

Dynamic and conscientious researcher with strong problem-solving abilities and extensive experience in managing complex tasks. Skilled in conducting rigorous research, analyzing data, and applying mathematical models to real-world problems.

MAIN RESEARCH INTERESTS

Applied Mathematics, Optimization, Operations Research, Complex Systems Modeling, Machine Learning, System Simulation, Manufacturing Engineering, Operations and Supply Chain Management.

EDUCATION

2022 PhD in economics and management – GSEM, University of Geneva, Switzerland

Thesis “Hybrid algorithms for designing production lines”

The thesis proposes sophisticated simulation-based optimization approaches for the design of unreliable serial production lines. Two challenging problems are considered: the buffer allocation problem, and the joint buffer and service time allocation problem. Allocating optimal buffer capacities and the assignment of appropriate service time to each machine is fundamental to enhance the production rate and to reduce investment costs (either in the form of work-in-process inventory costs, floor space use or capital investment), and are then among the most essential insights needed for designing production lines. Therefore, the design of effective optimization techniques is essential for the competitiveness of enterprises.

2004 Postgraduate in Electrical Engineering – EPFL, Swiss Federal Institute of Technology

1998 M.Sc. in Electromechanics – University of Boumerdes, Algeria

PROFESSIONAL EXPERIENCE

2022 – 2025 ***Research Fellow*** at the Geneva School of Business Administration, University of Applied Sciences, HES-SO, Geneva, Switzerland

2016 – 2022 ***PhD Researcher*** at the Geneva School of Economy and Management, University of Geneva, Geneva, Switzerland

2020 – 2021 ***Scientific Collaborator*** at the University of Applied Sciences, HES-SO, Geneva, Switzerland

2001 – 2021 ***Teacher*** of Advanced Mathematics, Physics, Applied Mathematics, Algorithms, Chemistry and Descriptive Geometry for Swiss Maturity and French Baccalaureate programs, various institutions in Switzerland and France (ECGF, Fribourg; École Rudolf Steiner, Geneva; Institut Florimont, Geneva; Institut Gamma, Geneva; Complétude, Paris)

2000 – 2001 ***Associate Member***, Large Hadron Collider (LHC) Project, CERN (European Organization for Nuclear Research), Geneva, Switzerland

1998 – 2000 ***Teaching Assistant*** of Mathematics, statistics and probabilities at the University of Chlef, Algeria

PROJECTS

2022 – 2025 **Geneva School of Business Administration, HES-SO (Geneva, Switzerland)**

1. **Leveraging Digital Technologies for Enhancing Dairy Supply Chain Resilience and Viability: Addressing Challenges in Waste Management, Transparency, and Traceability in Switzerland**
Conducted research on the adoption of Digital Technologies (DT) in Dairy Supply Chains (DSCs), focusing on enhancing resilience and long-term viability. The project evaluated the impact of DT on supply chain resilience and developed strategies to mitigate vulnerabilities. It specifically targeted the Gruyère AOP Supply Chain (GASC), a key Swiss product made exclusively with local ingredients. By optimizing waste management, transparency, and traceability, the project aimed to improve sustainability and resilience, positioning GASC as a model for other Swiss supply chains.
2. **Big Data Analytics and Artificial Intelligence in Sustainable Agriculture Supply Chain Management**
Conducted research on integrating blockchain and IoT technologies for improving healthcare waste management. The project focused on identifying challenges and barriers to adopting these technologies in reverse logistics for recyclable hospital waste. Utilized Best-Worst Method (BWM) and Decision-Making Trial and Evaluation Laboratory (DEMATEL) to prioritize challenges and analyze causal relationships, contributing to strategies for successful technology integration and promoting circular economy principles in healthcare.
3. **Agile and sustainable closed-loop supply chains in hydrogen powered mobility ecosystems**
Developed an optimized reverse logistics chain for hydrogen cartridge distribution, focusing on minimizing costs and CO2 emissions. Employed Capacitated Vehicle Routing Problem (CVRP) and various optimization techniques like Simulated Annealing (SA) and Genetic Algorithm (GA). The project, in collaboration with STOR-H, provided strategic recommendations for enhancing cost efficiency and environmental sustainability in hydrogen supply chains.
4. **Framework for Natural Disaster Management: A Healthcare Services Continuity Plan for Morocco**
Designed a Natural Disaster Management framework incorporating a HSC Plan for Morocco. The research aimed to ensure uninterrupted healthcare delivery during disasters by optimizing disaster logistics networks (DLNs). Focused on strategic and tactical decision-making, the framework improved regional coordination and resource allocation, enhancing disaster preparedness and resilience.
5. **Design of Humanitarian Relief Logistic Networks with Consideration of disaster Management**
Developed optimization models for humanitarian relief logistics, integrating pre- and post-disaster factors to enhance disaster response. Introduced a novel decomposition model to address uncertainties in relief operations, focusing on risk-averse strategies. The research provided actionable insights for improving the quality, responsiveness, and efficiency of disaster logistics networks.
6. **Demand Forecasting and Inventory Management for Short Life Cycle Products**
Improved demand forecasting and inventory management for short life cycle products by integrating social media data and expert insights. Developed a hierarchical forecasting procedure and a probabilistic inventory management model to optimize stock levels. Validated the approach through real-world case studies, enhancing supply chain efficiency and decision-making accuracy.
7. **Design and Planning of Reverse Sustainable Supply Chains for Clinical Trials Under Uncertainty**
Designed a sustainable reverse logistics framework for clinical trial supply chains, focusing on waste management and resource optimization. The research integrated circular practices like reuse and recycling while addressing uncertainties in demand and supply. Developed mathematical programming models to enhance sustainability across economic, environmental, and social dimensions.

2009 – 20014 **Institut Florimont (Geneva, Switzerland)**

Directed and supervised multiple student research projects, including a **post-baccalaureate project** on the design of a radio-controlled glider using XFLR5 and AVL for aerodynamic and flight-dynamic analysis, as well as **several Swiss Maturity projects** providing methodological and academic guidance. Also led a student project entitled *“An Ecological Outdoor Lighting System,”* which received the Gold Medal and the Youth Group Leaders (DJG) Prize at the International Exhibition of Inventions in Geneva, and co-organized the “Math Kangaroo” competition to promote mathematical engagement.

LANGUAGES

Arabe native
French fluent
English B2, good in a professional environment.

COMPUTER SKILLS

Python, Matlab, Arena, Flexsim, FLUX2D, JAVA (good notions)

PUBLICATIONS

JOURNAL ARTICLES

2025

- Rasool, M., Kassoul, K., & Belhaouari, S. B. (2025). *Gaussian Kernel-Based LSH for High-Dimensional Similarity Search*. IEEE Open Journal of the Computer Society. [doi.10.1109/OJCS.2025.3602355](https://doi.org/10.1109/OJCS.2025.3602355)
- Mokhtari, R., Brahim Belhouari, S., Kassoul, K., and Hocini, A. (2025). *ECG heartbeat classification using progressive moving average transform*. Scientific Reports, 15(1), 4285. doi.org/10.1038/s41598-025-88119-9
- Belhaouari, S. B., Islam, A., Kassoul, K., Al-Fuqaha, A., and Bouzerdoum, A. (2025). *KNNOR-Reg: A python package for oversampling in imbalanced regression*. Software Impacts, 100740. doi.org/10.1016/j.simpa.2024.100740
- Kraidia, I., Kassoul, K., Cheikhrouhou, N., Hassan, S., and Brahim Belhaouari, S. (2025). *ExPSO-DL: An Exponential Particle Swarm Optimization Package for Deep Learning Optimization*. Journal of Open Research Software, 13(1). [doi.10.5334/jors.521](https://doi.org/10.5334/jors.521)

2024

- Islam, A. Kassoul, K., and Brahim Belhaouari, S. (2024). *Efficient Recursive PSO for Pruning and Enhancing Explainability in Decision Trees*. Engineering Applications of Artificial Intelligence. [Available at SSRN 4988695](https://ssrn.com/abstract=4988695)
- Kassoul, K., and Cheikhrouhou, N. (2024). *Joint Allocation of Buffer Sizes and Service Times in Unreliable Assembly-Disassembly Systems*. IEEE Access, vol. 12, pp. 50723-50737, 2024. [doi.10.1109/ACCESS.2024.3385428](https://doi.org/10.1109/ACCESS.2024.3385428)
- Kassoul, K., Cheikhrouhou, N., and Zufferey, N. (2024). *Simultaneous allocation of buffer capacities and service times in unreliable production lines*. International journal of production research, 62(3), 644-664. doi.org/10.1080/00207543.2023.2168310
- Belhaouari, S. B., Islam, A., Kassoul, K., Al-Fuqaha, A., & Bouzerdoum, A. (2024). *Oversampling techniques for imbalanced data in regression*. Expert Systems with Applications, 252, 124118. doi.org/10.1016/j.eswa.2024.124118
- Awais, M., Belhaouari, S. B., & Kassoul, K. (2024). *Graphical Insight: Revolutionizing Seizure Detection with EEG Representation*. Biomedicine, 12(6), 1283. doi.org/10.3390/biomedicine12061283
- Awais, M., Kassoul, K., Omri, A. E., Aboumarzouk, O. M., Abdulhadi, K., & Brahim Belhaouari, S. (2024). *Graph-Based Electroencephalography Analysis in Tinnitus Therapy*. Biomedicine, 12(7), 1404. doi.org/10.3390/biomedicine12071404

2023

Kassoul, K., Cheikhrouhou, N., and Zufferey, N. (2023). *Adaptive Dynamic Jumping Particle Swarm Optimization for Buffer Allocation in Unreliable Production Lines*. IEEE Access,10, 90410 - 90420. doi.org/10.1109/ACCESS.2023.3307017

Brahim Belhaouari, S., Shakeel, M.B., Erbad, A., Oflaz, Z., and Kassoul, K. (2023). *Bird's Eye View Feature Selection for High-Dimensional Data*. Scientific Reports, 13, 13303. [doi/10.1038/s41598-023-39790-3](https://doi.org/10.1038/s41598-023-39790-3)

2022

Kassoul, K., Zufferey, N., Cheikhrouhou, N., and Belhaouari, S. B. (2022). *Exponential Particle Swarm Optimization for global optimization*. IEEE Access,10, 78320-78344. doi.org/10.1109/ACCESS.2022.3193396

Kassoul, K., Cheikhrouhou, N., and Zufferey, N. (2022). *Buffer allocation design for unreliable production lines using genetic algorithm and finite perturbation analysis*. International journal of production research, 60(10), 3001-3017. doi.org/10.1080/00207543.2021.1909169

CONFERENCE PAPERS

2024

Kassoul, K., Brahim Belhaouari, S., and Cheikhrouhou, N. (2024). *Particle Swarm Optimization-Based Variables Decomposition Method for Global Optimization*. In: Burqan, A., et al. Mathematical Analysis and Numerical Methods. IACMC 2023. Springer Proceedings in Mathematics & Statistics, vol 466. Springer, Singapore. doi.org/10.1007/978-981-97-4876-1_19

Kassoul, K., Rakesh D.R., Brahim Belhaouari, S., and Cheikhrouhou, N. (2024). *Buffer Allocation in Unreliable Production Lines using Infinitesimal Perturbation Analysis and Genetic Algorithm*. In: Kulkarni, A.J., Cheikhrouhou, N. (eds) Intelligent Systems for Smart Cities. ICISA 2023. Springer, Singapore. doi.org/10.1007/978-981-99-6984-5_28

Zaidi, S.A.J., Shoukat, Z., Brahim Belhaouari, S., and Kassoul, K. (2024). *IOT based Face Recognition and Surveillance System using Smart Phones*. In: Burqan, A., et al. Mathematical Analysis and Numerical Methods. IACMC 2023. Springer Proceedings in Mathematics & Statistics, vol 466. Springer, Singapore. doi.org/10.1007/978-981-97-4876-1_15

2023

Badulescu, Y., Kassoul, K., and Cheikhrouhou, N. (2023). *Associations between social media attributes for demand forecasting of new products*. In 9th International Conference on Control, Decision and Information Technologies, (CoDIT), Rome, Italy, 2023, pp. 01-06. doi.org/10.1109/CoDIT58514.2023.10284267

2021

Kassoul, K., Belhaouari, S. B., and Cheikhrouhou, N. (2021). *Dynamic cognitive-social particle swarm optimization*. In 2021 7th International Conference on Automation, Robotics and Applications (ICARA). IEEE, 200-205. doi.org/10.1109/ICARA51699.2021.9376550

2012

Samir, B. B., Al-Absi, H. R., and Kassoul, K. (2012). *Breast cancer classification using cluster k- nearest neighbor*. In AIP Conference Proceedings. American Institute of Physics, 1482(1), 382-385. doi.org/10.1063/1.4757499