



PhD in INGEGNERIA GESTIONALE / MANAGEMENT ENGINEERING - 40th cycle

THEMATIC Research Field: SUPPLY CHAIN AUTOMATION

Monthly net income of PhDscholarship (max 36 months)

€ 1500.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

As supply chains become more complex and interconnected, the need for streamlined, efficient and adaptive processes is increased. Automation plays a crucial role in achieving these goals by minimizing manual intervention, reducing errors, and improving response times across sourcing, production, distribution and sales functions.

The theory of automation can be seen as a foundational framework for understanding how tasks can be delegated to technology and managed more effectively. However, its potential in Supply Chain Management is underexplored, especially regarding how automation principles can be applied to optimize entire supply chains. This research aims to establish, among others, the connection between Automation Theory and Supply Chain Management, antouchpoint between these two disciplines, as happened in the past (cf. bullwhip effect).

Objective 1: Establishing the Foundation of Supply Chain Automation. One primary objective of this PhD research is to identify the parallels between Automation Theory and Supply Chain Management; this shall be done by proposing a framework that highlights the applicable concepts, thus enabling both academic and practical insights.

Objective 2: Developing a Comprehensive Framework for Supply Chain Automation.. This framework will enable an analysis of automation efforts along two key dimensions:
- Functional Stages, organized according to supply chain



	<p>processes: sourcing, production, distribution, and sales.</p> <ul style="list-style-type: none"> - Time, considering short-term, mid-term, and long-term perspectives, capturing both immediate actions and long-term plans for automation. <p>The objective is to address every quadrant by identifying real-world company cases that exemplify automation efforts across these dimensions. The framework will capture how companies integrate automation chain, thereby providing a holistic view of how automation fosters end-to-end process integration.</p> <p>Objective 3: Creating a Maturity Assessment Model for Supply Chain Automation. The research program will eventually tackle the task of developing an assessment model to evaluate where companies currently stand in terms of supply chain automation. This model will guide companies by identifying their automation maturity level and suggesting future pathways for evolution. The model will serve as a diagnostic tool that enables organizations to capture their current capabilities, plan actions and map out progressive improvements.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>To accomplish these objectives, the research will employ a combination of qualitative and quantitative methods:</p> <p>Literature Review: Conduct a comprehensive and structured review of existing literature on automation and supply chain management to establish foundational knowledge. The literature review will cover theories of process automation, supply chain integration, and previous frameworks for automation maturity in other fields.</p> <p>Case Studies: Select and analyze case studies of companies at different stages of supply chain automation. The case study approach will allow to generate insights into current industry practices, obstacles, and opportunities. Companies will be chosen to reflect various quadrants in the proposed framework, providing a representative view of automation efforts across sourcing, production, distribution, and sales.</p>



	<p>Surveys and Interviews: Develop and conduct surveys and interviews with industry professionals to capture the real-world challenges and goals associated with supply chain automation. These insights will supplement case studies, providing additional perspectives on best practices and common barriers to automation. The maturity assessment tool will be tested and refined based on feedback from industry practitioners. This iterative process will ensure that both the framework and assessment tool are practical, relevant, and adaptable to varying organizational contexts.</p>
<p>Educational objectives</p>	<p>The proposed PhD program is designed to equip the candidate with comprehensive research skills and practical expertise in supply chain automation. By the end of the program, the PhD candidate will have achieved the following educational outcomes:</p> <ul style="list-style-type: none"> •Research Skill Development: The candidate will acquire robust research skills, with a focus on the emerging field of supply chain automation. These skills will enable the candidate to contribute meaningfully to both academic knowledge and industry practices. •Specific Competencies: <ul style="list-style-type: none"> - Literature Review Mastery: The PhD candidate will be proficient in conducting structured literature reviews, while synthesizing key insights from existing research. - Qualitative Research Skills: The candidate will develop expertise in qualitative research methods, including case study analysis, interviews, and thematic analysis. This will allow for an in-depth exploration of automation practices in real-world companies. - Qualitative Data Analysis: The candidate will be trained in qualitative data analysis, using software tools and techniques to derive actionable insights from data gathered through interviews and case studies. - Research Communication and Publication: The



	candidate will gain experience in presenting research findings and publishing in peer-reviewed journals. These skills will enable the candidate to effectively communicate research outcomes to academic and industry audiences.
Job opportunities	Academia, international institutions, multinational organizations, consulting firms.
Composition of the research group	1 Full Professors 1 Associated Professors 0 Assistant Professors 1 PhD Students
Name of the research directors	Giovanni Miragliotta; Nizar Abdelkafi

Contacts
giovanni.miragliotta@polimi.it; nizar.abdelkafi@polimi.it

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	750.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Candidates with a background in Engineering, Management Engineering, Supply Chain Studies, Business Administration.</p> <p>The candidate might be involved as research associate in additional research projects and as teaching assistant in courses in the area of Operations and Supply Chain Management.</p> <p>A desk will be provided in the Department of Management, Economics and Industrial Engineering.</p> <p>•Involvement in projects: "For the overall development of their capabilities, PhD candidates will work on sinergical projects to favour empirical data collection and network development for their career. Projects will give candidates the opportunity to work in group (peers and other senior professors)".</p>



- Teaching and tutoring: "If coherent with the development of their doctoral program, the PhD candidate will have the opportunity to be involved in: teaching activities, tutoring to master students, tutoring to PhD candidates for administrative processes".
- Periods in companies: "The development of the PhD project requires a compulsory period to be spent in the company (e.g. INAIL in Rome) to better understand the company strategy and processes".

Funding for educational activities: 6.100,00 Euros for three years.