MANAGEMENT AND PRODUCTION ENGINEERING

CRT/DIGEP - Assessing and improving data quality in production contexts

Funded By	Dipartimento DIGEP FONDAZIONE CRT CASSA DI RISPARMIO DI TORINO [P.iva/CF:06655250014]

Supervisor	MASTROGIACOMO LUCA - luca.mastrogiacomo@polito.it

Contact	

Context of the research activity	In today's digital era, data has emerged as the foundation for constructing indicators and metrics that are critical for assessing organizational health, making corrective decisions, and formulating future strategies. This holds true across diverse organizational contexts, marking data as the starting point for internal quality evaluation. With the advent of so-called big data, the volume of available information has expanded exponentially compared to 20-30 years ago, offering unprecedented opportunities for understanding market trends, customer requirements, and product/service satisfaction levels. Moreover, the collection and management of data have become the core business of social media platforms, which utilize it for profiling and trend analysis. Despite its significance, the quality of data often remains underexamined. Questions about the quality/reliability of data, potential distortions/errors, and the methods to assess and improve data quality in databases or platforms are increasingly topical. Particularly in the manufacturing sector, understanding how data inaccuracies affect constructed indicators is crucial for ensuring quality in design and production processes. This research will leverage cutting-edge techniques from the field of Quality 4.0 to address these challenges, fostering innovation and enhancing scientific knowledge in data quality assessment. Incorporating these principles, this research marks a step toward integrating advanced technologies into quality management practices.

Objectives	The proposed doctoral research aims to delve into these aspects with a focus on the manufacturing production context. The primary objective is to develop innovative techniques for assessing the quality of datasets and the platforms or databases containing them. This includes: • Investigating methods to evaluate the extent of inaccuracies or "dirtiness" within a database and its data, thereby advancing the scientific understanding of data quality/reliability issues. • Developing predictive models to understand how data imperfections propagate through indicators derived from the data, contributing to the

	international body of research in data quality. • Analysing databases and data aggregation and synthesis techniques to ensure high-quality data metrics are utilized in decision-making processes. By addressing these objectives, the research seeks to advance the field of data quality assessment and improvement, particularly in contexts where quality and reliability are crucial. The inclusion of artificial intelligence aligns with the Quality 4.0 initiative, seeking to leverage technological advancements to refine data quality in the manufacturing sector.

Skills and competencies for the development of the activity	The ideal candidate for this research endeavour should possess a deep understanding of manufacturing and production environments, coupled with managerial competencies in database management. Essential skills include: • Proficiency in data analysis and statistical methods to dissect and understand complex datasets, which is critical for innovating in the field of data quality. • Knowledge of manufacturing processes and the critical role of data in evaluating and improving these processes, ensuring coherence with the themes of the PhD program. • Experience with database management systems and data quality assessment tools. • Strong analytical and problem-solving abilities to devise innovative solutions for data quality challenges. • Ability to work with cross-disciplinary teams, incorporating insights from production management, data science, and information technology. This combination of skills will enable the doctoral candidate to tackle the research objectives effectively, contributing valuable insights and methodologies to the field of management engineering and production.