Statistical approach for the optimization of dairy industrial performance

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Process - Structure - Functionality

Keywords

Dairy industry
Cheese production
Global performance
Machine learning
Multi-objective optimisation

Socio-economic context

- Cheese production is a complex process with many mechanical and manual steps that are sources of variability (raw milk and ingredient sources, human perception and intervention in the process, capabilities of processing tools, etc.)
- In order to improve the overall performance of cheese manufacturing process, it is necessary to control all the sources of variability. In this view, developing a global vision of the process through the analysis of the whole measurements collected during its course could constitute a powerful lever for optimizing production
- The integration of environmental indicators represents a major challenge for sustainable food production

Scientific context

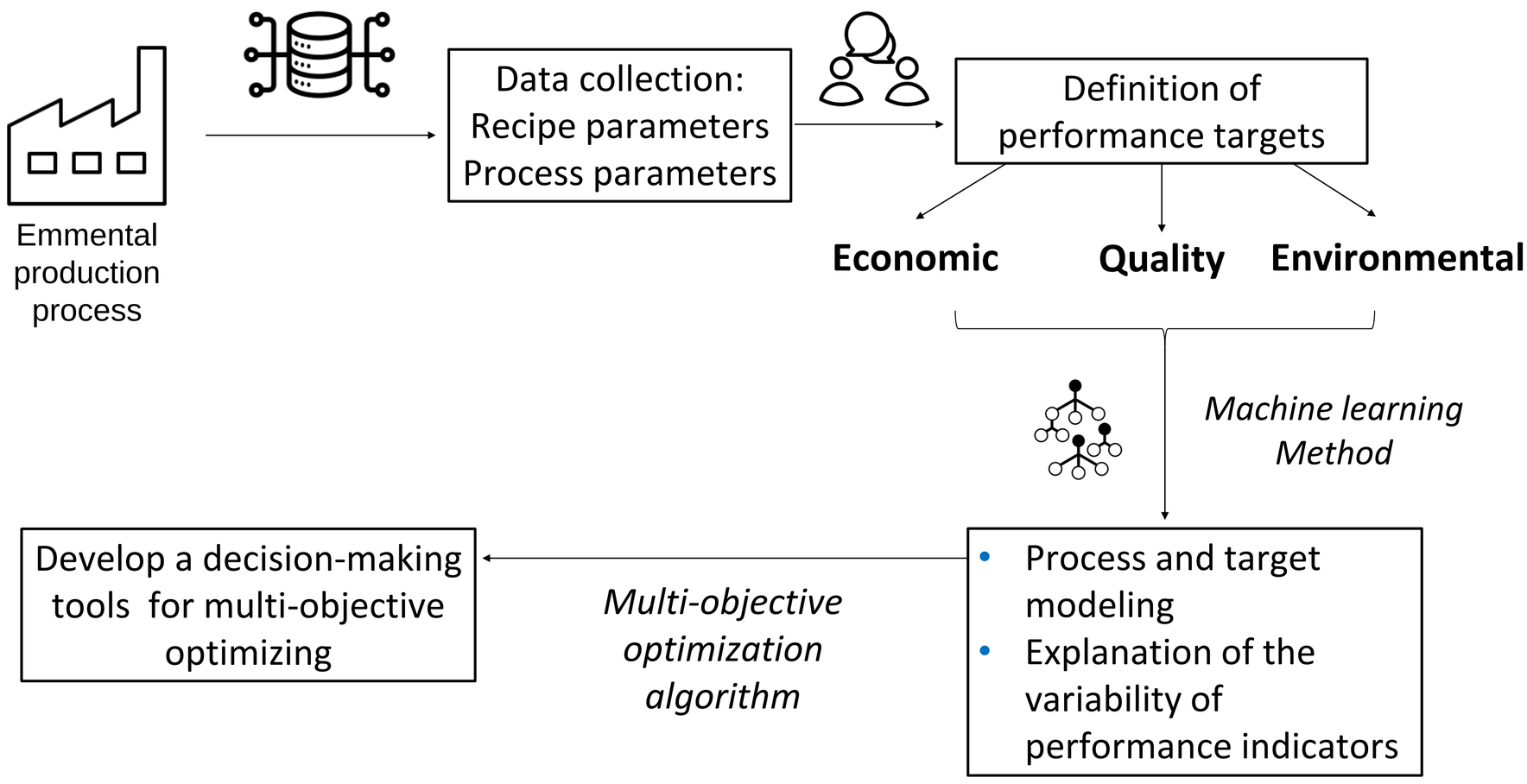
- The data set collected is very large, sometimes redundant and of very different typology, which explains why at present it is imperfectly analyzed in a global manner
- The emergence of artificial intelligence approaches such as machine learning in the industrial field is an interesting lever/way to evaluate and optimize the overall performance of the cheese manufacturing process
- These methods establish relationships, sometimes complex and non-linear, between parameters and performance indicators

Research question

- How can a statistical approach help in optimizing industrial performance ?
  - ➥ Case study of the Emmental production process

Overall strategy

Development of a method for modelling and optimizing the cheese-making process:



Expected results

- Identification of the main parameters influencing the set of performance indicators
- Development of a decision support method using multi-objective optimization

Perspectives

- Check the robustness of the approach by transferring its implementation to another production site
- Create an easy-to-use tool to help industries making the most appropriate decisions in terms of global performance

Funding