

APPLICATION OF PASSAGE PLAN TO AVOID SHIP AGROUND IN BARITO RIVER: Case Study on KM. Fleet Fresh

Septria Kumoro Jati ^{1*}, Iskandar ², Indah Nurhidayati ³

^{1,2,3} Nautical Study Program, Semarang Maritime Polytechnic

*Email: septriya09@gmail.com

(Received: 13-08-2024; Reviewed: 30-08-2024; Revised: 28-11-2024; Accepted: 14-04-2025; Published: 20-05-2025)

ABSTRACT

In the world of shipping, passage plans play an important role in improving the efficiency and safety of ship operations when sailing, so that narrow shipping channels are very useful because there are many dangerous areas of navigation in these areas. Ship incidents are often caused by external factors such as weather and track conditions, as well as human error in the operation of the ship. The passage plan is the most common strategy that aims to direct ships from one location to another safely, quickly, and efficiently. This study, entitled "Application of Passage Plan to Avoid Stranded Ships on the Barito River: A Case Study on KM. Armada Segara," uses a qualitative descriptive method with data collected through observation, interviews, documentation, and literature studies. The results of the study show that the implementation of a passage plan can reduce the risk of hazards during the voyage, although challenges such as equipment damage and weather uncertainty remain. So that it can be concluded in this study, before the start of the voyage, it is good to plan a good voyage and implement the passage plan according to the steps that have been set so that a safe voyage to the destination is created.

Keywords: Ship Stranding, External and Internal Factors, Implementation of Passage Plan.

INTRODUCTION

Study This focus on the interior areas of Indonesia, which require transportation to support the economy and cooperation between regions. Transportation by sea, like a ship, according to Samekto, et al. (2019) is an effective solution because it can transport goods and people at low cost. However, access to area waters interior often difficult because track narrow passage and varying depths. Ships are not always suitable for all types of waters, such as the Barito River, which can potentially cause accidents such as ships sinking, colliding, or running aground. Therefore, a passage plan is very important to guide ships and prevent navigation hazards in narrow channels.

According to (Song, 2021; Hafita (2022) a narrow shipping lane is a route used by ships before reaching a dock or port in an inland area. The waters in this shipping lane are usually narrow, and ships sailing in the lane must stay as close as possible to the outer boundary of the shipping lane or the shipping water on the right side of the hull, as long as it is safe and can be done properly because in a narrow shipping lane, apart from being busy with ship activity, there are many navigation obstacles such as shallow waters, coral, shipwrecks, and other navigation hazards. This allows ships to run aground and collide with each other.

Writer do observation with sailing on the course cruise narrow Barito River. The Barito River in Banjarmasin is one of the areas with quite a lot of ship activity, making it possible for ship collisions to occur because many types of ships pass through the narrow channel area (Huang et al., 2020), including merchant ships, tugboats pulling barges, and other ships that carry out activities along the Barito River channel (Purwitasari et al., 2024). Around the river there are also shipwrecks and many areas that are still shallow Because not yet done dredging in the area the lack of attention from officer deck to condition the can cause boat run aground.

According to Rachman, et al (2024) passage plan is an important element in maintaining navigational safety that is used to guide safe travel along a shipping route. A passage plan is used from the beginning to the end of a ship's voyage, including when docking at the destination port. In connection with benefit making a passage plan for guide exercise safe movement along the shipping route, the impact of not making a passage plan /shipping route, the shipping will not be possible to run smoothly because most likely the ship will move without direction, this can cause ship accidents, either in the form of a ship running aground, collision, leaks due to hitting a reef or other navigational hazards. This is all the result of a lack of planning in the implementation of shipping, so that it can cause losses in the form of material and loss of life that is not small.

The implementation of a good passage plan needs to be carried out considering the many dangers that exist at sea and in narrow shipping lanes (Huntington et al., 2015). There are also stages in a shipping design/ passage plan, namely appraisal or assessment covering all relevant information for shipping (Yu et al., 2021), planning or planning in shipping (Song, 2021), execution or implementation (Katana, 2017; Katana et al., 2016; Song, 2021), evaluation or route that has been determined in the previous stage (Vettor et al., 2020), monitoring or supervision so that the ship sails safely (Hetherington et al., 2006), efficiently and effectively (Teoh, 2022).

KM. Armada Segara namely the fleet of places writer carry out research. The fleet is a type of container ship that has sea transportation services from Jakarta-Banjarmasin and Jakarta-Batam. The route that is the focus of the research is the route from Jakarta-Banjarmasin, the author focuses on the narrow shipping lane of the Barito River Banjarmasin . Traveling on the narrow shipping lane of the Barito River is often encountered with navigation obstacles such as ship accidents due to the busy activity of ships in the channel, around the river there are also many navigation hazards such as shallow waters and shipwrecks. The complex conditions in the area cause obstacles or accidents during navigation, thus requiring more attention from sailors, especially deck officers , to the entry buoy and guide beacon. The use of checklists related to the shipping and navigation plan also needs to be considered by the Captain and his crew in order to avoid navigation hazards in the channel.

Ship Runs Aground

A ship running aground is one of the shipping accidents or failures when the ship is maneuvering. Meanwhile, according to Law No. 17 (2008) concerning Shipping, Article 245, a ship accident is an incident experienced by a ship that can threaten the safety of the ship and human lives, such as a ship sinking, colliding, and running aground. The existence of factors external like condition geographical area , and weather , internal error factors from party executor exercise motion ships that can cause shipping accidents that harm many parties involved. The definition of a ship accident according to the Maritime Glossary / Maritime Dictionary is an event that results in.

Narrow Shipping Channel

Narrow channels are waters that are limited by navigational hazards and are used to direct ships to inland ports, such as rivers. The calmness of the channel and harbor basin is important to reduce the impact of waves and currents. Navigation in narrow channels requires high alertness and the use of navigational aids such as sea signs and signal lights. Capt. Agus Hadi Purwantomo recommend for reduce speed, sailing in the middle of the channel, taking care when overtaking vessels, and using safe speeds in populated areas. Maritime regulations, including the P2TL Regulations and COLREG, govern navigation to prevent collisions and ensure clear communication between vessels.

Passage Plan

Passage Plan, according to SOLAS Chapter V ANNEX 24 (1974), is the planning of a ship's voyage for a comfortable, expeditious and effective journey. According to Huda (2021), it involves determining the position, course and strategy of the voyage to ensure safety and efficiency. Good planning helps reduce the risk of accidents by allowing deck officers to plan arrival times, fuel requirements and logistics. Passage plans are prepared by the second mate, with implementation under the responsibility of the master. The planning process includes four stages: Appraisal: Gathering

information and assessing risks. Planning: Developing ideal steps. Execution: Carrying out the plan taking into account conditions such as weather. Monitoring: Monitoring position boat throughout route. Surveillance using standard methods such as flat navigation, astronomy, and electronics is essential. Documentation of sea practices on KM. Armada Segara is also a reference.

Characteristics of the Barito River

This study discusses the characteristics of the narrow shipping channel in the Barito River from OB to Trisakti Port, Banjarmasin, along 41 km, which is traveled by the KM. Armada Segara ship in 5-6 hours at a speed of 5.5 knots. The main characteristics include. an average depth of 7-8 m, up to 13 m at Trisakti Port. Channel Width and Length: 600 m wide and 909 miles long. Tidal The channel can only be passed during the highest tide for about 6 hours. Basic Morphology: The riverbed is flat with a slope of 0.12% to 0.89%, with rapid sedimentation despite annual dredging. Navigation Reference: Ships must follow navigation signs and buoys. These characteristics are important for the safety and efficiency of shipping in the narrow channel of the Barito River.

Characteristics of KM. Armada Segara

KM. Armada Segara is a European-designed container ship for transporting standard containers. Characteristics maneuver boat includes :

- a. Maneuver : The ship must follow the cruise plan and pay attention to the environment. When the engine stops and the rudder is in the middle , the ship tend move to right .
- b. Maneuvers in Waters Narrow : The pilot/ skipper and deck officer must consider the shape of the ship, engine, propeller, and draft, especially in the Barito River.

METHOD

The research method used is descriptive qualitative. This research was conducted on KM. Armada Segara on August 19, 2022 to August 20, 2023. This ship is owned by PT. Salam Pasific Indonesia Lines. The data sources for this research are primary data and secondary data collected from data collection techniques including observation, interviews, literature studies and documentation. The informants for this research are the Captain, First Officer, and Second Officer. Research This analyzed with *Grounded Theory* and validated through triangulation. In an effort to confirm the accuracy of the data, triangulation was employed in this study. Researchers seek to get a more complete and accurate picture of the phenomenon they are studying by contrasting information from documentation and literature reviews with the findings of direct observation.

By gathering information from many sources (such as interviews, observations, and documents) and applying multiple techniques (such as content analysis and comparison), triangulation is a methodology used to assess the veracity of data. Researchers might boost their confidence in their findings by comparing these data.

RESULTS AND DISCUSSION

On Friday, December 2, 2022, at 14.10 WITA, the ship KM. Armada Segara ran aground in a narrow channel of the Barito River east of Kaget Island moment avoid the barge that was towed by the tug boat. The ship came out from passage plan route and difficulties maneuver Because low speed , bad weather, and difficulty in detecting the barge. The tilt of the ship due to wind and waves made the rudder inoperative, causing the ship to run aground in shallow waters with a depth of 5.8 meters, while the ship's draft was 6.4 meters. The ship's speed dropped to 2.9 knots. The second officer forgot to provide important information about the shallow area. After waiting for several hours, the ship was able to move again at high tide at 18.00 WITA and docked at Tri Sakti Port for loading and unloading.

Factors That Cause Ships to Run Aground

External factors covering weather Bad weather, regional conditions, and the geographical shape of the waters affect the safety of ships and cargo, and risks can be reduced with good preparation. Weather factors from the wind at that time showed 30-35 knots and the ship's tilt of 20 degrees caused the KM. Armada Segara ship to run aground in the narrow channel of the Barito River. Characteristics of the Barito River with The average depth of 7 m and rapid sedimentation of silt, as well as the channel width of 600 m, affect the maneuvering of ships which must pay attention to the tides and crowds.



Figure 1. The ship KM. Armada Segara ran aground

Source:

<https://youtu.be/7wv81p5gPBI?si=rXYFXdV-fFZ9znvi> (2022)



Figure 2. Echosounder when the KM. Armada Segara Ship Runs Aground

Source: Personal Documentation (2022)



Figure 3. Location of the KM. Armada Segara Ship Grounded

Source: Personal Documentation (2022)



Figure 4. Safety Meeting Time when the Ship Runs Aground

Source: Personal Documentation (2022)

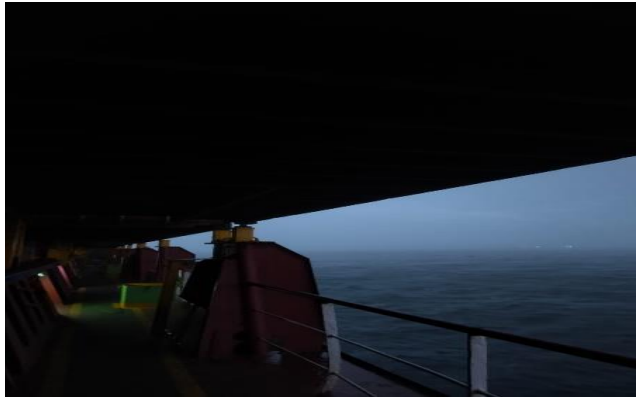


Figure 5. Weather when the KM. Armada Segara
Ship Ran Aground
Source: Own Documentation (2022)



Figure 6. The Crowds of the Barito River
Source: Personal Documentation (2022)

Internal factors involve activities and elements within the ship that can be controlled. First, human/crew factors can be seen when making *the Passage Plan*, errors and lack of hazard markings on the passage plan contributed to the ship running aground. Then, the action taken by the Captain, lack of attention to water conditions when avoiding barges, caused the ship to pass through shallow areas, causing the ship to run aground. Lack of crew coordination, lack of coordination between the second mate and the land side caused the unavailability of supporting equipment and important information. Lack of Navigation Equipment like lacks ECDIS and Radar does not functioning optimally, also contributed to the ship running aground.

The Adverse Impact of a Ship Running aground



Picture 7. Dented Section in *Bulbous Bow*
Source: Personal Documentation (2022)

The accident of the KM. Armada Segara ship in the Barito River caused serious impacts, namely, Crew Losses which include Crew Safety Risk of life being threatened if the ship runs aground until the ship sinks because the rescue equipment does not guarantee immediate safety. Then condition Decrease physical and potential psychological trauma due to increased guard hours and heavy supervisory duties.

Besides that loss condition boat damage bulbous bow section dented because collision repair quickly needed. Losses to the Company and Consumers due to the delay in the arrival of the cargo loaded on the ship at that time. In addition, the Company PT. SPIL experienced financial losses from ship repairs and damage to the ship's keel. And consumers delay delivery goods cause loss consequence schedule determined by the consumer become messy due to the delay in the load.

Implementation of a Good *Passage Plan* to Avoid Ships Running aground on the Narrow Shipping Lane of the Barito River

Implementing a good passage plan is very important for safe and efficient sailing. The second mate prepares a sailing plan with the captain's approval (Adityatjahja, 2022). The benefits include a detailed and on-route sailing plan, estimated arrival times and fuel and logistics requirements, early response to weather changes and navigational hazards, marking navigational hazards to avoid dangerous areas, ensuring the keel distance of the ship with base sea (UKC) and take into account draft changes due to mass types of water (FWA and DWA). And there are four aspects in making a passage plan including first Appraisal by collecting relevant information, second planning by planning a safe route, third Execution by carry out plan, fourth Monitoring with monitor cruise For ensure conformity track.

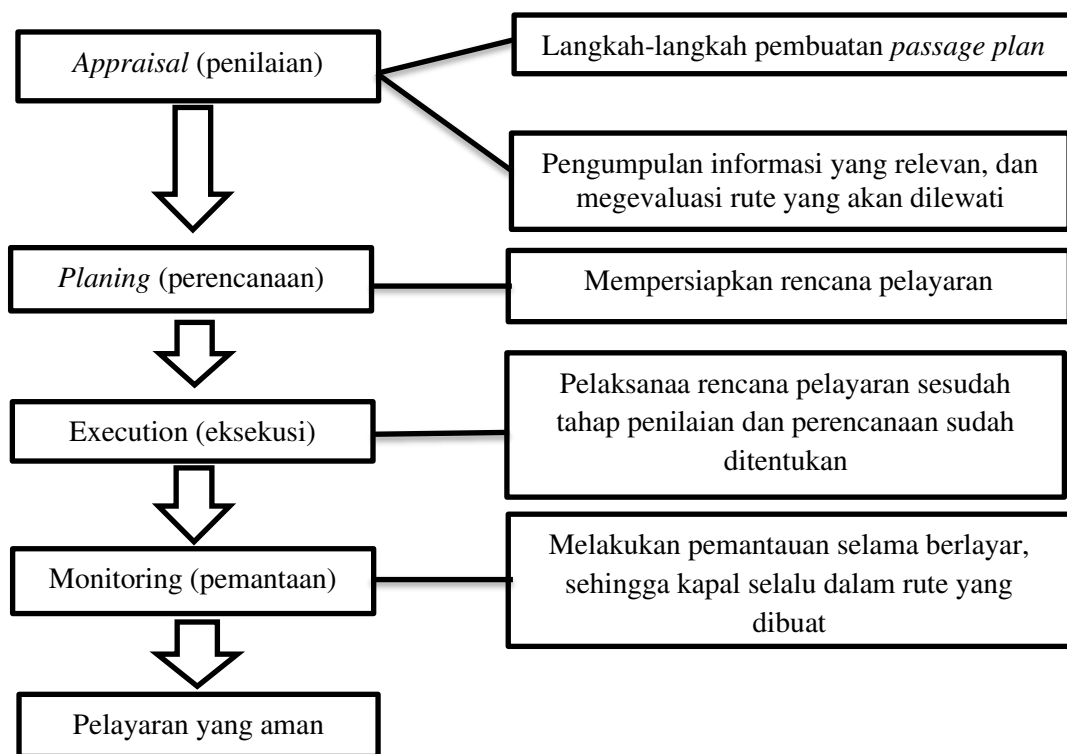


Figure 8. *Passage Plan Creation Stage Section*
Source: Personal Documentation (2022)

Here is a summary of the creation of a passage plan and things to consider when sailing on the Barito River. The creation of a Passage Plan includes an appraisal discussion of sailing strategies and gathering information to evaluate risks and hazards on the route. Planning the second mate plans the route by marking hazards on the map and determining safe distances, routes, and emergency actions. Execution The Captain adjusts the plan based on weather and logistics, and estimates the time of arrival

(ETA) at a safe speed. Monitoring position boat throughout route with navigation methods and updating navigation publications (Hermawan et al., 2020).

Things to watch out for on the Barito River are: Crew Responsibilities Reporting to the Port VTS, monitor danger, guard light navigation, and pay attention to the depth and ebb and flow of water, then the need to apply the rules when sailing in narrow shipping lanes According to the P2TL Rules (Andromeda et al., 2023). Rule 9 Sailing close to the edge of the channel, small vessels do not obstruct large vessels, and vessels behind give signals when in doubt. Rule 6: Monitor ship speed and maintain a safe distance. Rule 19: Adjust speed and direction when visibility is limited (Mustain & Herlina, 2024). Rules 34d and 34e: Give sound signals when in doubt or approaching a bend. Then the navigation signal turns on the navigation lights and pays attention sign danger as well as flare guide for avoid stranded.

CONCLUSION

Based on the discussion study this , writer conclude that the implementation of the passage plan is very important For avoid ship grounded in the Barito River. Ship grounding occurs due to two main factors: external, such as dense ship activity in narrow channels, shallow waters, and bad weather, and internal, including inadequate navigation equipment, out-of-date maps and publications, and lack of evaluation of accident-prone areas. The impacts of ship grounding include losses to ships, companies, and consumers, with damage to ships due to hitting hard structures, repair costs borne by companies, and delays in delivery that are detrimental to consumers. Therefore that , the author emphasize the need implementing a good passage plan with attention specifically on navigational hazards and compliance with shipping regulations in the narrow channels of the Barito River.

REFERENCES

- Adityatjahja, A. (2022). Tanggung jawab nahkoda dalam pengangkutan barang melalui laut. *Jurnal Sains Teknologi Transportasi Maritim*, 4(1), 22–27.
- Andromeda, V. F., Mustain, I., & Herlina, Y. (2023). Pengembangan Simulasi Lampu Navigasi Berbasis Machine Learning Yang Merupakan Pemanfaatan Materi Ajar Dari Youtube Pada Pembahasan Colregs Rule. *Jurnal Sains Dan Teknologi Maritim*, 24(1), 19–30.
- Hafita, yuniar ayu. (2022). *alur pelayaran sempit*. 23(September), 41–52.
- Hermawan, C. M., Anwar, M. S., & Junius, E. (2020). Peningkatan Pemahaman Para Mualim Terhadap Penggunaan Ecdis Guna Menunjang Keselamatan Pelayaran. *Jurnal Sains Teknologi Transportasi Maritim*, 2(1), 36–42.
- Hetherington, C., Flin, R., & Mearns, K. (2006). Safety in shipping: The human element. *Journal of Safety Research*, 37(4), 401–411.
- Huang, Y., Chen, L., Chen, P., Negenborn, R. R., & Van Gelder, P. (2020). Ship collision avoidance methods: State-of-the-art. *Safety Science*, 121, 451–473.
- Huntington, H. P., Daniel, R., Hartsig, A., Harun, K., Heiman, M., Meehan, R., Noongwook, G., Pearson, L., Prior-Parks, M., & Robards, M. (2015). Vessels, risks, and rules: Planning for safe shipping in Bering Strait. *Marine Policy*, 51, 119–127.
- Katana, E. L. (2017). *Determinants of strategy execution in Shipping Companies in Kenya*. JKUAT-COHRED.
- Katana, E. L., Waiganjo, E. W., & Mugambi, F. M. (2016). Influence of organizational resources on strategy execution in shipping companies in Kenya. *European Journal of Business and Management*, 8(33), 50–58.
- Mustain, I., & Herlina, Y. (2024). Development Navigation Light for Tugboat Prototype Based on Arduino. *Journal of Maritime Research: JMR*, 21(2), 411–418.

-
- Perkapalan, J. T., Teknologi, I., Tama, A., Jl, A., Rachman, A., & Timur, J. (2024). *Optimalisasi Passage Planning Pada Electronic Chart Display and Information System Guna Meningkatkan Keselamatan Pelayaran (Studi Kasus Psv Anggrek 601) Sulthan Shalahuddin Anhar atau dapat disebut dengan passage plan . Hal ini bertujuan agar meminimalis*. 3(1).
- Purwitasari, D., Artana, K. B., Handani, D. W., & Ardiansyah, K. E. Z. (2024). Determining The Causation Probability of Ship Collision in the Barito River Using Fault Tree analysis (FTA) & Bayesian Network Modelling. *IOP Conference Series: Earth and Environmental Science*, 1423(1), 12012.
- Samekto, P. A., & Pujiastuti, R. R. (2019). Pemanfaatan Transportasi Laut Untuk Meningkatkan Pertumbuhan Sektor Pariwisata. *Jurnal Sains Dan Teknologi Maritim*, 19(2), 151–164. <https://doi.org/10.33556/jstm.v19i2.204>
- Song, D. (2021). A literature review, container shipping supply chain: Planning problems and research opportunities. *Logistics*, 5(2), 41.
- Teoh, S. Y. (2022). Improving shipping efficiency industry-led consortium blockchain smart contract. *Journal of Global Information Management (JGIM)*, 30(1), 1–32.
- Vettor, R., Szłapczyńska, J., Szłapczyński, R., Tycholiz, W., & Soares, C. G. (2020). Towards improving optimised ship weather routing. *Polish Maritime Research*, 27, 60–69.
- Yu, H., Fang, Z., Fu, X., Liu, J., & Chen, J. (2021). Literature review on emission control-based ship voyage optimization. *Transportation Research Part D: Transport and Environment*, 93, 102768.