

## PhD topic: Service ramp-up management considering sustainability and risks

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**UMR (Lab):** Laboratoire d'Informatique de Modélisation et d'Optimisation des Systèmes, LIMOS UMR 6158

**Hosting Institution:** Mines Saint Etienne, Fayol Institute, France.

**International:** One or more stay abroad will be planned.

**Funding:** approximately 1700 €/month – as from October, 2021.

**Key words:** ramp-up, project management, agility, sustainability, risk, simulation, service, production.

### Overview

Market volatility and increasing customer requirements coupled with industry 4.0 emergence are transforming project and operations management. For instance, evolving market demand in quality and in quantity, fostered by cutting-edge technologies and global circumstances, requires more agile and even customer-driven management of projects and operations (Lyons et al. 2012; Medini et al. 2019). For instance, frequent product and service development or upgrading and introduction into the market became a requirement to survive competition (Surbier et al. 2014; Medini et al. 2020). However this is challenged by several factors such as product complexity, process maturity and demand fluctuations and uncertainty (Schuh et al. 2015; Doltsinis et al. 2020). Ramp-up management comes into play at this point as it is concerned specifically with improving the performance of production ramp-up phase (Slamanig and Winkler 2011; Schmitt et al. 2018).

Ramp-up management refers to the value creation phase starting with the completion of product and process design and ending with the achievement of the full production capacity (Schuh et al., 2008). This phase plays a major role in keeping-up with the pace of market demand evolution (Slamanig and Winkler 2011; Schmitt et al. 2018). As a matter of fact, COVID 19 crisis uncovered several urgent challenges such as the need for quick production ramp-up of medical equipment to keep-up with the pressure on healthcare sector (Ahmad et al. 2020; Das 2020). These challenges involve equipment production ramp-up and most importantly service ramp-up, in particular healthcare services, and services to deliver the desired equipment in a timely manner such as in additive manufacturing (Nazir et al. 2020).

Under these circumstances, the thesis aims to improve the agility and resilience of industrial systems during the ramp-up/ramp-down phase of services with an application to additive manufacturing and healthcare sectors. More specifically, the thesis is concerned with the alignment of industrial systems capacity with customer needs from a qualitative and quantitative point of view, while adopting an integrated sustainability and risk assessment approach.

These objectives face a major difficulty resulting from the inadequacy of existing approaches, methods and tools to address ramp-up management in the service sector. The specific characteristics of service compared to product make it challenging to rely solely on existing literature to address service ramp-up (Lenfle and Midler 2009; Akkermans et al. 2019). For instance, service ramp-up occurs during the operation phase while product ramp-up takes place during the production. Therefore, service ramp-up is more critical as any service failure is visible to customers (Akkermans et al. 2019). Moreover, as service operation involves several actors (Cavaliere and Pezzotta 2012; Medini and Boucher 2016) the ramp-up process needs to be managed across the value network (Maull et al. 2012;). In addition, most of ramp-up management literature is focused on particular manufacturing sectors such as automotive and microelectronics. Furthermore, offering variety and demand uncertainty add to the complexity of service ramp-up projects. Therefore, more suitable approaches are required to mitigate ramp-up project failure risk and deliver customer-driven sustainable services and products.

From a methodological point of view, the thesis work will rely a general approach integrating agile project management principles and simulation. The thesis work will be structured as follows:

- Analyse the context of service in the manufacturing sector and in particular in additive manufacturing and in healthcare sector. This will rely on scientific literature and on surveys among relevant practitioners.
- Study and apply principles of agile project management to the context of ramp-up/ramp-down management in service domain.
- Study the integration of sustainability indicators into risk management to assess ramp-up/ramp-down strategies.
- Analyse simulation approaches to select the most appropriate one.s and build a simulation model to assess ramp-up/ramp-down strategies.

From a scientific point of view, the thesis will allow a breakthrough from a conceptual and methodological point of view on the convergences between the objectives of sustainability, customer orientation and economic growth.

Among the expected deliverables from the thesis, can be cited the following:

- A pool of best practices for (service) ramp-up management derived from industrial uses cases and scientific literature review.
- A framework consisting of a guideline and a software tool (implementing the simulation model) for service ramp-up projects management.
- A proof of concept from additive manufacturing (and healthcare) sectors.

The thesis project will benefit from ongoing international collaborations with European and American universities, one or several stays can be planned, in particular in US within the framework of the SUSTAIN project (<https://sustainproject.wp.imt.fr/>).

The thesis subject falls within the themes of the LIMOS UMR 6158 Laboratory, more particularly the ODPS axis - Decision-making Tools for Production and Services, as well as the EVS UMR 5600 Laboratory. The thesis is also in the scientific fields of the doctoral school ED 488.

The selected PhD student will be hosted by Mines Saint-Etienne and will be working at the GEO department (*Génie de l'Environnement et des Organisations*) of Fayol Institute.

### **Expected skills**

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Masters of Science or Engineer degree in industrial management or a related field, with one or more of the following skills:

- Industrial engineering (modelling and simulation, production management)
- Project management (agile methods, risk management).
- A background in sustainability (environmental) is appreciated.

### **Application procedure (before April 30, 2021)**

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Application should include the following :

- CV + Cover letter;
- Academic transcripts of the last two years;
- Abstract of the research project during the master internship;
- Recommendation letters;

An electronic copy of the application should be sent to [khaled.medini@emse.fr](mailto:khaled.medini@emse.fr) with [laforest@emse.fr](mailto:laforest@emse.fr) in copy.

For any question, please feel free to email :

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