Università degli Studi di Modena e Reggio Emilia

Sede di Reggio Emilia

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ING-IND/17 RESEARCH TEAM

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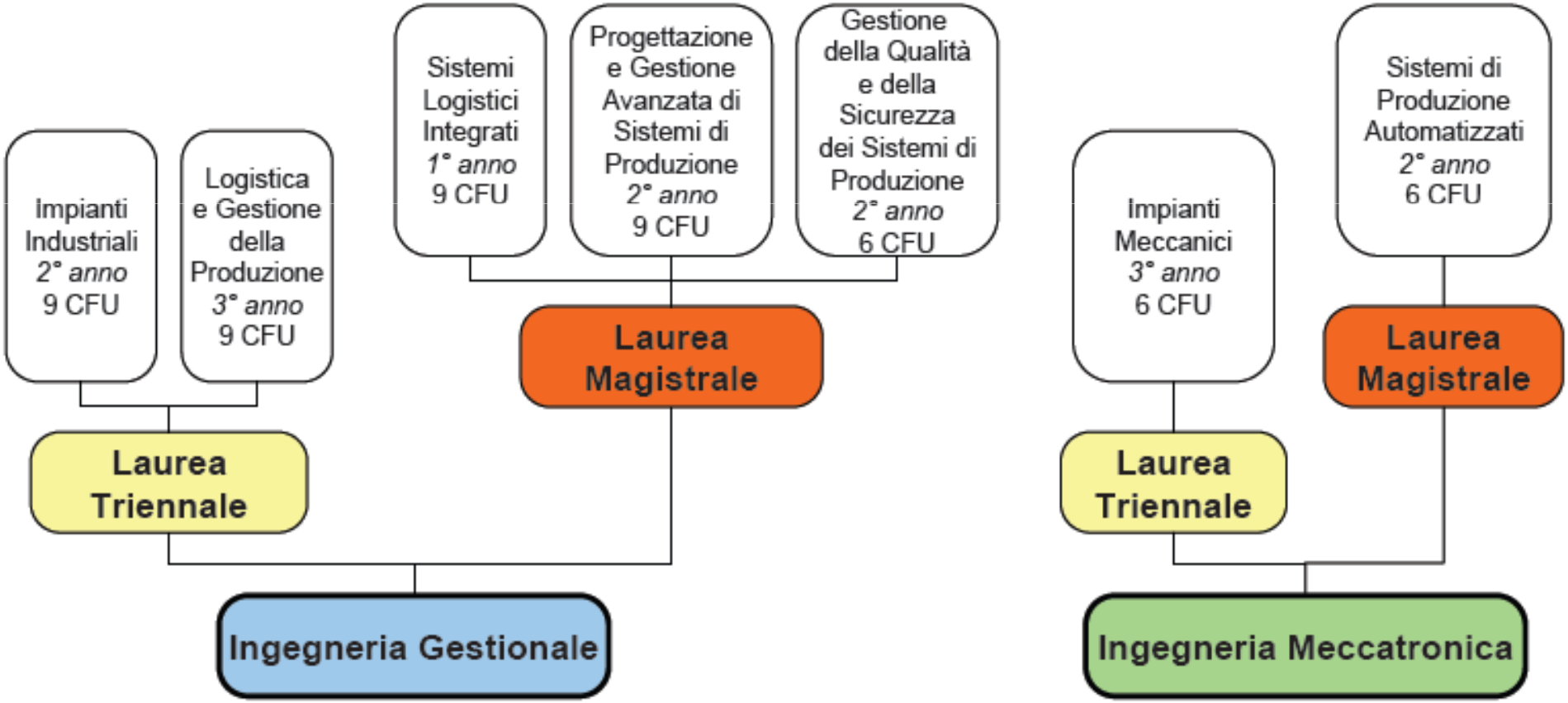
TEACHING ACTIVITY

Ph.D. School in "Industrial Innovation Engineering"



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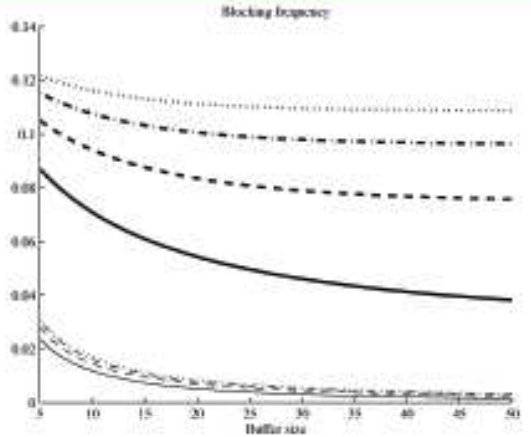
STOCHASTIC MODELING OF MANUFACTURING SYSTEMS

Modeling methodology

Discrete time, discrete state Markov chain

Continuous time, mixed state Markov process

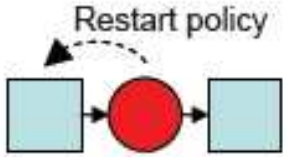


Key issue addressed

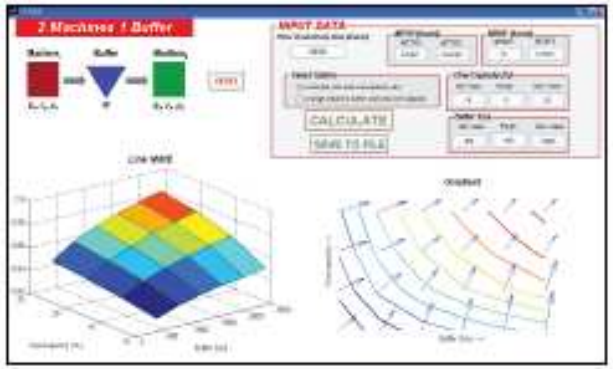
Introduction of buffer level driven control policies

Approach

Closed form solution for the basic building block



Decomposition techniques for long lines



In cooperation with ***Dr. Stanley B. Gershwin***
Massachusetts Institute of Technology
Cambridge, MA, USA

Industrial partner

Tetra Pak Packaging Solutions

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STORAGE AREA DESIGN AND AUTOMATION

Key issue

Development of mathematical and simulative models for the design and management of fully automated warehouses

Automation technology

Laser Guided Vehicles (LGVs)

Maxipacker pallet shuttle system

Industrial partner

Elettric80 S.p.A.

ASSEMBLY LINES BALANCING AND DESIGN

Key issue

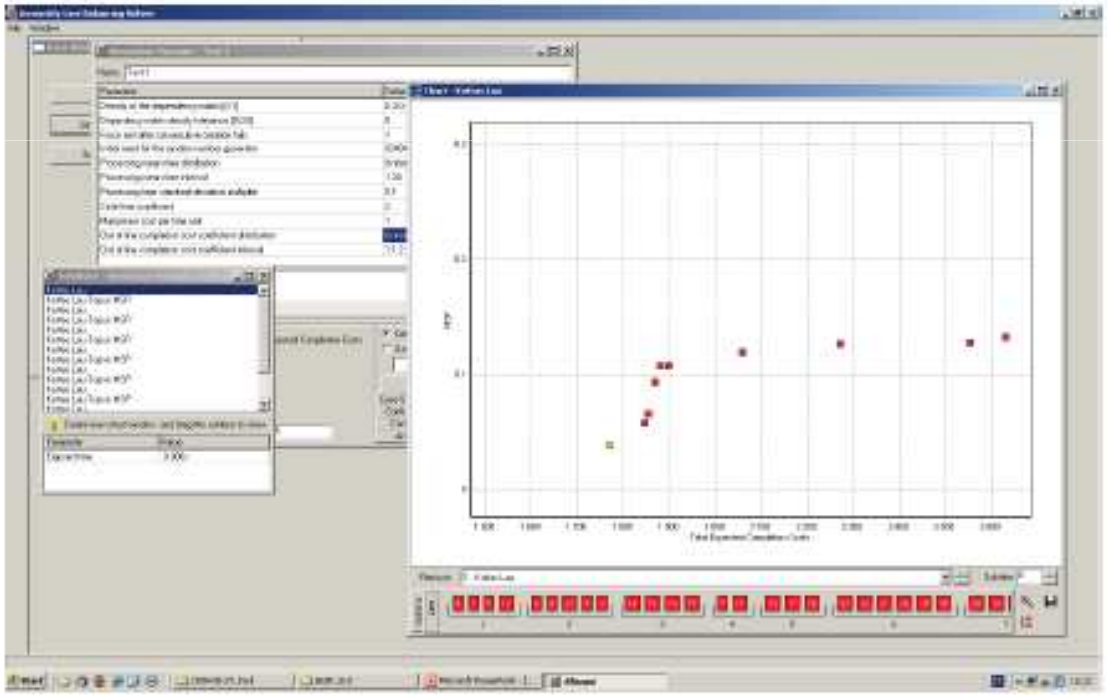
Development of heuristics for balancing assembly lines subjected to changes in product design and operative parameters

Methodology

Combinatorial optimization techniques

Multi-attribute decision making techniques

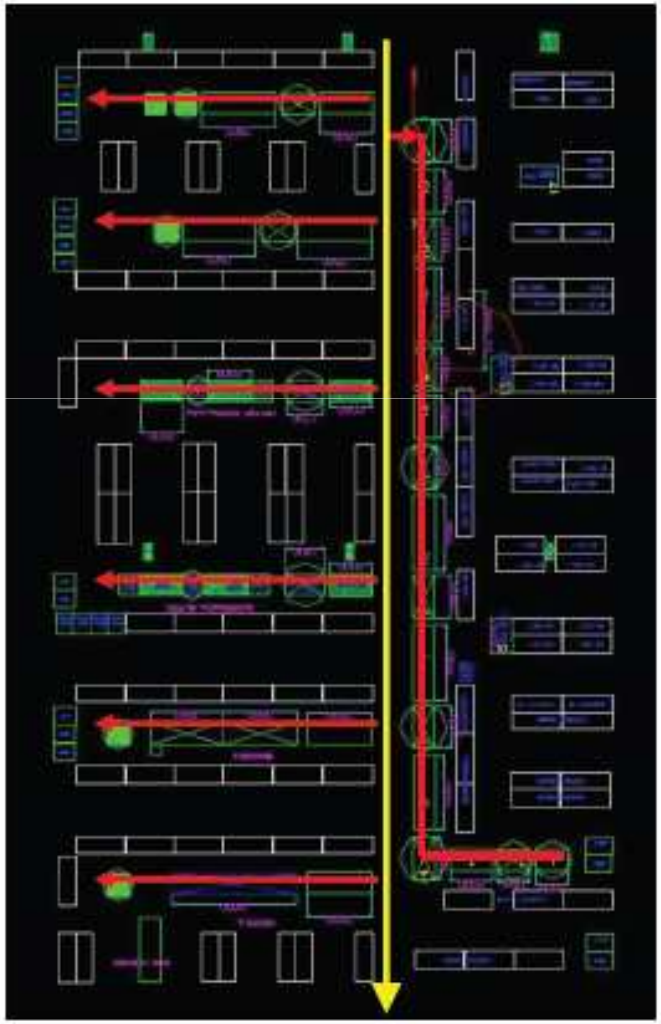
Heuristic and meta-heuristic algorithms



LAYOUT DESIGN

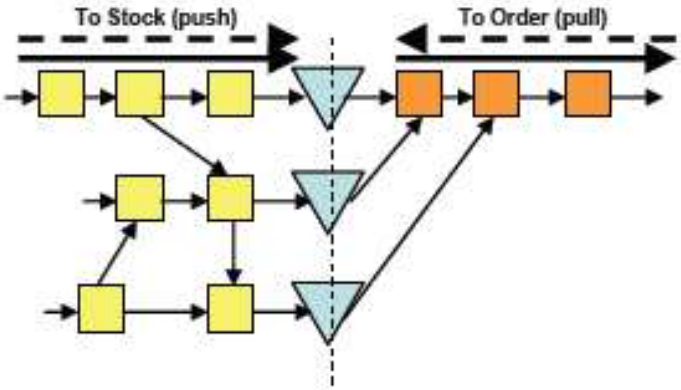
Key issues

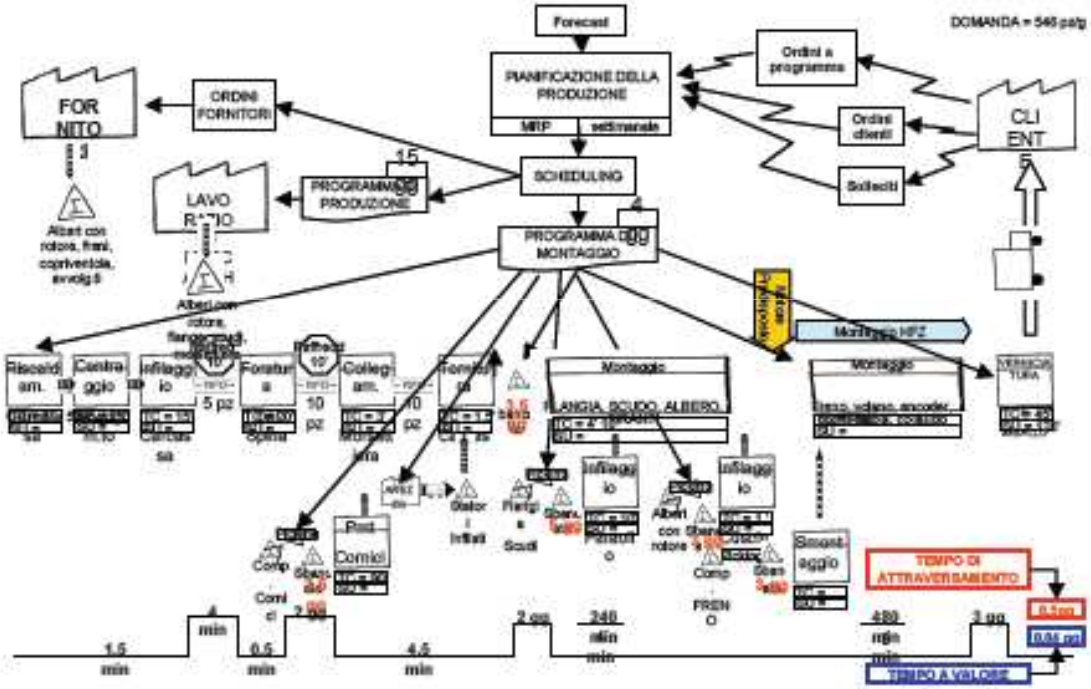
- Group technology
- Material flows optimization
- Balanced line feeding



Key issues

- Value Stream Mapping
- Decoupling point
- Pull system
- Kanban, CONWIP

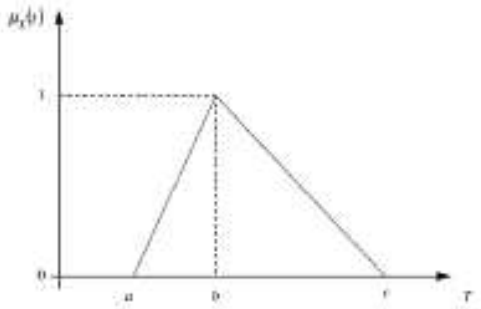




SAFETY MANAGEMENT IN WORKPLACES

Key issue

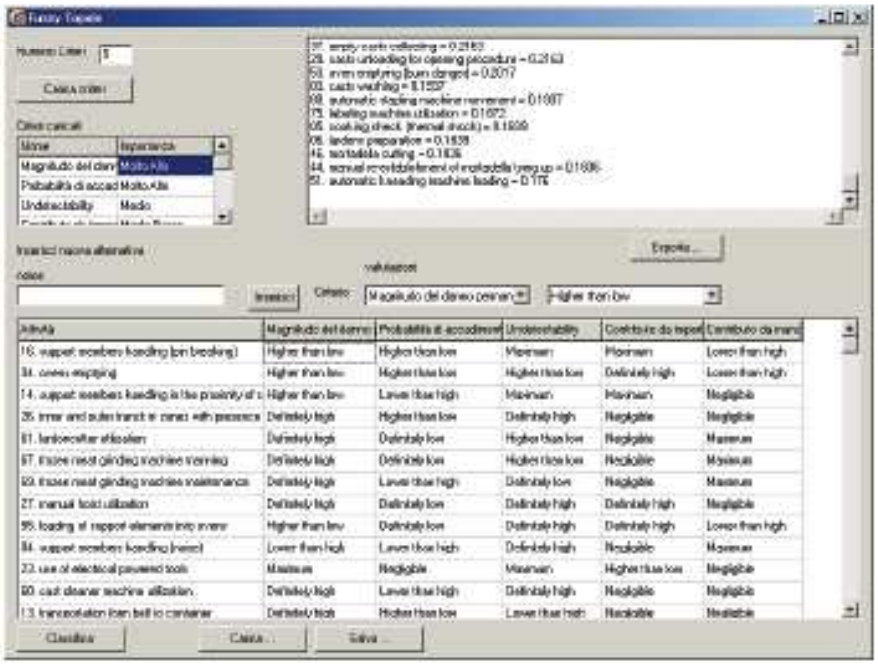
Development of multi attribute decision making support tool to assess hazard related to the execution of activities in workplaces

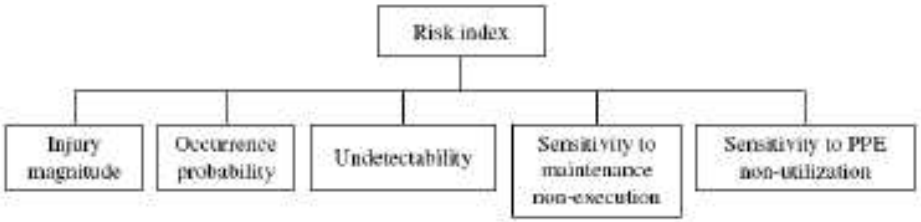


Methodology

Fuzzy systems

Multi-attribute decision making techniques





SPARE PARTS MANAGEMENT AND DEMAND FORECASTING

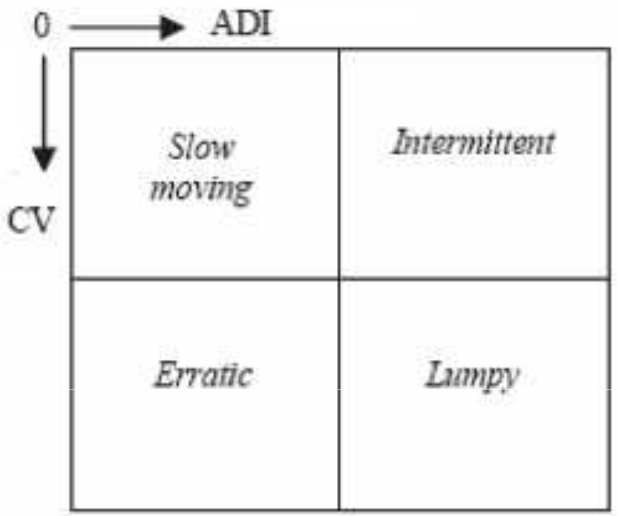
Key issue

Forecasting of demand profiles of irregular and sporadic items

Methodology

Time series analysis techniques

Neural networks



WASTE MANAGEMENT AND RECYCLING

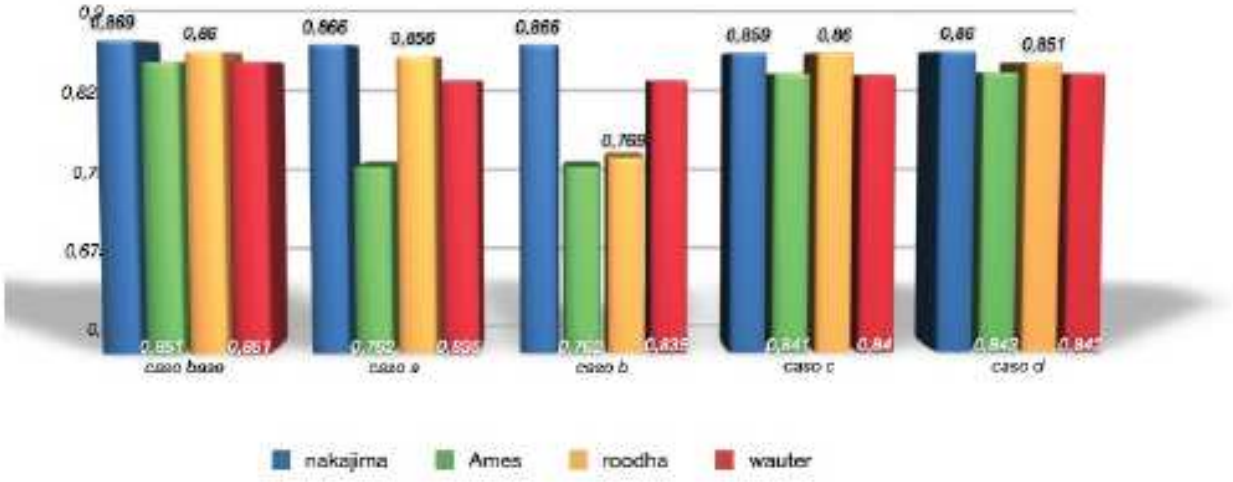
Key issues

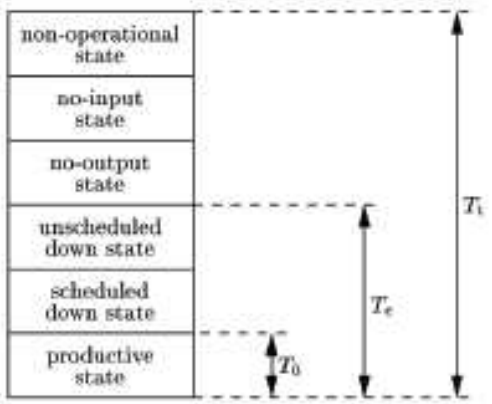
WEEE recovery network management and design

WEEE reprocessing plant design

Key issue

Overall Equipment Effectiveness computation with respect to different production systems



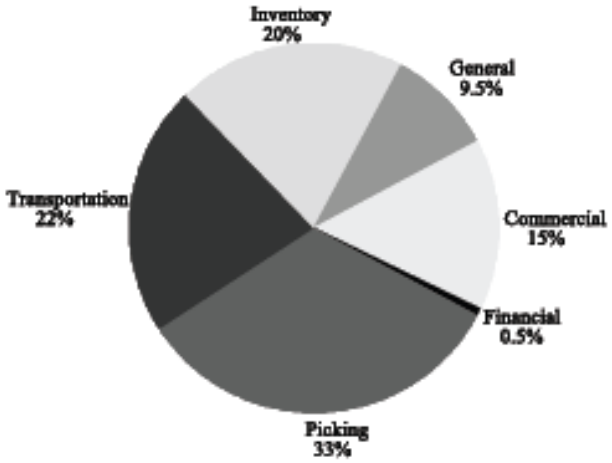


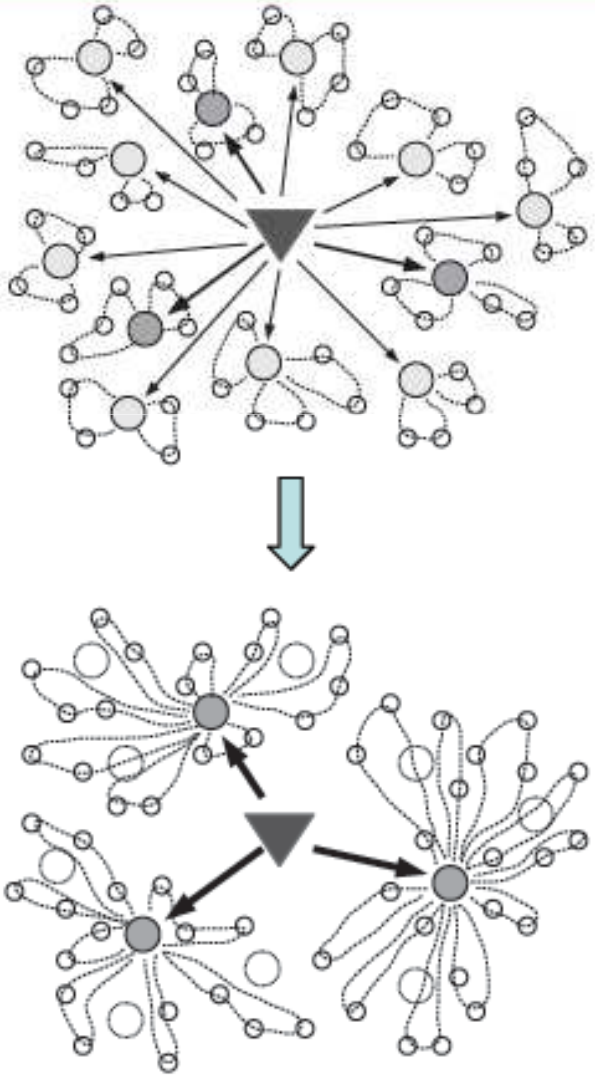
SUPPLY CHAIN DESIGN AND MANAGEMENT

Key issues

Development of mathematical and simulative models for the design and management of supply chains

Cases in which picking activity hugely influences product flows along the chain are also considered





Industrial partners

System Logistics

Coca-Cola (Spain)

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TOP 10 PUBLICATIONS last 5 years (2006 – 2011)

GAMBERINI R., F. LOLLI, B. RIMINI, M. TORELLI, E. CASTAGNETTI (2011) An innovative approach for job pre-allocation to parallel unrelated machines in the case of a batch sequence-dependent manufacturing environment INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH, da p.4353 a p.4376 Vol 49	1
R. GAMBERINI; A.GRASSI; B. RIMINI (2006) A new multi-objective heuristic algorithm for solving the stochastic assembly line re-balancing problem INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS, da p.226 a p.243 Vol 102	1
R. GAMBERINI; E. GEBENNINI; B. RIMINI (2009) An innovative container for WEEE collection and transport: details and effect following the adoption WASTE MANAGEMENT, da p.2846 a p.2858 Vol 29	2
R. GAMBERINI; A. REGATTIERI (2008) Double pressing for porcelain stoneware tiles: An exploratory analysis INDUSTRIAL MANAGEMENT & DATA SYSTEMS, da p.1081 a p.1100 Vol 8	3
A. GRASSI, R. GAMBERINI, C. MORA, B. RIMINI (2009) A fuzzy multi-attribute model for risk evaluation in workplaces SAFETY SCIENCE, da p.707 a p.716 Vol 47	4
M. BRAGLIA, GRASSI A. (2009). A new heuristic for the flowshop scheduling problem to minimize makespan and maximum tardiness. INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH, vol. 47; p. 273-288	5
R. GAMBERINI, E. GEBENNINI, A. GRASSI, C. MORA, B. RIMINI (2008) An innovative model for WEEE recovery network management in accordance with eu directives INTERNATIONAL JOURNAL OF ENVIRONMENTAL TECHNOLOGY AND MANAGEMENT, da p.348 a p.368 Vol 8	5
GAMBERINI R., E. GEBENNINI, R. MANZINI, A. ZIVERI (2010) On the integration of planning and environmental impact assessment for a WEEE transportation network – A case study RESOURCES CONSERVATION AND RECYCLING, da p.937 a p.951 Vol 54	6
R. GAMBERINI; A. GRASSI; C. MORA; B. RIMINI (2008) An innovative approach for optimizing warehouse capacity utilization INTERNATIONAL JOURNAL OF LOGISTICS, da p.137 a p.165 Vol 11	6
R. GAMBERINI; E. GEBENNINI; B. RIMINI; E. SPADACCINI; D. ZILOCCHI (2009) Low cost automation and poka yoke devices: tools for optimizing production processes INTERNATIONAL JOURNAL OF PRODUCTIVITY AND QUALITY MANAGEMENT, da p.590 a p.612 Vol 4	7

Research Topics – Ing/Ind-17

1	2	3	4	5	6	7
Production system analysis and design	Auxiliary plant analysis and design	Processes and production technologies	Ergonomics and safety of industrial systems	Production system management	Logistics	Production system automation

RESEARCH PROJECTS INDUSTRIAL PARTNERS (2007 – 2011)

Project	Year	Area	Description
PRIN	2008	6	Development of innovative methodologies to optimise internal and supply chain logistics in hospitals
EU	2010	2	Innovative chain for energy REcovery from waste in naturaL parkS (RELS)
PRI-RER	2010	7	Maintenance of Mechatronic Systems — In Intermech–Mectron Interdepartmental Centre on Industrial Research

INDUSTRIAL PARTNERS FUNDING RESEARCH PROJECTS

- ACMA – G.D Group (BO)
- Angelo Po Grandi Cucine (Carpi, MO)
- Barilla S.p.A. (PR)
- Elettric80 (Viano, RE)
- Fiorini Group S.p.A. (Forlì, FC)
- Plannet s.r.l. (RE)
- System Logistics (Fiorano, MO)
- Tetra Pak Packaging Solutions (MO)