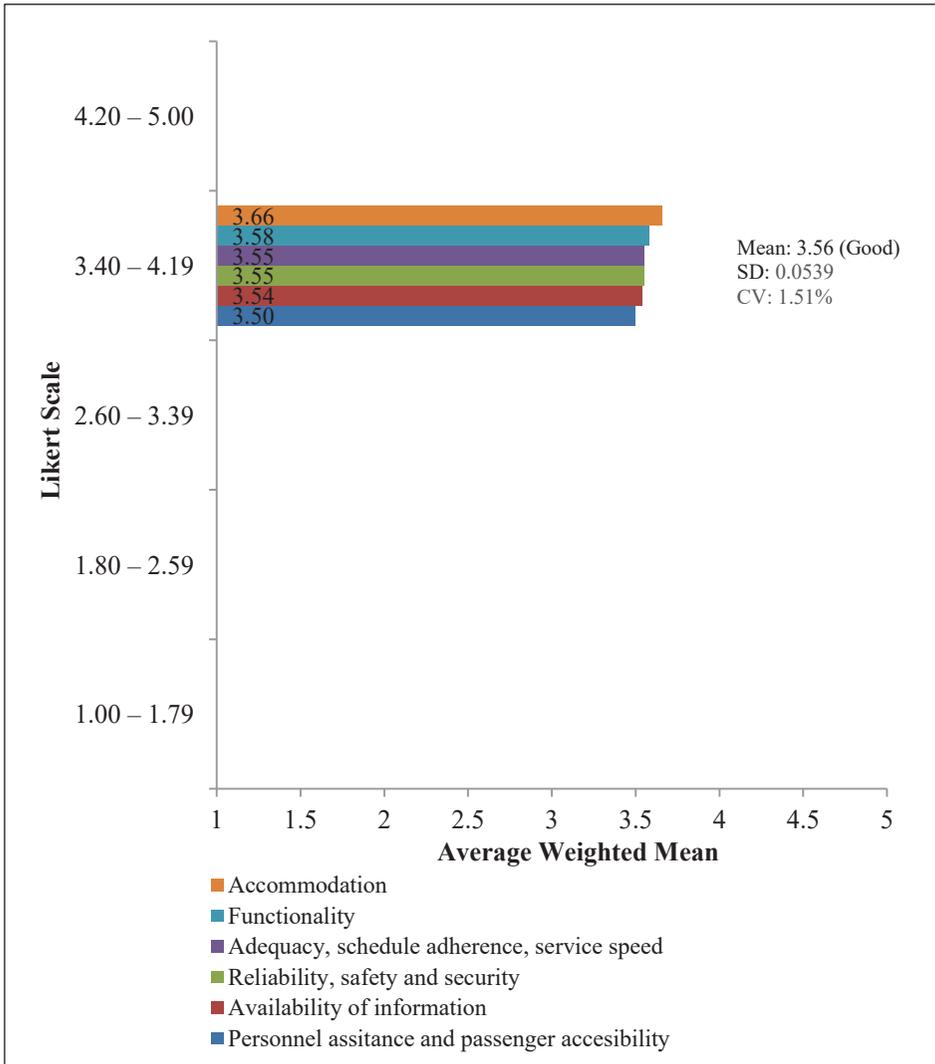


Figure 2. Overall assessment rating of Ro-Ro transportation services in Ozamiz City.

Despite variation in the numerical ratings, the overall assessment of Ro-Ro transportation regarding service quality is good, and the responses of the passengers are comparable. Identifying the gap in service quality based on the passenger's subjective preferences can help improve the services of Ro-Ro ferries (Miremadi et al., 2011) to primarily ensure the safety in navigation (Papanikolaou & Vassalos, 2001). The results of this study could help the PPA, and the shipping lines formulate an effective development plan to ensure that passengers are well-served.

Conclusion and Recommendations

The Ro-Ro transportation services in Ozamiz City are good with regard to adequacy, schedule adherence, service speed, staff assistance and passenger accessibility, reliability, safety and security, functionality, availability of information, and accommodation. However, improvement in the service quality of Ro-Ro is still a challenge to the port authority and shipping lines to offer excellent service to the passengers.

The PPA in Ozamiz City and the shipping owners may use the findings of this study as basis to enhance the Ro-Ro services. More attention has to be given to improving the ferry toilet by making its accessibility easy and by upgrading the materials with regular maintenance. Walk-through metal detectors have to be upgraded to ensure the safety and security of passengers. Developing a website for ferry information can enhance travel efficiency. Low-speed old ferries have to be replaced. There is also a need for more ferries to accommodate the increasing number of passengers in Ozamiz City and nearby places.

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Literature Cited

- Andrews, G. (2015). *Performance & prospects of roll-on/roll-off service: A study with special reference to Cochin Port Trust* (Doctoral dissertation). Indian Maritime University, India.
- Aravilla, J. (2000, April 15). NBI arrests suspect in Ozamiz ferry bombing. *Philippine Star Global*. Retrieved from <http://www.philstar.com/headlines/87614/nbi-arrests-suspect-ozamiz-ferry-bombing>
- Asian Development Bank. (2010). Bridges across oceans: Initial impact assessment of the Philippines nautical highway system and lessons for Southeast Asia. Retrieved from <https://think-asia.org/bitstream/handle/11540/1050/bridgesoceans.pdf?sequence=1>
- Atienza, R. P. (2014). Credit card usage pattern in Ozamiz City, Philippines. *Journal of Multidisciplinary Studies*, 3(1), 60-85. doi: <http://dx.doi.org/10.7828/jmds.v3i1.626>
- Basilio, E. L. (2008). Linking the Philippine islands through highways of the sea. *Center for Research and Communication Foundation Inc., Pasig City, Philippines*.
- Baylon, M. (2015, February 14). When RORO reigned supreme. *Philippine Ship Spotter's Society*. Retrieved from <https://psssonline.wordpress.com/2015/02/14/when-ro-ro-reigned-supreme/>
- Boquet, Y. (2012). Moving around the Philippines: Challenges and dynamics of inter- island transportation in a developing country. Paper presented at Hong Kong Society for Transportation Studies (HKSTS) Conference, Hongkong (pp.29-36).

- Calleja, N. (2013, November 15). Port authority calls for more ferries to transport long line of vehicles to Tacloban. *Inquirer.Net*. Retrieved from <http://newsinfo.inquirer.net/527901/port-authority-calls-for-more-ferries-to-transport-long-line-of-vehicles-to-tacloban>
- Castro, J. T. (2011). Establishing the Mindanao intermodal logistics network: Gateways and corridors. Paper presented at the Proceedings of the Eastern Asia Society for Transportation Studies (pp. 132-132). Vietnam: Eastern Asia Society for Transportation Studies.
- Cruz, N. H. (2011, April 28). All you want to know about the new Ro-Ro ports. *Inquirer.net*. Retrieved from <http://opinion.inquirer.net/4706/all-you-want-to-know-about-the-new-ro-ro-ports>
- Danesi, A., Farina, A., & Lupi, M. (2010). A comparative analysis of Lo-Lo and Ro-Ro short sea shipping networks in Italy. Paper presented at the Proceedings of International Conference on Information and Communication Technologies, Jeju, South Korea (pp. 27-28). Institute of Electrical and Electronics Engineers.
- De Alwis, W. R., Pakirisamy, P., Wai San, L., & Xiaofen, E. C. (2012). A study on hand contamination and hand washing practices among medical students. *International Scholarly Research Notices Public Health*, 2012(1-6). doi: 10.5402/2012/251483
- De La Cruz, L. (2003, February 27). Victims of Ozamiz ship blast still cry for justice. *Philippine Star Global*. Retrieved from <http://www.nation/196938/victims-ozamis-ship-blast-still-cry-justice>
- Deng, D. (2013). Fall 2013 facilities and services customer satisfaction survey results. Office of Institutional Analysis, New Mexico University. Retrieved from http://hr.nmsu.edu/ofs/wp-content/uploads/sites/57/2013/11/FS-Survey-2013_w_o_Comments.pdf

- Fan, W. S., & Tsai, M. C. (2010). Factors driving website success—the key role of Internet customisation and the influence of website design quality and Internet marketing strategy. *Total Quality Management, 21*(11), 1141-1159. doi: <http://dx.doi.org/10.1080/14783363.2010.529335>
- Felsenstein, C., Benedict, K., & Baldauf, M. (2013). Maritime safety and security challenges—3d simulation based training. *TransNav: International Journal on Marine Navigation and Safety of Sea Transportation, 7*(3), 327-336. doi: 10.12716/1001.07.03.02
- Gagatsia, E. (2007). Review of maritime transport safety and security practices and compliance levels: Case studies in Europe and South East Asia. Paper presented at the European Conference of Transport Research Institutes, Young Researchers Seminar (pp. 1-14).
- Gundić, A., & Frančić, V. (2014). Particularity of safety measures on board ships operating in the “Motorways of the Sea” service. *Pomorstvo: Scientific Journal of Maritime Research, 28*(1), 70-79.
- Husain, A. S. (2014). Potential threat to ship and port security-case study. *International Society of Ocean, Mechanical and Aerospace Scientists and Engineers, 1*, 93-96.
- Hvattum, L. M., Norstad, I., Fagerholt, K., & Laporte, G. (2013). Analysis of an exact algorithm for the vessel speed optimization problem. *Networks, 62*(2), 132-135. doi: 10.1002/net.21503
- International Labour Organization. (1996). Accident prevention on board ship at sea and in port, 1-150. Geneva, Switzerland. Retrieved from http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/normativeinstrument/wcms_107798.pdf

- International Maritime Organization. (1989). Access to marine passenger terminals for elderly and disabled passengers. *Fal.5 Circ. 3*, 1-10 Retrieved from <http://www.imo.org/en/OurWork/Facilitation/docs/FAL%20related%20nonmandatory%20instruments/FAL.5-Circ.3.pdf>
- International Maritime Organization. (1997). IMO and ro-ro safety. *Focus on IMO*, 1-29. Retrieved from <http://www.imo.org/en/OurWork/Safety/Regulations/Documents/RORO.pdf>
- International Maritime Organization. (2002). List of contents of the emergency medical kit/bag and medical consideration for its use on Ro-Ro passenger ships not normally carrying a medical doctor. Retrieved from <http://www.imo.org/en/OurWork/Safety/RadioCommunicationsAndSearchAndRescue/SearchAndRescue/Documents/ MSC.1-Circ.1042>
- Karayannis, T., Papanikolaou, A., & Molland, A. F. (2000, April). The introduction of high-speed ferries into the eastern mediterranean. Paper presented at the International Congress of International Maritime Association (pp. 1-11).
- Kotowska, I. (2015). The role of ferry and ro-ro shipping in sustainable development of transport. *Review of Economic Perspectives*, 15(1), 35-48. doi: <https://doi.org/10.1515/revecp-2015-0010>
- Kristensen, H. O. H., & Hagemester, C. (2011). Environmental performance evaluation of ro-ro passenger ferry transportation. *Trafikdage på Aalborg Universitet 2011*, 1-12.
- Laird, J. J. (2012). Valuing the quality of strategic ferry services to remote communities. *Research in Transportation Business & Management*, 4, 97-103. doi: <https://doi.org/10.1016/j.rtbm.2012.06.013>

- Lorenzo, E. (1998). The domestic shipping industry of the Philippines: A situation report. *Maritime Industry Authority*, 1-17. Retrieved from <http://marinaph.freehostia.com/report/domestic/domestic98.pdf>
- Martell, H., Martínez, J. E., & de Oses, X. M. (2014). Speeds & capacities necessity of boats for improve the competitiveness of the short-sea-shipping in West Europe respecting the marine environment. *Journal of Maritime Research*, 10(2), 65-76.
- Medina, M. (2010, February 24). Remembering the heroes of the Daima tragedy. *Misamis News Digest*. Retrieved from <http://micmed19.blogspot.com/2010/02/remembering-heroes-of-daima-tragedy.html#.WcoAVFN97Dc>
- Miremadi, A., Ghalamkari, S., & Sadeh, F. (2011). Customer satisfaction in port industry (A case study of Iranian shipping). Paper presented at 2011 International Conference on Sociality and Economics Development, Singapore (pp. 58-62). Singapore: International Association of Computer Science and Information technology.
- Morales-Fusco, P., Sauri, S., & Spuch, B. (2010). Quality indicators and capacity calculation for ro-ro terminals. *Transportation Planning and Technology*, 33(8), 695-717. doi: <http://dx.doi.org/10.1080/081060.2010.527179>
- Nurwahyudy, A. (2014). *Contemporary issues in domestic ro-ro passenger ferry operation in developing countries: Identification of safety issues in domestic ferry operation based on accident investigation reports on ferry involved accidents in Indonesian waters, 2003-2013* (Doctoral dissertation). World Maritime University, Sweden.

- Odchimar, A. I., & Hanaoka, S. (2015). Intermodal road-ro-ro transport in the Philippines, its development and position in the domestic shipping. *Journal of the Eastern Asia Society for Transportation Studies*, 11(0), 739-759. doi: <http://doi.org/10.11175/easts.11.739>
- Pantouvakis, A. (2006). Port-service quality dimensions and passenger profiles: An exploratory examination and analysis. *Maritime Economics & Logistics*, 8(4), 402-418. doi: <https://doi.org/10.1057/palgrave.mel.9100167>
- Papanikolaou, A., & Eliopoulou, E. (2001, October). The European passenger car ferry fleet—review of design features and stability characteristics of pre-and post solas 90 ro-ro passenger ships. Paper presented at Euroconference on Passenger Ship Design, Construction, Safety and Operation, Anissaras-Crete (pp. 1-14).
- Papanikolaou, A., & Vassalos, D. (2001, June). Enhanced safety requirements for European ro-ro passenger ships: The Stockholm agreement: Past, present and future. Paper presented at the Proceeding of the Second International Conference on Safety of Maritime Transport, Chios, Greece (pp. 1-28).
- Philippine Ports Authority. (2008). Port Management Office of Iligan. Retrieved from http://www.ppa.com.ph/iligan/Revised/Iligan_Priv-Daima.htm
- Priadi, A. A., Tjahjono, T., & Benabdelhafid, A. (2012). Assessing safety of ferry routes by ferry handling model through ahp and fuzzy approach. *Intelligent Information Management*, 4(05), 277-283. doi: <http://dx.doi.org/10.4236/iim.2012.425039>
- Raosoft, Inc. (2004). Sample Size Calculator. Retrieved from <http://www.raosoft.com/samplesize.html>

- Renwick, S., Stewart, R., & Howai, N. (2012). Intra-regional transport for agricultural commodities: A regional public good. AGBU 6002: International Trade and Marketing. Retrieved from [http://www.uwispace.sta.uwi.edu/dspace/bitstream/handle/2139/12631/Intra - Regional% 20 Transport% 20for% 20Agricultural%20Commodities%20a%20regional%20public%20 good.pdf?sequenc=1](http://www.uwispace.sta.uwi.edu/dspace/bitstream/handle/2139/12631/Intra%20Regional%20Transport%20for%20Agricultural%20Commodities%20a%20regional%20public%20good.pdf?sequenc=1)
- Sabra, S. M. M. (2013). Bacterial public health hazard in the public female restrooms at Taif, KSA. *Middle-East Journal of Scientific Research*, 14(14), 63-68. doi: 10.5829/idosi.mejsr.2013.14.1.7326
- Sarinas, B. G. S., Docto, D. O., Dumaiicos, M. B., & Flores, J. R. P. (2014). Solid waste management: Compliance, practices, destination and impact among merchant vessels docking in Iloilo ports, Philippines. *Journal of Maritime Research*, 9(2), 73-76.
- Tsekouras, G. J., Kanellos, F. D., & Prousalidis, J. (2014). Simplified method for the assessment of ship electric power systems operation cost reduction from energy storage and renewable energy sources integration. *Institute of Engineering and Technology Electrical Systems in Transportation*, 5(2), 61-69. doi: 10.1049/iet-est.2013.0011
- Valkeejärvi, K. (2006). The ship's electrical network, engine control and automation. *Gallois Magazine [Online]*, 3(1).
- Wankhede, A. (2014). Different types of alarms in ships. Marine Insight. *In Marine Safety*. Retrieved from <https://www.marineinsight.com/marine-safety/different-types-of-alarms-on-ship/>
- Wilson, B. (2015). Five maritime security developments that will resonate for a generation. *Harvard National Security Journal Online*, 1-10. Retrieved from <https://ssrn.com/abstract=2810593>

Winbow, A. (2002, March). The importance of effective communication. Paper presented at International Seminar on Maritime English, Istanbul, Turkey (pp. 20-22). Istanbul, Turkey: Istanbul Technical University.

Zuniga, K., Baird, C., Burgess, S., Clark, R., Heckel, S., Stanley, H., ... & Webster, K. (2013, October). "Would you; could you; on a boat?" Wait-time and travel-time activities during river ferry journeys and their relationship to overall satisfaction in Brisbane Queensland. Paper presented at Australasian Transport Research Forum 2013 Proceedings, Brisbane, Queensland (pp. 1-19). Brisbane, Australia: Department of Infrastructure and Regional Development.