SUNG WON CHO

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Education

Korea University — Seoul, Republic of Korea
Ph.D. in Industrial Management Engineering — *Mar. 2016 – Aug. 2021*

- Integrated Master and Ph.D. Program
- Thesis: Intelligent planning for advanced operations in container terminals

Korea Aerospace University — Gyeonggi-do, Republic of Korea
B.S. in Logistics — *Mar. 2011 – Feb. 2016*

Experience

Dankook University — Cheonan, Republic of Korea
Assistant Professor — *Sep. 2023 – Present*

- Taught courses in Operations Research (OR), Supply Chain Management (SCM) and Simulation Applications within the Department of Management Engineering at Dankook University
- Conducted research on the optimization of intelligent logistics and transportation systems

Korea Research Institute of Ships & Ocean Engineering (KRISO) — Daejeon, Republic of Korea
Senior Researcher — *June 2019 – Aug. 2023*

- Conducted various public projects for maritime safety and maritime logistics as a researcher in Maritime Digital Transformation Research Center at KRISO which is a government-funded institute

Korea University — Seoul, Republic of Korea
Lecturer — *Mar. 2019 – June 2019*

- Responsible for the major course in Industrial Management Engineering at Korea University
- Taught the course about the logistics system design (port container terminals, baggage handling systems in airport, and hub and sub terminals for last-mile delivery) with the optimization models and the simulation tool (AutoMod)

Researcher — *Mar. 2016 – June 2019*

- Conducted various public and private projects as a project manager in Logistics/Transportation Information System Laboratory at Korea University
- Managed three Ph.D. candidate students and ten master's students and delegated work

Skills

Programming Languages: Python, R, Java
Technical Software: Gurobi (Optimization), R (Statistical), AutoMod (Simulation), MATLAB, Excel
License: Pilot of an ultra light vehicle (Unmanned multicopter), Small Vessel Operator (Boat Only)

Publications(international)

1. Woo, S. H., Park, H. J., **Cho, S. W.**†, Kim, K. H. (2024). Proactive berth scheduling with data-driven buffer time in container terminals. *International Transactions in Operational Research*. (SSCI, impact factor: 3.61), DOI:10.1111/itor.13412

2. Park, H. J., **Cho, S. W.**†, Nanda, A., Park, J. H. (2023). Data-driven dynamic stacking strategy for export containers in container terminals. *Flexible Services and Manufacturing Journal*, 35(1), 170-195. (SCI(E), impact factor: 2.603), DOI:10.1007/s10696-022-09457-8

3. **Cho, S. W.**†, Park, H. J., Kim, A., Park, J. H. (2022). GMM-based online optimization for container stacking in port container terminals. *Computers & Industrial Engineering*, 108671. (SCI(E), impact factor: 7.180), DOI:10.1016/j.cie.2022.108671

4. Lee, W., **Cho, S. W.**† (2022). AIS Trajectories Simplification Algorithm considering Topographic Information. *Sensors*, 22(18), 7036. (SCI(E), impact factor: 3.847), DOI:10.3390/s22187036

5. Nanda, A., **Cho, S. W.**†, Lee, H., Park, J. H. (2022). KOLOMVERSE: KRISO open large-scale image dataset for object detection in the maritime universe. *arXiv preprint*. DOI:arXiv:2206.09885

6. **Cho, S. W.**†, Park, J. H., Park, H. J., Kim, S. (2021). Multi-UAV Coverage Path Planning Based on Hexagonal Grid Decomposition in Maritime Search and Rescue. *Mathematics*, 10(1), 83. (SCI(E), impact factor: 2.258), DOI:10.3390/math10010083

7. Quan, J., **Cho, S. W.**† (2021). Optimal Ordering Policy for Retailers with Bayesian Information Updating in a Presale System. *Sustainability*, 13(22), 12525. (SCI(E)/SSCI, impact factor: 3.251), DOI:10.3390/su132212525

8. **Cho, S. W.**, Park, H. J., Lee, H., Shim, D. H., Kim, S. Y.† (2021). Coverage path planning for multiple unmanned aerial vehicles in maritime search and rescue operations. *Computers & Industrial Engineering*, 161, 107612. (SCI(E), impact factor: 5.431), DOI:10.1016/j.cie.2021.107612

9. Park, H. J., **Cho, S. W.**, Lee, C.† (2021). Particle swarm optimization algorithm with time buffer insertion for robust berth scheduling. *Computers & Industrial Engineering*, 160, 107585. (SCI(E), impact factor: 5.431), DOI:10.1016/j.cie.2021.107585

10. Kim, A., Park, H. J., Park, J. H., **Cho, S. W.**† (2021). Rescheduling Strategy for Berth Planning in Container Terminals: An Empirical Study from Korea. *Journal of Marine Science and Engineering*, 9(5), 527. (SCI(E), impact factor: 2.458), DOI:10.3390/jmse9050527

11. **Cho, S. W.**, Park, H. J., Lee, C.† (2021). An integrated method for berth allocation and quay crane assignment to allow for reassignment of vessels to other terminals. *Maritime Economics & Logistics*, 23(1), 123-153. (SSCI, impact factor: 3.119), DOI:10.1057/s41278-020-00173-4

12. Kim, K. H., Han, Y. J., Lee, S., **Cho, S. W.**, Lee, C.† (2019). Text mining for patent analysis to forecast emerging technologies in wireless power transfer. *Sustainability*, 11(22), 6240. (SCI(E)/SSCI, impact factor: 2.576), DOI:10.3390/su11226240

13. Ko, S. Y., **Cho, S. W.**, Lee, C.† (2018). Pricing and collaboration in last mile delivery services. *Sustainability*, 10(12), 4560. (SCI(E)/SSCI, impact factor: 2.592), DOI:10.3390/su10124560

Publications(domestic)

1. Noh, Y., Park, Y., Hong, J., **Cho, S. W.**† (2024). Scheduling Inbound Trucks for Workload Balancing of Outbound Docks in Cross-docking Systems. *Journal of Logistics Science & Technology*, 5(1), 59-75. (KCI 후보), DOI:10.23178/jlst.5.1.202403.004

2. Park, H. J., Park, J. H., **Cho, S. W.**† (2021). Robust Berth Planning under Uncertain Vessel Arrival. *Journal of Navigation and Port Research*, 45(3), 102-108. (KCI), DOI:10.5394/KINPR.2021.45.3.102

3. Eum, S., Lee, S.†, Meng, X., **Cho, S. W.**, Lee, C. (2019). Analysis of Research Trends of Wireless Power Transfer System for Locomotives Using Topic Modeling Based on LDA Algorithm. *Journal of the Korean Institute of Industrial Engineers*, 45(4), 284-301. (KCI), DOI:10.7232/JKIIE.2019.45.4.284

4. Meng, X. Y., Han, Y. J.†, Eum, S. M., **Cho, S. W.** (2018). The Strategy of Wireless Power Transfer for Light Rail Transit By Core Technologies Analysis Based on Text Mining. Journal of The Korea Society of Computer and Information, 23(11), 193-201. (KCI), DOI:10.9708/jksci.2018.23.11.193

5. Im, H., **Cho, S. W.**, Quan, J., Kim, J. J., Lee, C., Lee, G. M.† (2017). Prediction of Aviation Security Technologies through Cluster Analysis of Patent Big Data. *Journal of Aviation Management Society of Korea*, 15(5), 43-63. (KCI)

Work in progress

1. Nanda, A., **Cho, S. W.**†, Lee, H., Park, J. H. KOLOMVERSE: Korea open large-scale image dataset for object detection in the maritime universe. *IEEE Transactions on Intelligent Transportation Systems (Accepted)*

2. Lee, W., **Cho, S. W.**† Reinforcement learning approach for outbound container stacking in container terminals. *Computers & Industrial Engineering – Under review*

3. **Cho, S. W.**, Lee, J. H., Park, Y. R., Zhou, Y., Lee, W.†, Lee, C.† An ant colony optimization for priority-based coverage path planning with multiple UAVs. *Applied Soft Computing – Under review*

4. **Cho, S. W.**, Kim, K. H., Park, H. J., Lee, C.† Optimal load scheduling for outbound containers in port container terminals. *Expert Systems with Applications – Under review*

5. Lee, H., Nanda, A.†, **Cho, S. W.**†, Jung, J., Yang, H. S., Park, J. H. C-ATOM; Click-based semi-automatic annotation tool for object detection in the maritime domain using a test-time augmented box integrated model. *Computers in Industry – Under review*

6. **Cho, S. W.**†, Park, H. J. Storage space allocation for outbound and transshipment containers in container terminals. *Working paper*

7. **Cho, S. W.**, Nanda, A., Lee, W.† Ship fuel consumption prediction based on concatenated neural networks using iterative learning. *Working paper*

8. Choi, S., Lee, Y., **Cho, S. W.**† Particle swarm optimization based search area decomposition method for enhanced UAV coverage path planning. *Working paper*

9. **Cho, S. W.**† A bi-objective optimization for coverage path planning with unmanned aerial vehicles in maritime search and rescue operations. *Working paper*

10. **Cho, S. W.**, Lee, W.† Coverage path planning for UAV-USV collaboration in maritime search and rescue operations. *Working paper*

11. Lee, K., **Cho, S. W.**† Dynamic rescheduling strategy for passenger congestion balancing in airport passenger terminals. *Working paper*

12. Lee, H., Lee, W., **Cho, S. W.**† Dueling deep Q-network based container stacking system at a container terminal. *Working paper*

13. **Cho, S. W.**† A heuristic approach for pre-marshalling problem in container terminals. *Working paper*

Conferences(international)

1. Lim, A., Lee, S., Hong, J., Noh, Y., **Cho, S. W.**†, Lee, W.† (2024). Q-Learning for Outbound Container Stacking at Container Terminals. *The 12th International Conference on Logistics and Maritime Systems (LOGMS 2024)*, Germany

2. **Cho, S. W.**, Lee, C.† (2019). Simultaneous Allocation of Berth and Quay Cranes with Consideration of Vessel Priority. *The 9th International Conference on Logistics and Maritime Systems (LOGMS 2019)*, Singapore

3. **Cho, S. W.**, Lee, C.† (2018). Analysis of Technological Spillover Effects Among Technology Classes: Case of Korea Technology Finance Corporation. *The 5th East Asia Industrial Engineering Workshop (EAWIE 2018)*, Seoul, Republic of Korea

Conferences(domestic)

1. 최승찬, 이요한, 이원희, 박세길, **조성원**† (2024). 해상 수색 영역 분할 최적화 기반의 다중 드론 경로 계획. 한국해양과학기술협의회 춘계공동학술대회
2. 박규린, **조성원**, 김선영†, 김기훈, 표춘선 (2019). 무인선-무인기 협업에 의한 조난자/유출유 수색을 위한 초기 수색 경로 생성. 대한조선학회 추계학술대회
3. **조성원**, 이철웅†, 권구포 (2019). 택배 허브터미널의 분류능력 향상을 위한 입하 도크 운영 스케줄링. 대한산업공학회 춘계공동학술대회
4. **조성원**, 이철웅† (2019). 인공지능 기반의 수하물 X-Ray 영상 내 위험물 인식. 대한산업공학회 춘계공동학술대회
5. **조성원**, 이철웅†, 최상희 (2019). 선박의 불확실성에 대비한 최적의 선석 계획. 대한산업공학회 춘계공동학술대회
6. 임현우, **조성원**, 이철웅† (2017). 물류센터의 최적 입출하 도크 수 산출에 관한 연구. 한국SCM학회 추계컨퍼런스
7. **조성원**, 임현우, Quan Jinxian, 김진주, 이철웅† (2017). 스마트 항공 보안 기술 적용에 따른 운영 효율성 향상 방안. 한국SCM학회 춘계컨퍼런스
8. **조성원**, 임현우, 이규민, 이철웅† (2017). ICT 융합형 물류기술의 현황 및 개발 전략. 한국물류과학기술학회 춘계학술대회

Projects

Dankook University

Mission planning for UAV-USV collaboration in maritime search and rescue operations — *Jan. 2024 – Present*

- Developed a dynamic rescheduling framework with an event-driven policy which is dynamically executed to update the schedule for multiple UAV and USV to respond to some specified events

Advancement of KOTEC's Technology Rating System — *Sep. 2023 – Dec. 2023*

- Developed an economic model that interprets technology rating indicators into five factors: core competency, innovation, productivity, profitability, and sustainability)

Korea Research Institute of Ships & Ocean Engineering (KRISO)

Construction of Global Maritime Testbed for Intelligent Onboard Space — *Apr. 2023 – Aug. 2023*

- Building a testbed based on the virtual environment using a ship maneuvering simulator to validate global e-Navigation services

Development of Intelligent Container Stacking Service Technology for Digital Ports — *Jan. 2023 – Aug. 2023*

- Developing a reinforcement learning algorithm for the determination of container storage location to improve the operational efficiency of the port

Development of Chained Services to Optimize Logistics Between Port Stakeholders — *Apr. 2022 – Aug. 2023*

- Managing the project and developing chained logistics services for the sea, port, and land operations
- Developed 10 services for maritime logistics optimization and digitalization

Open Platform Technologies for Smart Maritime Safety and Industries — *Jan. 2021 – Aug. 2023*

- Developed a container stacking strategy based on a data-driven online algorithm to determine the storage location of an arriving container in real-time

KOLOMVERSE — *Sep. 2020 – Dec. 2020*

- Managed the KOLOMVERSE (**K**orea **o**pen **l**arge-scale image dataset for **o**bject detection in the **m**aritime uni**verse**) project to create a total of 5.4 million 4k maritime object image datasets by collecting and refining data samples from territorial waters of Korea over 4,500 hours under different weather conditions for the development of maritime autonomous surface ships

SMART-Navigation — *June 2019 – Dec. 2020*

- Developed a ship collision risk classification model using model-based learning algorithm to implement Navigation Monitoring & Assistance Service of SMART-Navigation (i.e. e-Navigation) funded by Ministry of Oceans and Fisheries, Republic of Korea
- Designed and performed an integration test plan for SMART-Navigation Project to guarantee the service quality while enhancing the quality of life for mariners at sea of Korea

Maritime Search and Rescue System using Multiple USVs and UAVs Collaboration *June 2019 – Dec. 2020*

- Developed a randomized search heuristic algorithm for solving the coverage path planning problem of multiple heterogeneous unmanned aerial vehicles (UAVs) to provide an initial search path plan for UAVs to complete their missions

Logistics/Transportation Information System Laboratory

Development of Advanced Terminal Operating System (TOS) *Jan. 2018 – May 2019*

- Developed and upgraded algorithms for berth schedule, load schedule, storage space allocation, rehandling system of Hanjin Busan Newport Corporation
- (Berth scheduling) Reduced 21% operating cost by developing the rescheduling framework which consists of berth allocation and quay crane assignment algorithms
- (Load scheduling) Improved 18% operating efficiency of vessel's turnaround time by developing metaheuristic algorithms and optimization algorithms considering the ship operation and yard operation
- (Storage space allocation) Improved 27% performance of workload balance between each block of the yard by developing the long and short-term yard template planning algorithms and data-driven dynamic stacking algorithms
- (Rehandling system) Reduced 8% the time of loading operations by developing the pre-marshalling algorithm for export containers

Evaluation of Wireless Power Transfer (WPT) Technology for Railway Application *Jan. 2018 – May 2019*

- Extracted keywords from patents using text mining techniques and clustered keywords based on the semantic similarity using the association rule mining (ARM) to identify vacant and emerging technologies in WPT

Korea Airports Corporation (KAC) Smart Airport Master Plan *Nov. 2018 – Dec. 2018*

- Re-categorized KAC's 30 projects into 15 projects using the analytic hierarchy process (AHP) and assessed technology readiness level for each project

Measurement of Technological Spillover Effect *Jul. 2018 – Oct. 2018*

- Collected 575,790 patents granted in the Korean Intellectual Property Office (KIPO) from June 2013 to July 2018 and Established the measurement of technological spillover effect using text mining, ARM, and DEMATEL to advance a technology evaluation system of KOTEC, which is the most representative non-profit credit guarantee institution in Korea

Methods to Improve the Productivity of Terminals *Jan. 2017 – Oct. 2017*

- Developed a simulation model for analyzing the productivity of the hub terminal to improve the efficiency of the hub-and-spoke network of Hanjin Express, which is the major parcel delivery company in Korea
- Designed a standardized parcel terminal model and proposed layout concepts

Development Strategy of Convergence Technologies in Logistics *Mar. 2016 – Jul. 2016*

- Analyzed logistics technologies, patents, markets, and policies, and forecasted logistics technology trends for the next 10 to 20 years to determine future R&D topics of the Ministry of Land, Infrastructure and Transport, Republic of Korea

Awards and honors

Foundation of Korea Logistics Industry Promotion (KLIP)

2^{nd} place in The 8^{th} Logistics Essay Competition *Nov. 2021*

2^{nd} place in The 7^{th} Logistics Essay Competition *Nov. 2020*

Korea Airports Corporation (KAC)

1^{st} place in Aviation Industry Development Strategy Essay Competition *Nov. 2021*

3^{rd} place in Gimpo International Airport 60^{th} Anniversary Essay Competition *Nov. 2018*

The Society of Logistics Science and Technology (LOGIST)

2^{rd} place in Logistics Essay Competition *Nov. 2021*

Korea Institute for Maritime Strategy (KIMS)

3rd place in Essay Competition *June 2021*

Ministry of the Interior and Safety (MOIS)

Minister of MOIS' Commendation in Disaster and Safety Essay Competition *Dec. 2020*

Korea Institute of Science and Technology (KIST)

Convergence Research Policy Fellowship *May 2020 – Sep. 2020*

- Research Topic: Development of Artificial Intelligence (AI)-based Seaside Operating System in Port Container Terminals

Korea University

KU Graduate Junior Fellow–Research Grant *Jul. 2019 – June 2020*

- Research Topic: Development of Optimal Berth Planning with Data Analytics for Advanced Terminal Operating System(TOS)

Pusan National University

1st place in The 5th Logistics Essay Competition *Nov. 2019*

Korea Aerospace Industries (KAI)

2nd place in Aerospace Thesis Prize *Oct. 2019*

Incheon International Airport Corporation (IIAC)

2nd place in Airport Security Essay Competition *Nov. 2018*

1st place in Airport Security Essay Competition *Nov. 2016*

Korean Society For Railway

2nd place in Railway Essay Competition *Nov. 2018*

Patents

1. System for stacking container and method thereof, **Cho, S. W.**, Park, H. J., Park, J. H., KR Patent 10-2380374 (2022)

2. Method for generating a ship collision risk classification model, Yang, Y., **Cho, S. W.**, Park, J. H., Jang, J., KR Patent 10-2241881 (2021)