Modelling the evolution of demand forecasts in production-inventory systems within uncertain and seasonal environments.

Production and inventory decisions are highly affected by demand distribution and the way demand is modeled. In a production system characterized by long lead times and stochastic seasonal demand patterns, achieving accurate demand forecasts ahead of the selling season is crucial. However, even with the use of advanced forecasting techniques, the accurate prediction of future occurrences remains a challenge. Therefore, a rolling horizon approach is commonly employed in practice, where forecasts and plans are updated over time based on evolving demand information. Successful implementation of planning in a rolling horizon framework relies on the accuracy of the forecast evolution method. Therefore, this thesis aims to develop a probabilistic model to capture the evolution of demand forecasts over time, addressing the challenges posed by stochastic seasonal demand patterns. In particular, the thesis aims to address the following questions:

- What models currently exist for forecasting demand evolution, and how effective are they in handling seasonal demand patterns?
- How can the evolution of demand forecasts for seasonal demand patterns be accurately modeled?
- What are the benefits of utilizing a forecast evolution model within a multi-stage production-inventory planning framework?

To this end, a comprehensive literature review needs to be done to investigate different forecast evolution methods applied in dynamic production and inventory planning frameworks. Additionally, the thesis will develop a method for modeling forecast evolution specifically suited to seasonal demand patterns, addressing uncertainties in both the quantity and timing of demand forecasts. The performance of the proposed evolution model will then be evaluated through a dynamic stochastic production-inventory planning model.