PhD offer

2023-2026

Rethinking hierarchical supply chain planning systems

to make supply chain planning simple, adaptable, and effective
in highly uncertain, opportunistic, complex, and diverse environments

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Pierre Fabre

Keywords:
Supply Chain Planning, Agility, Flexibility, Robustness, Decision Support Systems, Decision-Making Processes, Modeling, Simulation, Optimization.

Partners:
Industrial engineering center of IMT Mines Albi (Albi, France):
https://cgi.imt-mines-albi.fr/
Pierre Fabre (Lavaur, France):
https://www.pierre-fabre.com/en

Advisors:
Directors:
- Matthieu LAURAS (IMT Mines Albi)
- Raphaël OGER (IMT Mines Albi)

Supervisors:
- Malek DJOUDI (Global planning director, Pierre Fabre)

Location:
The PhD will be in Albi in France (IMT Mines Albi) and business trips to different Pierre Fabre sites in the region are to be expected.

Contract:
3-year full-time contract (beginning 2023 to 2026).

Application:
Applications (Resume, cover letter, Master's transcript, and any document likely to help assess the candidate's level and motivations) must be sent by e-mail to raphael.oger@mines-albi.fr before December 5th, 2022. Shortlisted applicants will have the opportunity to present their motivations orally during an interview to be scheduled in December 2022 or January 2023.
For additional information, you can contact raphael.oger@mines-albi.fr.

Topic:
Pierre Fabre is a leading pharmaceutical and dermo-cosmetic company. Located mainly in the South-West of France, the company has a significant international scope with a particularly complex logistics network. For more than two decades, the company has been a pioneer in terms of innovation in the management of its supply chains, and today the company wants to rethink its supply chain planning system.

Recent events (2008 economic crisis, Covid-19, wars, natural disasters, etc.) have shown how sensitive the economy in general, and especially supply chains, are to disruptions and uncertainties. The quality of the decisions that supply chain managers are called upon to make is more than ever dependent on the risks and opportunities that they can consider in a short period of time. To be able to avoid a risk or seize an opportunity within a supply chain, it is naturally necessary to have ad hoc means for identification, analysis, and decision making. To make the right decisions at the right time, neither too early nor too late. Unfortunately, existing supply chain planning systems were not designed for such unstable contexts and now have critical limits.

In the manufacturing field, Manufacturing Resource Planning (MRP II) introduced in the 80s (Ling and Goddard, 1988) has been the planning system of reference for companies for the past decades. Since 2011, the Demand Driven Adaptive Enterprise (DDAE) model is emerging has a new planning system (Demand Driven Institute, n.d.; Ptak and Smith, 2011). Both these planning systems are what is called Hierarchical Planning Systems (HPS), meaning that there are planning activities with top-down interdependencies (usually top-down directives and bottom-top feedback). However, even though their theory indicates to consider uncertainty and associated scenarios, in practice their implementations within companies are mainly deterministic because the theories does not provide practical solutions for it. In addition, an interesting element is that both these planning systems emerged from industrials and not from academics.

Therefore, the objective of this thesis is to rethink hierarchical supply chain planning systems to create a new decision support system for supply chain planning that will have the following characteristics:

1. Includes decision-making processes and information systems that are easy to implement, execute, maintain, adapt to different manufacturing environments, and understand. For example, the system could automatically dispatch decision options at the right decision level according to their characteristics and context.
2. Enables companies to maintain excellent performance in highly volatile, uncertain, complex, ambiguous (VUCA), opportunistic, and various environments. This system will allow to analyze the performance of a multitude of possible plans regarding a multitude of potential hazards and decisions, to guarantee an excellent performance.

The proposal resulting from the research work will obviously be tested and deployed on the industrial cases proposed by Pierre Fabre.

The following structural scientific orientations are envisaged for this doctoral thesis:

- The proposed approach will combine innovations in terms of hierarchical planning systems, decision-making processes, planning techniques in uncertain environments, and information systems.
- The proposed approach will develop decision support mechanisms based on what-if analysis, confidence intervals and/or fuzzy logics instead of the deterministic approaches traditionally used.
- The proposed approach will include proposals for collaborative decision-making processes.
- The proposed approach will include a review and comparison of existing approaches in terms of mindset, structure, and performance.

In conclusion, the ambition of this doctoral thesis is to design and develop the next decision support system for the future of supply chain planning which will allow, in a now fundamentally unstable context, to easily and serenely make planning decisions that will guarantee the capacity of the supply chains to maintain their performance levels.

Research team:
A team on a human scale, benevolent, competent, ambitious, open to the international, and in constant contact with the business reality (companies, public services, NGOs, etc.).

Applicant's profile:
Holder of a master's degree in engineering, science, or management with proven knowledge in one or more of the following fields: industrial engineering, supply chain management, decision sciences, data sciences, applied mathematics, simulation models, decision support systems, business intelligence.

A good level of English is required as well as good writing skills in English. An appetite for computer programming is preferable.

References:

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