europass Curriculum vitae

PERSONAL INFORMATION

Roberto Sala

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Gender Male | Nationality Italian

CURRENT POSITION

September 2025 – Today

Tenure Track Researcher - Assistant Professor

University of Bergamo, Italy

Tenure Track Researcher (RTT) position. The aim of the research is to develop new methods to support the assessment of the economic and environmental sustainability of business models based on Product-Service System offerings using Total Cost of Ownership (TCO) methodologies, with a particular focus on the effects related to maintenance services.

Academic Recuitment Field: 09/B2 – Industrial Mechanical Plants.

Group of Academic Recuitment Fields: 09/IIND-05 – Industrial Mechanical Plants.

Academic Discipline: IIND-05/A – Industrial Mechanical Plants (formerly ING-IND/17).

May 2024 – Today

Member of the Interdepartmental Working Group on Artificial Intelligence.

University of Bergamo, Italy

Representative of the Department of Management, Information and Production Engineering. Involved in the organization of events on Artificial Intelligence within and outside the University, aimed at promoting interdisciplinary research and scientific dissemination.

April 2024 – Today

Erasmus+ Exchange Coordinator for the Scientific-Disciplinary Sector IIND-05/A (formerly ING-IND/17)

University of Bergamo, Italy

Evaluation and approval of course substitutions for Bachelor's and Master's degree programs in Engineering at the University of Bergamo with foreign courses, concerning the Scientific-Disciplinary Sector IIND-05/A (formerly ING-IND/17).

October 2023 – Today

Member of ASAP Research Center

University of Bergamo, Italy

Inter-university initiative aimed at developing projects and research activities in the fields of scientific research, innovation, and technology transfer related to service innovation and the servitization of manufacturing companies. The center involves researchers from the University of Bergamo, the University of Brescia, the University of Florence, and the University of Eastern Piedmont. It is characterized by national and international collaborations on topics related to servitization and Product-Service Systems (PSS). https://www.asapsmf.org/

RESEARCH EXPERIENCE

November 2023 – August 2025

Assistant Professor

University of Bergamo, Italy

Assistant Professor position funded on NPRR project Made in Italy Circular and Sustainable (MICS) - Spoke 7 (New and consumer-oriented business models for resilient and circular supply chains). The objective of the research is to develop new methods to support the assessment of economic and environmental sustainability of business models based on Product-Service Systems offerings.

May 2022 – October 2023

Research Fellow - STARS program

University of Bergamo, Italy

Research fellow contract, part of the UniBg STARS program, titled "Sviluppo di un sistema di progonostica a supporto dell'ingegneria di manutenzione basato di modelli di Digital Twin". The project had the objective of developing Digital Twin models able to favour augmented decision-making for the delivery of maintenance, and related services, in the manufacturing context. The activity required: 1) an analysis of the literature on the topic, 2) an analysis of framework in support of the development of digtial twin models, 3) the development of decision-making tools that, combined with the digital twin, could beneficially impact the operational decision-making for maintenance delivery. Scientific responsible: Prof. Giuditta Pezzotta.

January 2022 – April 2022

Research Contract

University of Bergamo, Italy

Project entitled "Sviluppo di un modello di simulazione ibrida del processo di erogazione della manutenzione". The project consists of three main phases: 1) Analysis of hybrid simulation models, 2) Development of the hybrid simulation model, 3) Validation of the model in an industrial context. The project involves the use of AnyLogic software, which allows the simultaneous use of hybrid simulation and discrete event simulation, which are ideal for modeling the process under consideration. From the industrial perspective, the project focuses on the analysis of the maintenance service delivery process of a manufacturing company. Scientific responsible: Prof. Matteo Kalchschmidt.

November 2021 – December 2021

Research contract

University of Bergamo, Italy

The collaboration involved a coaching activity to be carried out with one of the participants in the Digital Manufacturing Transformation 2021 executive program. The activity, carried out over the course of 8 hours, has provided supervision with respect to an improvement project to be made in the company. Specifically, the activity involved the analysis of different techniques and methods of production scheduling with the aim of increasing the saturation of operators and machinery and, at the same time, reducing the number of orders delivered late. Course responsible: Prof. Sergio Cavalieri.

October 2021 – December 2021

Research Contract

University of Bergamo, Italy

Project in collaboration with ABB S.p.A entitled "Analysis of robot failure data". The activity focused on the analysis of the failure data of the robots with the aim of identifying causes and correlations. At the same time, an analysis at the reliability level was also carried out with the aim of identifying failure trends. From the operational point of view, the analysis were carried out through the use of software like Microsoft Excel and Microsoft Power BI in conjunction with the use of Python programming language. Responsible of the project: Prof.ssa Giuditta Pezzotta.

October 2020 – September 2021

Research Fellow

University of Bergamo, Italy

Research fellow contract titled "Il ruolo delle tecnologie digitali nei processi operativi delle filiere logistiche". The project had the objective of analysing business operational processes with particular focus on the role of digital technologies to support their management and decision-making activities. The activity required: 1) an analysis of the literature on technologies in the field of logistics, 2) an analysis of decision-making tools to support operational processes impacting the field of logistics. Scientific responsible: Prof. Sergio Cavalieri.

June 2021 – June 2021

Research contract

University of Bergamo, Italy

Project titled "Consulenza tecnico-scientifica relativa alla sperimentazione e valutazione dell'applicazione SIMVSM (Value Stream Mapping)". The objective of the project was to identify the main vendors of VSM mapping solutions and to evaluate the different applications on the basis of a set of variables related to the usability of the software and its applicability in real contexts. Scientific responsible: Prof. Paolo Gaiardelli.

November 2020 – December 2020

Research contract

University of Bergamo, Italy

Project titled "Supporto nell'analisi degli attuali metodi di pianificazione e gestione della produzione e definizione degli interventi di miglioramento".The project had as objective the analysis of the production planning process of the company Ebera srl with the aim of identifying the criticalities and define a subsequent proposal for improvement using both methodological tools and the support of digital tools. Scientific responsible: Prof. Fabiana Pirola.

October 2017 – September 2020

PhD in Technology, Innovation and Management

University of Bergamo and University of Naples Federico II, Italy

Technology, Innovation and Management doctoral program. The research project aimed at developing a framework to support human decision-makers in the data-driven PSS delivery with a special focus on maintenance delivery. Tutor: Prof. Sergio Cavalieri. Co-Advisors: Prof. Giuditta Pezzotta and Prof. Fabiana Pirola.

October 2019 – October 2019

Research contract

University of Bergamo, Italy

Project titled "Implementazione del metodo Product Service Concept Tree (PSCT) per l'identificazione di nuove idee di servizio". The objective of the project was to identify new services to be offered to customers by SMI S.p.A. The main tool used during the activity was the Product Service Concept Tree (PSCT). The analysis focused mostly on the identification of new maintenance services. Scientific responsible: Prof. Fabiana Pirola.

October 2018 – January 2019

Research contract

University of Bergamo, Italy

Project titled "Scheduling della produzione di IV Gamma". The project had as objective: 1) the analysis, at literature level, of the different scheduling approaches, 2) the analysis of the productive process of the company involved in the FRESHCUT project, 3) the definition of the simulation model of the plant. Scientific responsible: Prof. Roberto Pinto.

July 2017 – September 2017

Research Fellow

University of Bergamo, Italy

Research Fellow funded by DIVERSITY project (GA 636692 – Call H2020). The project aims at providing a concurrent collaborative environment for product-service design supporting companies from the context sensitive capturing and searching of knowledge to the transformation of these data into product-service functionalities (www.diversity-project.eu). Scientific responsible: Prof. Sergio Cavalieri

April 2017 – July 2017

Research Contract

University of Bergamo, Italy

Project in collaboration within a research project funded by Cotonificio Albini S.p.A. The research activities dealt with the improvement of the stock management process. Scientific responsible: Prof. Sergio Cavalieri

April 2016 – March 2017

Research Scholar

University of Bergamo, Italy

- CAREL Spa funded project. The research activities consisted in the supervision in the definition of new PSS offering related to the company evolution in the era of Industry 4.0 and in the definition and adoption of structured methodology to support the servitization process of the company. Scientific responsible: Prof. Giuditta Pezzotta.
- Bergamo Tecnologica funded project. The project funded by Bergamo Tecnologica was mainly focused on the improvement of the production process of SALF spa (namely SALF project). The research activity concerned the analysis of the production process through an initial mapping of the different activities, the identification of the main issues and the proposal of suitable solutions for the identified problems in the area of production planning and control.
- Support in the project proposal writing for European and regional calls

LECTURING EXPERIENCE

September 2023 – Present

Lecturer

University of Bergamo, Italy

Lecturer for the course of "Gestione, Analisi e Rappresentazione dei Dati" (ID code: 22062-MOD2). Responsible for the teaching part regarding data representation through the use of python (pandas, plotly and dash libraries) and Tableau (16 teaching hours - 3 CFU).

February 2023 – Present

Lecturer

University of Bergamo, Italy

Lecturer for the course of "Laboratory Sustainable Industrial System" (ID code: 37207-ENG). Responsible for the teaching part regarding continuous simulation (System Dynamics) focusing on topics related to product-service systems (PSS), maintenance and sustainability (24 teaching hours - 3 CFU).

February 2022 – Present

Lecturer

University of Bergamo, Italy

3-hour seminar on the topic of Product-Service Systems (PSS) for the PhD in Technology, Innovation, and Management (TIM). The seminar content includes an overview of the topic of PSS ranging from its origins to recent developments, with special emphasis on the integration of technologies characterizing Industry 4.0 within PSS offerings.

October 2022 – Present

Lecturing Support Activities

University of Bergamo, Italy

The activity involves support in theoretical and practical lectures and writing a didactic case study related to maintenance management for the "Industrial Asset Management" course (ID code: 37200-ENG) taught by Prof. Adolfo Crespo Marquez. The case study is based on the identification of maintenance issues related to an industrial asset and its improvement using the tools seen during the course.

October 2016 – September 2023

Lecturing Support Activities

University of Bergamo, Italy

The activity deals with the support in the theoretical and practical lectures relates to the Value stream Mapping lean tool. In addition, the activity concerns the conceptualization and writing of a teaching case study related to the Value Stream Mapping for the curses of “Corso integrato di Gestione delle Operations e Sistemi integrati di produzione” (ID code: 37041) and “Operations Management and Supply and Service Chain Management” (ID code: 37154-ENG1) held by Prof. Sergio Cavalieri, Prof. Giuditta Pezzotta, and Prof. Fabiana Pirola. The case study is based on the identification of the problems related to an imaginary manufacturing process and the related improvement using the lean tools seen during the course.

February 2019 – February 2023

Lecturing Support Activities

University of Bergamo, Italy

The activity deals with the support in the exercise lectures and the conceptualization and writing of a teaching case study for the curses of “Gestione della Produzione Industriale” 9 CFU (ID code: 22017) and 6 CFU (ID code: 21033) held by Prof. Giudtta Pezzotta and Prof. Fabiana Pirola. The case study is based on the identification of the problems related to an imaginary manufacturing production process and the related improvement using the methods and tools seen during the course.

February 2019 – February 2023

Lecturing Support Activities

University of Bergamo, Italy

The activity deals with the support in the theoretical and practical lectures for the curses of "C.I. Simulation techniques in healthcare process (Healthcare Operations)" (Cod. 148005) held by Prof. Fabiana Pirola and Prof. Sergio Cavalieri.

January 2017 – October 2023

Lecturing contract

Fondazione di Partecipazione dell'Istituto Tecnico Superiore "Area Tecnologica della Mobilità Sostenibile – Logistica e Sistemi e Servizi Innovativi per la Mobilità di Persone e Merci", Italy

The training activity is divided between the first and second year of the course. For the first year of course the activity (16 hours in total) is focused on the theory and relative practice to the production and service process mapping. Specifically, the training focuses on modeling languages such as ARIS and Service Blueprinting, allowing an overview of the differences and use cases for each modelling language. For the second year of the course (about 12 hours), the training deals with the theme of Value Stream Mapping (VSM). VSM is a mapping methodology related to the Lean Manufacturing approach that allows to highlight value-added and non-value-added activities in company processes. This mapping methodology stimulates critical thinking on possible improvements to be made at the level of the production process for the company.

EDUCATION AND TRAINING

October 2017 – March 2021

PhD in Technology, Innovation and Management

University of Bergamo and University of Naples Federico II, Italy

Technology, Innovation and Management doctoral program, area CUN 09 - Ingegneria industriale e dell'informazione. The research project aims at developing a framework to support human decision-makers in the data-driven PSS delivery with a special focus on maintenance delivery.

Supervisor: Prof. Sergio Cavalieri

Co-Advisors: Prof. Giuditta Pezzotta, Prof. Fabiana Pirola

Title: A Dual-perspective, Data-based, Decision-making approach to manage the Maintenance service delivery process: the D3M framework

Final mark: Elevato

Graduation date: March 31st, 2021

December 2019 – February 2020

Visiting Scholar

Blekinge Institute of Technology, Sweden

The visiting period was aimed at carrying out the research validation of the decision-making framework, and related instruments, developed during the PhD. The results of the visiting period are described in a journal papers written in collaboration with Professor Marco Bertoni, hosting professor during the visiting period.

October 2018 – November 2018

Visiting Scholar

The University of Hong Kong, Hong Kong, China

The visiting period was aimed at carrying out the research on decision-making processes and model in the Product-Service System and Industry 4.0 contexts. The results of the visiting period are described in two papers written in collaboration with Professor George Q. Huang, hosting professor during the visiting period.

July 2017

NEMO Sumer School

University of Vienna, Austria

The Summer School (From 16/07/2017 to 28/07/2017. Total lecturing/practice hours: 60) focuses on the Enterprise Modelling in the Age of Internet of Things. A special attention was devoted to the modelling methods able to support modelling in the context on Industry 4.0.

October 2013 – April 2016

Master of Science in Management Engineering

Polytechnic University of Milan, Italy

Grade: 105/110

Supervisor: Professor Mauro Mancini

Thesis: A Real Option investment model for the wind and photovoltaic plants evaluation

August 2014 – January 2015

Erasmus+

Université de Technologie de Compiègne, France

During the period spent in France I had the chance attend four courses focused on the project management and on the creation of innovative start-ups. Besides this I had the chance to attend a course focused on the working relationship and habits in different countries

October 2010 – September 2013

Bachelor of Science in Management and Production Engineering

Polytechnic University of Milan, Italy

Grade: 88/110

Supervisor: Uros Sikimic

Thesis: Business Game

PERSONAL SKILLS

Mother tongue: Italian

Other languages

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1			
	TOEIC C1				
French	B1	B1			
	UTC Test B1				

Levels: A1 and A2: Basic user – B1 and B2: Independent user – C1 and C2: Proficient user
Common European Framework of Reference for Languages

Communication skills

Good communication and interpersonal skills, acquired through experience as a lecturer and participation in national and European projects, which have fostered collaboration with individuals from diverse cultural and professional backgrounds.

Organisational / managerial skills

Extensive experience in the planning and management of research and training activities, acquired through studies and projects carried out in Italy and abroad. Organizational skills developed through participation in national and European projects, with responsibilities as work package leader and scientific coordinator. Coordination activities in the drafting and development of deliverables and in the supervision of project tool implementation. Involvement in the preparation of complex project proposals, ensuring effective management of relationships and collaboration with numerous consortium partners.

Computer skills

- Excellent knowledge of the Microsoft Office suite
- Excellen knowledge of simulation and modelling software (e.g. Flexsim, Arena, AnyLogic). Simulation and modelling focused on Discrete-Event Simulation, Agent-Based Simulation, System Dynamics Simulation and hybrid modelling approaches
- Excellent knowledge of editing software
- Good programming skills in python using packages related to data analysis (e.g. pandas, numPy, scikit-learn) and text-mining (e.g., NLTK, spaCy, gensim)

Driving licence

B

PUBLICATIONS, WORKSHOPS AND CONFERENCES

Selected publications in proceedings of Peer-Reviewed Scientific Conferences

- Galimberti, M., Carminati, L., SALA, R., Pirola, F., Pozzi, R., Rossi, M., 2026. *Designing Practical Learning Activities for Industry 4.0 and 5.0: A Case Study in a Learning Factory*, in: IFIP International Conference on Advances in Production Management Systems. Springer, pp. 107–121.
- Rakic, S., Slavic, D., Softic, S., Turcin, I., Bocanet, V., Arioli, V., SALA, R., Medic, N., 2025. *Mapping the Intersection of Product-Service Systems, Industry 5.0, and the Sustainable Development Goals: A Bibliometric Study*, in: IFIP International Conference on Advances in Production Management Systems. Springer, pp. 3–16.
- SALA, R., Ardolino, M., Adrodegari, F., Pezzotta, G., 2025a. *Digital servitization of the machinery sector: a comparison between Italy-Based and Foreign companies*. Procedia Computer Science 253, 1432–1441.
- Bonello, A., Francalanza, E., Zammit, J., Maffei, A., Enoksson, F., Boffa, E., Pirola, F., Pezzotta, G., SALA, R., Priarone, P.C., others, 2024. *Development of an Agile Blended Learning Framework for Engineering Higher Educational Instutions post Covid-19.*, in: Proceedings of the 33rd International Electrotechnical and Computer Science Conference. IEEE Slovenia, pp. 644–647.
- Carminati, L., SALA, R., Pirola, F., Capriotti, V., Magni, F., Dehbozorgi, M.H., Rossi, M., Terzi, S., Pozzi, R., Rossi, T., others, 2024. *Building the Workforce of Tomorrow: A Systematic Literature Review of the Essential Skills for the Future Industrial Landscape*. XXIX SUMMER SCHOOL "Francesco Turco"–Industrial Systems Engineering 1–7.
- Dehbozorgi, M.H., Rossi, M., Terzi, S., Carminati, L., SALA, R., Magni, F., Pirola, F., Pozzi, R., Strozzi, F., Rossi, T., 2024. *AI Education for Tomorrow's Workforce: Leveraging Learning Factories for AI Education and Workforce Preparedness*, in: 2024 IEEE 8th Forum on Research and Technologies for Society and Industry Innovation (RTSI). pp. 677–682. https://doi.org/10.1109/RTSI61910.2024.10761217
- Sala, R., Pirola, F., Arioli, V., Dovere, E., 2024b. *Maintenance lifecycle cost analysis through Agent-Based Simulation*. IFAC-PapersOnLine 58, 43–48.
- Arioli, V., SALA, R., Pirola, F., Pezzotta, G., others, 2024. *Sustainability in the Service Offerings of Manufacturing companies: Evidence from the industrial sector*, in: Proceedings of the Summer School Francesco Turco1. IT, pp. 1–7.
- Sala, R., Pirola, F., Pezzotta, G., Cavalieri, S., 2024. *Leveraging Natural Language Processing for enhanced remote troubleshooting in Product-Service Systems: A case study*. Procedia Computer Science 232, 1259–1268.
- SALA, R., Pirola, F., Pezzotta, G., 2023. *On the development of the Digital Shadow of the Fischertechnik Training Factory Industry 4.0: an educational perspective.* Procedia Computer Science, 4th International Conference on Industry 4.0 and Smart Manufacturing 217, 640–649. https://doi.org/10.1016/j.procs.2022.12.260
- SALA, R., Pirola, F., Pezzotta, G., Cavalieri, S., 2022. *NLP-based insights discovery for industrial asset and service improvement: an analysis of maintenance reports*. IFAC-Pap., 14th IFAC Workshop on Intelligent Manufacturing Systems IMS 2022 55, 522–527. https://doi.org/10.1016/j.ifacol.2022.04.247

Selected publications in Scientific Journals

- Arioli, V., Pezzotta, G., Romero, D., Adrodegari, F., SALA, R., Rapaccini, M., Saccani, N., Marjanovic, U., Rakic, S., West, S., others, 2025a. *Digital servitization business typologies in the manufacturing sector*. International Journal of Industrial Engineering and Management 16, 1–23.
- Arioli, V., SALA, R., Pirola, F., Pezzotta, G., 2025b. *Requirements definition for the economic, environmental and social sustainability assessment of Product-Service Systems: State-of-the-art*. Computers & Industrial Engineering 111382.
- SALA, R., Francalanza, E., Arena, S., 2025b. *A review on three decades of manufacturing maintenance research: past, present and future directions*. Production & Manufacturing Research 13, 2469037.
- SALA, R., Maffei, A., Pirola, F., Enoksson, F., Ljubić, S., Skoki, A., Zammit, J.P., Bonello, A., Podržaj, P., Žužek, T., Priarone, P.C., Antonelli, D., Pezzotta, G., 2024a. *Blended learning in the engineering field: A systematic literature review*. Computer Applications in Engineering Education n/a, e22712. https://doi.org/10.1002/cae.22712
- Alp, E., Pirola, F., SALA, R., Pezzotta, G., Kuhlenkötter, B., 2024. *Operative service delivery planning and scheduling in Product-Service Systems: A systematic literature review*. Service Business 1–32.
- SALA, R., Pirola, F., Pezzotta, G., Cavalieri, S., 2023. *Improvement of maintenance-based Product-Service System offering through field data: a case study*. Production & Manufacturing Research 11, 2278313. https://doi.org/10.1080/21693277.2023.2278313
- Arioli, V., Ruggeri, G., SALA, R., Pirola, F., Pezzotta, G., 2023. *A Methodology for the Design and Engineering of Smart Product Service Systems: An Application in the Manufacturing Sector*. Sustainability 15, 64. https://doi.org/10.3390/su15010064
- SALA, R., Venuta, M., Pirola, F., Pezzotta, G., Cavalieri, S., 2022. *IoT platform-enabled decision-making for maintenance service delivery in PSS context: a case study*. Int. J. Prod. Lifecycle Manag. 14, 206–230. https://doi.org/10.1504/IJPLM.2022.125824
- SALA, R., Pirola, F., Pezzotta, G., Cavalieri, S., 2022. *Data-Driven Decision Making in Maintenance Service Delivery Process: A Case Study*. Appl. Sci. 12, 7395. https://doi.org/10.3390/app12157395
- SALA, R., Bertoni, M., Pirola, F., Pezzotta, G., 2021. *Data-based decision-making in maintenance service delivery: the D3M framework*. J. Manuf. Technol. Manag. 32, 122–141. https://doi.org/10.1108/JMTM-08-2020-0301
- Pezzotta, G., Sassanelli, C., Pirola, F., SALA, R., Rossi, M., Fotia, S., Koutoupes, A., Terzi, S., Mourtzis, D., 2018. *The Product Service System Lean Design Methodology (PSSLDM)*. J. Manuf. Technol. Manag. 29, 1270–1295. https://doi.org/10.1108/JMTM-06-2017-0132
- Sassanelli, C., Pezzotta, G., Pirola, F., SALA, R., Margarito, A., Lazoi, M., Corallo, A., Rossi, M., Terzi, S., 2018. *Using design rules to guide the PSS design in an engineering platform based on the product service lifecycle management paradigm*. Int. J. Prod. Lifecycle Manag. 11, 91–114. https://doi.org/10.1504/IJPLM.2018.092826

Participation to conferences

- The candidate has participated in more than 20 scientific conferences as a speaker over the past 10 years.

Peer Reviewer Activities

- Reviewer for more than 15 internationally recognized scientific journals, including Computers in Industry, Expert Systems with Applications, Journal of Manufacturing Technology Management, and Sustainable Production and Consumption.

Courses

- Course on the Business Model Innovation, June 8-10, 2016, Bergamo, Italy, at quo-d srl
- Applied Text Mining in Python, September 2021, on Coursera, link to certificate: https://www.coursera.org/account/accomplishments/certificate/NBLWD9TFBQ4U
- Master MeGMI - Gestione strategica del ciclo di vita degli asset, A.Y. 2020/2022
- Master MeGMI - Ingegneria di manutenzione 1, A.Y. 2020/2022
- Master MeGMI - Ingegneria di manutenzione 2, A.Y. 2020/2022
- Master MeGMI - Sistemi informativi di manutenzione, A.Y. 2020/2022
- Master MeGMI - Strumenti e metodi per la Smart Maintenance, A.Y. 2020/2022

Membership in industry associations

- Full Member of Associazione Italiana Docenti Impianti Industriali (AIDI), industrial sector associtation for IIND-05/A (ex ING-IND/17)
- Full Member IFIP Working Group 5.7, Advances in Production Management Systems (APMS)
- Member of the IFAC AMEST Working Group community

PERSONAL DATA

I authorize the processing of my personal information under Legislative Decree 196/03

Roberto Sala
Bergamo, December 6, 2025
Document signed with a digital signature pursuant to Legislative Decree No. 82/2005 and subsequent amendments.