Product-Level Make-to-Order and Make-to-Stock Classification: A Decision-Support Framework for Capacity Balancing at DermaPharm A/S

Master's thesis
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Synopsis:

Denne rapport tager udgangspunkt i DermaPharm A/S, en dansk producent af hudplejeprodukter. Projektet undersøger virksomhedens produktionsplanlægning og de udfordringer, der opstår som følge af høj efterspørgselsvariation, sæsonudsving og begrænset produktionskapacitet. Dette ledte til den initierende problemformulering: *"What operational trade-offs and decision criteria determine product-level suitability for differentiated Make-to-Order, hybrid, and Make-to-Stock planning strategies within a regulated manufacturing environment?"* Gennem kvalitative interviews, procesanalyse og kvantitativ dataanalyse blev virksomhedens nuværende MTO-planlægningssetup analyseret. Analysen identificerede centrale udfordringer relateret til sæsonbestemte kapacitetsbelastninger, reaktiv planlægning, lagerrelaterede risici samt manglende strukturerede beslutningskriterier. Ved hjælp af analyse på efterspørgselsvariation og en kvantitativ pointbaseret vurderingsmodel blev produkter evalueret ud fra efterspørgselsvolumen, efterspørgselsstabilitet og salgskontinuitet med henblik på at identificere potentielle MTS-kandidater. Afslutningsvist udvikles et datadrevet beslutningsværktøj til klassificering af produkter mellem MTO-, hybrid- og MTS-strategier. Gennem sensitivitets- og kapacitetsanalyser vurderes det, hvordan selektiv MTS-produktion kan bidrage til kapacitetsudjævning og reducere planlægningspres. Resultaterne indikerer, at en differentieret hybridstrategi kan forbedre kapacitetsudnyttelsen og skabe en mere stabil produktionsplanlægning uden væsentligt at øge lagerrelaterede risici.

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Preface

The following report was written between February 1, 2026, and May 22, 2026, by a Master's student in the Operations and Supply Chain Management program during their fourth semester at Aalborg University. Generative artificial intelligence (AI) has been applied in this project as an assisting tool for language improvement and to support the development of analytical models.

The project has been assisted by use of the following programs:

- ChatGPT
- Clipto
- Microsoft Excel
- Microsoft Teams
- Overleaf LaTeX
- RStudio

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Introduction 1

1.1 Context Analysis

Manufacturing companies operating in regulated industries face increasing challenges in balancing operational efficiency, responsiveness, and compliance requirements. In skincare and cosmetic production environments, production planning is further complicated by demand variability, seasonality, shelf-life limitations, and strict quality regulations [26, 31].

A central challenge is often the mismatch between fluctuating demand and relatively fixed production capacity. Demand is often influenced by external factors such as weather conditions, market trends, and promotional activities, resulting in highly variable sales patterns across product categories. In particular, seasonal products such as sun care products generate concentrated demand peaks within limited periods, while demand remains significantly lower throughout the year[2, 4, 17].

These fluctuations create operational imbalances within the production system. During peak periods, companies frequently experience bottlenecks, overtime requirements, increased planning pressure, and reduced flexibility. However, low-demand periods may result in underutilized production resources and lower operational efficiency [11, 16].

To manage these challenges, companies typically apply either Make-to-Order (MTO) or Make-to-Stock (MTS) production strategies. Under an MTO strategy, production is initiated in response to confirmed customer orders, which reduces inventory-related risks and limits exposure to product expiry. Alternatively, this approach also increases dependency on short-term demand fluctuations and limits the ability to proactively balance production capacity over time [2, 15].

In contrast, an MTS strategy enables production based on forecasted demand, allowing companies to smooth production, improve capacity utilization, and reduce lead times. Nevertheless, producing in advance introduces inventory-related risks, particularly in industries characterized by expiry constraints and uncertain demand [1, 15, 26, 32].

Consequently, production planning involves a fundamental trade-off between operational efficiency and inventory risk. While MTO minimizes the risk of overproduction and obsolescence, MTS improves production stability and responsiveness but increases exposure to tied-up capital, waste, and non-compliance with shelf-life requirements [11].

These challenges create a need for a structured and data-driven approach to production planning. Rather than applying a uniform strategy across the entire product portfolio, companies must differentiate between products based on characteristics such as demand variability, demand volume, and inventory-related risk [12, 16].

1.2 Introduction to DermaPharm A/S

DermaPharm A/S (DermaPharm) is a Danish manufacturer of environmentally certified and allergy-friendly skincare products with integrated product development and manufacturing facilities in Denmark. In recent years, the company has experienced significant growth in both production volume and product portfolio complexity, increasing the demands placed on production planning and resource coordination[9].

Historically, DermaPharm has operated predominantly according to an order-driven production strategy characterized primarily by MTO principles, although selected products and seasonal categories are partially supported by forecast-driven and stock-based planning elements.

While this approach supports regulatory compliance and reduces exposure to inventory-related risks, it also creates a highly reactive planning environment. In practice, fluctuating demand patterns and seasonal sales peaks contribute to uneven capacity utilization, frequent re-prioritization of production schedules, and reduced planning stability. The empirical findings further indicate that this forecast-supported planning logic is currently applied selectively rather than systematically. In particular, interview findings revealed that approximately 80% of own-label sun care demand is covered through pre-season production, while the remaining share remains flexible in order to respond to demand uncertainty.A.2.

These challenges are particularly evident within the sun care category, where demand is concentrated within limited seasonal periods while production capacity remains relatively fixed throughout the year. At the same time, DermaPharm operates within a regulated manufacturing environment characterized by certification requirements and shelf-life constraints, limiting the feasibility of producing products far in advance [6, 13, 18, 25, 36] A.3.

As a result, the company faces a structural operational trade-off between improving capacity utilization and maintaining low inventory exposure. This creates a need for a more differentiated production planning approach capable of balancing responsiveness, production stability, and inventory-related risk across the product portfolio.

Within this context, the present thesis investigates how selected products may be classified according to differentiated MTO, hybrid, and selective MTS planning strategies. The purpose is not to replace MTO entirely, but to develop a structured and data-driven framework for identifying under which conditions products are suitable for stock-based productionA.5.

1.2.1 Expected Contribution

This thesis contributes both theoretically and practically by developing a quantitative decision-support framework for evaluating product-level suitability for differentiated MTO, hybrid, and selective MTS planning within a regulated skincare manufacturing environment.

From a theoretical perspective, the study extends existing research on hybrid MTO/MTS planning by demonstrating how operational uncertainty, shelf-life constraints, and bottleneck-related workload pressures interact within regulated skincare manufacturing environments. The thesis further contributes by operationalizing these interacting dimensions into a structured product-level decision-support framework for differentiated planning strategy selection[24, 26].

From a practical perspective, the project provides decision support for DermaPharm by identifying products suitable for selective MTS production and evaluating the operational trade-offs associated with such a transition [4, 19].

The framework is intended to support more differentiated and proactive production planning by linking product characteristics and operational constraints to planning strategy selection. Through this, the thesis aims to contribute to improved filling-line workload balancing and planning stability while maintaining compliance, product quality, and controlled inventory risk.

1.3 Initial Problem Identification

Through the context analysis and the presented case, structural inefficiencies within the current production planning environment were identified as a central operational challenge affecting planning stability and filling-line workload balancing at DermaPharm. The company operates predominantly according to a reactive MTO production strategy, which effectively limits inventory-related exposure but simultaneously creates challenges related to workload balancing, production responsiveness, and operational flexibility [2, 26]A.4.

In particular, demand variability and strong seasonal demand concentration appear to create uneven workload distribution across the production system, resulting in underutilized capacity during low-demand periods and operational bottlenecks during seasonal peak periods. Preliminary findings further indicate that these operational pressures are especially concentrated within the filling operations, where increased setup frequency, smaller production runs, and limited line flexibility intensify workload pressure during high-demand periods [15, 35]A.6.

Consequently, fluctuations in demand appear to contribute to continuous reprioritization of production orders, unstable workload distribution, and reduced planning flexibility, thereby negatively influencing operational responsiveness and production stability [29, 32].

At the same time, the cosmetic skincare context introduces additional planning complexity due to shelf-life limitations, certification requirements, and inventory-related constraints [6, 13, 18, 25, 36]A.3.

These conditions increase the risks associated with holding inventory and complicate the applicability of traditional forecast-driven MTS strategies. However, an exclusively reactive MTO environment may simultaneously limit the organization's ability to proactively smooth workload distribution and respond effectively to seasonal demand concentration [2, 22, 24]A.5.

Existing literature increasingly emphasizes that production planning should not necessarily be understood as a binary choice between MTO and MTS, but rather as a differentiated planning continuum where products may require different planning approaches depending on operational conditions and demand characteristics. Within this perspective, hybrid planning approaches emerge as a potentially relevant direction for organizations operating under both demand uncertainty and inventory-related constraints [2, 37].

These conditions collectively create an initial operational trade-off. While forecast-driven or partially stock-based production may contribute to improved workload balancing and planning stability, it simultaneously increases exposure to inventory-related risks such as expiry-related waste and tied-up capital [4, 19]. Within regulated manufacturing environments, these trade-offs are further complicated by operational uncertainty, fluctuating demand behavior, and limited product shelf life [24].

Consequently, there is a need to further investigate how demand behavior, operational constraints, and inventory-related limitations interact within the current production planning environment at DermaPharm. In particular, there is a need to examine whether differentiated planning approaches may support improved workload balancing and planning stability without creating disproportionate inventory-related exposure.

Based on the initial meetings and preliminary assessment outlined in Section A.2, the study therefore investigates the following initial problem statement:

> ***What operational trade-offs and decision criteria determine product-level suitability for differentiated Make-to-Order, hybrid, and Make-to-Stock planning strategies within a regulated manufacturing environment?***

The initial problem identification therefore establishes the preliminary analytical direction of the thesis, which is subsequently refined and operationally validated through the Process Discovery, Process Analysis, and quantitative product evaluation presented in the following chapters.

2 Literature Review

The purpose of literature review is to establish the theoretical and analytical foundation for differentiated production planning at DermaPharm. The review aims to identify the operational dimensions, planning trade-offs, and decision variables most relevant to product-level MTO, hybrid, and selective MTS planning within regulated manufacturing environments characterized by operational uncertainty, seasonal demand concentration, and inventory-sensitive products.

Rather than functioning solely as a descriptive overview of existing literature, the review serves a broader analytical purpose within the structure of the thesis. The objective is therefore not only to define central theoretical concepts, but also to structure the analytical direction of the study by identifying the operational mechanisms and constraints influencing differentiated production planning decisions.

Accordingly, the literature review establishes the conceptual basis for the analytical framework applied throughout the thesis. In particular, the review focuses on how demand behavior, filling-line workload constraints, and inventory-related risks interact to influence planning stability and production strategy selection under uncertainty.

It further supports the development of the quantitative product-classification framework by identifying measurable operational characteristics associated with forecast-driven production suitability. As a result, it provides the theoretical foundation for the Process Discovery, Process Analysis, Data Analysis, and Process Redesign chapters.

Within the overall thesis structure, the role of the literature review is therefore to define the key analytical dimensions that are subsequently:

- observed within the current DermaPharm planning environment,
- analyzed in relation to operational instability and workload concentration,
- quantified through historical demand and operational data,
- and ultimately operationalized into a structured decision-support framework for differentiated product-level MTO/MTS classification.

This chapter therefore functions as the theoretical starting point for the thesis' overall analytical framework and establishes the central concepts guiding the subsequent empirical and quantitative analysis.

2.1 Production Planning Paradigms

2.1.1 MTO, MTS, and Hybrid Production Planning

Production planning literature has long distinguished between MTO and MTS as two fundamentally different approaches to balancing responsiveness, capacity utilization, and inventory exposure [26]. While MTO systems reduce inventory-related risk by initiating production only after confirmed customer demand, MTS systems enable forecast-driven production intended to stabilize operations, improve responsiveness, and smooth resource utilization over time [24].

However, recent research increasingly emphasizes that the distinction between MTO and MTS should not be viewed as binary. Instead, production systems are often positioned along a continuum where planning strategies differ across products, customers, and operational contexts [23]. This shift has led to growing interest in hybrid MTO/MTS systems and customer order decoupling strategies, particularly in environments characterized by uncertain demand, capacity constraints, and perishable inventory.

In regulated manufacturing environments such as skincare and cosmetics production, production planning becomes particularly complex because operational efficiency must be balanced against strict compliance-related constraints. Products are subject to shelf-life limitations, certification requirements, traceability obligations, and customer-specific expiry requirements, all of which reduce planning flexibility and constrain inventory positioning decisions. Seasonal demand fluctuations, high product variety, and constrained filling-line capacity create substantial operational pressure on workload balancing and production responsiveness.

Consequently, the suitability of MTO and MTS planning strategies cannot be evaluated based solely on demand behavior. Instead, planning decisions depend on the interaction between demand variability, inventory-related risk, production flexibility, and product-specific operational constraints under conditions characterized by significant operational uncertainty.

Despite extensive research on MTO and MTS strategies, relatively limited attention has been directed toward regulated manufacturing contexts where shelf-life and compliance requirements significantly constrain forecast-driven production decisions. Existing studies frequently address hybrid planning, demand segmentation, and decoupling strategies in conventional manufacturing settings, while fewer contributions examine how these principles apply in industries exposed to expiry-related risks and strict quality requirements.

This creates a need for a more context-specific and operationally grounded decision framework capable of supporting product-level MTO/MTS classification under uncertainty and shelf-life constraints. Accordingly, the purpose of this literature review is not merely to define existing concepts, but to identify the operational variables and planning trade-offs most relevant to differentiated production strategy selection at DermaPharm.

The review therefore focuses on five interconnected themes:

- Hybrid MTO/MTS strategy design and customer order decoupling

- Demand variability and forecastability
- Shelf-life and perishability constraints
- Filling-line workload balancing and lot-sizing
- Integrated planning and decision-support frameworks

Together, these themes establish the theoretical foundation for the analytical framework and the subsequent development of a quantitative product-classification model.

2.1.2 Approach

The literature review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines [27]. The purpose of applying PRISMA was to ensure a systematic and transparent identification, screening, and selection of literature relevant to product-level MTO/MTS decision-making in regulated manufacturing environments.

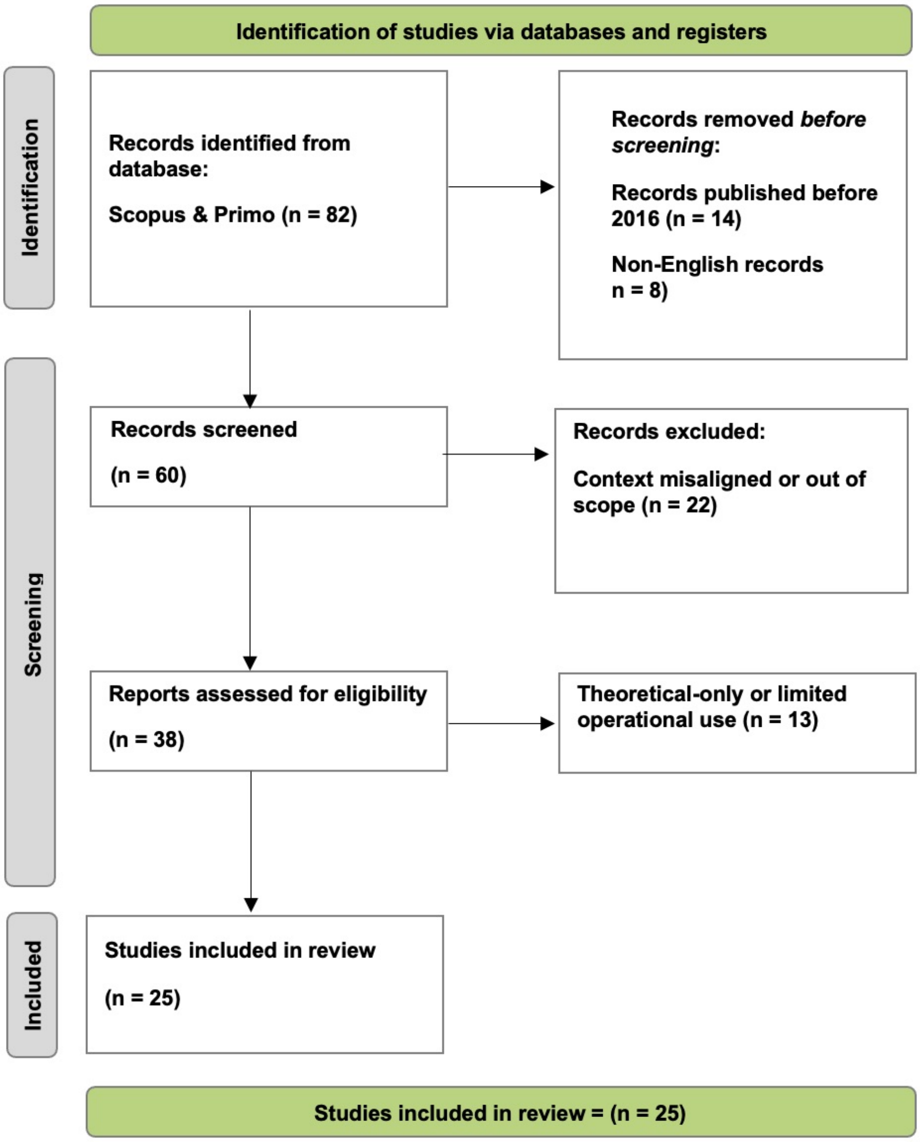

Figure 2.1
Literature Identification and Screening Flowchart According to PRISMA (2020).

Database and Search Query

The Scopus database was used as the primary source for identifying relevant peer-reviewed literature. The search strategy was designed to capture studies related to hybrid production strategies, customer order decoupling, demand variability, shelf-life constraints, and pharmaceutical or cosmetics-related supply chains[14].

The search focused on article titles, abstracts, and keywords in order to ensure conceptual relevance to the operational planning problem addressed in this thesis. To ensure recency and applicability, the search was limited to English-language journal publications from 2016 onward.

Screening and Selection

The initial search yielded 82 records. Following the removal of non-English publications and records published before 2016, the remaining studies were screened for operational relevance.

Studies were excluded if they:

- addressed unrelated contexts outside production planning,
- lacked relevance to MTO/MTS decision-making,
- focused primarily on technical or mathematical model formulation without operational applicability,
- or were purely conceptual without practical planning implications.

Following the screening process, 25 studies were retained for detailed analysis.

Analytical Approach

The selected studies were analyzed inductively in order to identify recurring operational themes, planning constraints, and decision variables relevant to differentiated MTO/MTS planning.

Rather than reviewing studies individually, the analysis focused on identifying common patterns across the literature concerning:

- conditions supporting forecast-driven production,
- determinants of inventory-related risk,
- operational implications of demand variability,
- and the role of structured decision-support in hybrid production environments.

The identified themes form the basis for the subsequent analytical framework and product-classification logic developed in this thesis.

2.1.3 Results

The reviewed literature consistently identifies production strategy selection as a multi-dimensional planning problem shaped by the interaction between demand characteristics, operational constraints, and inventory-related risks.

Across the reviewed studies, five central themes emerge as particularly relevant for evaluating product-level MTO/MTS suitability in regulated manufacturing environments:

- hybrid strategy design and customer order decoupling,
- demand variability and forecasting,
- shelf-life and perishability constraints,
- filling-line workload balancing and lot-sizing,
- and integrated planning and decision-support.

Importantly, these themes are highly interconnected. Demand predictability influences the feasibility of forecast-driven production, while shelf-life constraints limit the acceptable inventory horizon. Similarly, the operational benefits of MTS depend on whether forecast-driven production contributes to improved filling-line workload balancing without introducing disproportionate inventory exposure.

Hybrid Strategy Design and Customer Order Decoupling

A recurring conclusion in the literature is that production systems rarely operate as purely MTO or MTS environments. Instead, Instead, Adan et al. and Harfeldt-Berg et al. emphasize hybrid planning approaches in which products are differentiated according to operational and market-related characteristics [2, 23].

Central to this discussion is the customer order decoupling point (CODP), which Harfeldt-Berg et al. describe as the boundary separating forecast-driven upstream activities from order-driven downstream activities. Similarly, Olhager argues that the positioning of the CODP significantly influences inventory exposure, responsiveness, and production flexibility. while Wemmerlöv et al. further emphasize its importance in product segmentation and differentiated planning structures[23, 26, 37].

The literature further indicates that hybrid strategies become particularly relevant in environments where products differ substantially with respect to demand predictability, operational complexity, and shelf-life constraints. Adan et al. argue that the suitability of MTS production cannot be evaluated uniformly across an entire product portfolio, but instead requires product-level differentiation[2].

Demand Variability and Forecastability

Pathy et al. argue that demand variability emerges as one of the most influential determinants of MTS suitability throughout the reviewed literature. This perspective is supported by Syntetos et al. who discuss that forecast-driven production is operationally viable primarily when demand patterns are sufficiently stable and predictable. In contrast, Trapero et al. highly suggests that volatile or intermittent demand increases forecast uncertainty and significantly raises the risk of overproduction and inventory obsolescence [30, 33, 35].

Importantly, the literature positions demand variability not merely as a descriptive characteristic, but as a critical classification variable in production planning. Syntetos et al. therefore argue that production strategy selection should be based on measurable demand behavior rather than generalized planning logic[33].

The findings are particularly relevant in contexts characterized by strong seasonal fluctuations, where Kumar et al. emphasize that concentrated demand peaks create substantial pressure on production capacity[20].

Shelf-Life and Perishability Constraints

While stable demand may support MTS planning, the literature consistently emphasizes that perishability constraints fundamentally limit the feasibility of stock-based production.

Polotski et al. argues that, for products subject to expiry limitations, remaining shelf-life requirements effectively define the maximum acceptable inventory horizon. Similarly, Nahmias et al., Liu et al., and van Donselaar et al. emphasize, production planning decisions must account not only for forecastability, but also for the risk of obsolescence, waste, and non-compliance[10, 20, 22, 24].

Within regulated manufacturing and pharmaceutical supply chain research, Shah and Papathanasiou et al. and Ketzenberg et al. further argue that shelf-life constraints must be integrated directly into lot-sizing and replenishment decisions, as traditional inventory optimization approaches often fail to capture expiry-related operational risks adequately[19, 28, 31].

These findings suggest that MTS suitability depends on balancing forecast reliability against acceptable inventory exposure.

Filling-Line Workload Redistribution and Lot-Sizing

Another central theme within the literature concerns the relationship between production strategy, filling-line workload redistribution, and operational stability.

Beemsterboer et al. associate MTO systems with reduced inventory exposure but increased planning instability, uneven workload distribution, and frequent production reprioritization. In contrast, Kim et al. as well as Kuthambalayan et al. argue that MTS systems may contribute to smoother production flows and improved filling-line workload redistribution, particularly within environments characterized by seasonal demand concentration and recurring demand patterns[12, 34].

However, Rossi et al. emphasize that the operational benefits of forecast-driven production depend heavily on how production batches, bottlenecks, and resource dependencies are managed throughout the production system. According to Slack et al., in practice, selective MTS production may reduce workload pressure in one part of the system while simultaneously shifting bottlenecks elsewhere[29, 32].

This highlights the importance of evaluating production strategy decisions in relation to the broader operational system rather than individual products in isolation. Consequently, Chen et al. mentions that production strategy selection should not solely focus on inventory reduction or forecast responsiveness, but also on how differentiated planning strategies influence operational stability, workload distribution, and bottleneck behavior across the production environment.[4]

Integrated Planning and Decision Support

Liu et al. and Xu et al. advocate the importance of structured and data-driven planning frameworks capable of integrating demand behavior, bottleneck-related workload constraints, and inventory-related risks into production planning decisions[22, 38].

Rather than relying exclusively on experience-based planning logic, Pasupuleti et al. advocate the use of differentiated classification approaches and decision-support systems to guide production strategy selection under operational uncertainty.[3]

Across the literature, Fisher and Syntetos et al. argue that demand predictability and inventory-related risk consistently emerge as the two dominant dimensions underlying MTO/MTS decision-making. At the same time, Slack and Rossi et al. highlight that bottleneck structures, setup dependencies, and workload concentration significantly influence the practical suitability of forecast-driven production strategies[16, 29, 32, 33].

Together, these findings support the development of a product-level classification framework integrating measurable operational characteristics into differentiated MTO, hybrid, and selective MTS planning decisions.

2.1.4 Concluding Remarks

Overall, the literature demonstrates that MTO/MTS strategy selection should be understood as a multi-dimensional operational trade-off rather than a binary strategic choice. Across the reviewed studies, three interconnected dimensions consistently emerge as central determinants of product-level production strategy selection:

- demand characteristics,
- filling-line workload constraints,
- and inventory-related risks.

Within regulated manufacturing environments, these dimensions collectively influence the operational suitability of products for MTO, hybrid, and selective MTS planning strategies.

Accordingly, the literature review establishes the theoretical foundation for the analytical framework applied throughout the thesis by defining the relationships between demand behavior, filling-line workload redistribution requirements, and inventory-related exposure within differentiated production planning environments.

Across the reviewed studies, demand predictability and inventory-related risk consistently emerge as the primary determinants influencing product suitability for selective MTS production.

At the same time, the literature further highlights that the operational implications of production strategy selection depend heavily on context-specific factors such as bottleneck positioning, filling-line workload constraints, setup dependencies, product variety, and regulatory requirements.

While existing research provides substantial insight into hybrid planning systems and differentiated production strategies, relatively limited attention has been directed toward regulated manufacturing environments characterized by expiry constraints, filling-line bottlenecks, and strict compliance requirements.

This gap motivates the analytical direction of the present thesis. Accordingly, the subsequent analysis focuses on evaluating how demand characteristics, filling-line workload constraints, and inventory-related risks can be integrated into a structured decision-support framework for product-level MTO/MTS classification at DermaPharm.

Collectively, these dimensions represent interconnected sources of operational uncertainty within the production planning environment. Consequently, the analytical direction of this thesis is grounded in understanding how demand-related uncertainty, filling-line workload constraints, and inventory-related exposure influence differentiated production planning decisions at product level.

Figure 2.2 illustrates the overall analytical framework applied throughout the study. The framework integrates the key operational dimensions identified in the literature and structures the relationship between product characteristics, filling-line workload redistribution requirements, inventory-related exposure, and differentiated planning strategy selection.

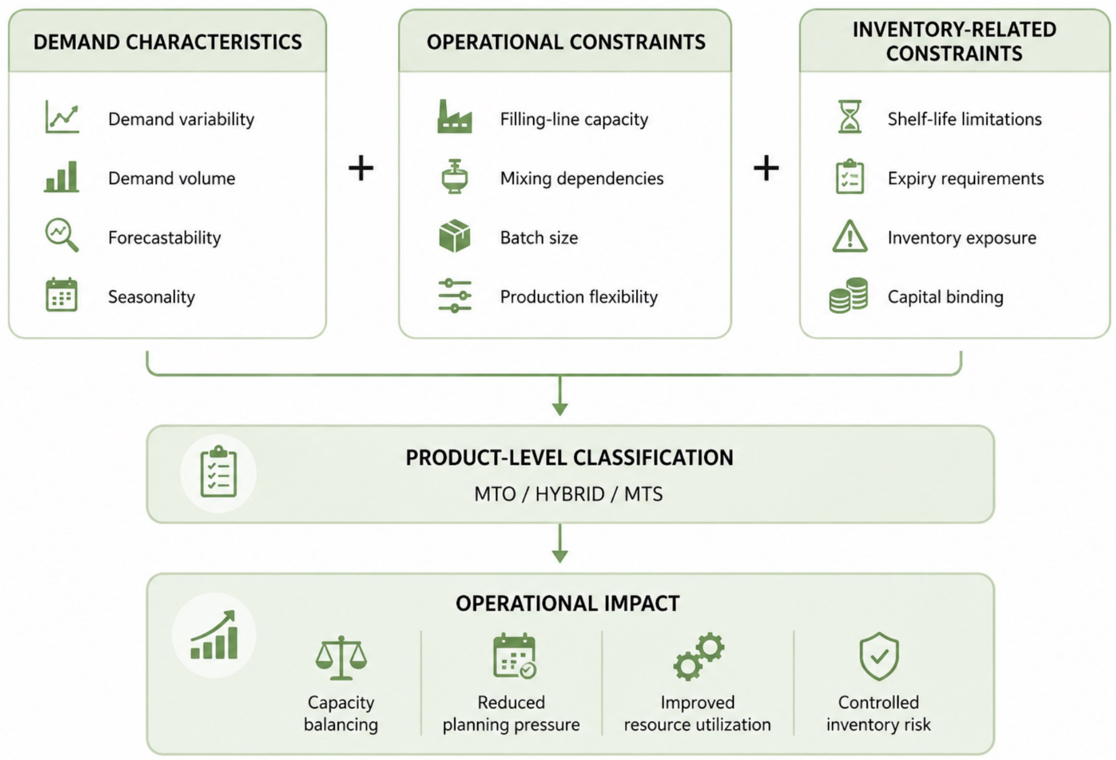

Figure 2.2
Overall analytical framework for product-level MTO/MTS classification.

This serves as the central decision architecture throughout the thesis. The Process Discovery and Process Analysis examine how these dimensions appear within the current DermaPharm planning environment, while the Data Analysis quantitatively evaluates the identified operational characteristics and demand behavior across the product portfolio. Finally, the Process Redesign applies these dimensions into a structured decision-support framework for differentiated product-level MTO/MTS classification.

Methodology 3

3.1 Project Framework

To ensure a systematic approach to addressing the identified problem, the study adopts the Business Process Management (BPM) framework proposed by Dumas [11]. The BPM framework provides a comprehensive methodology for analyzing, evaluating, and improving organizational processes by combining qualitative insights with data-driven analysis [11]. Its relevance in this project stems from the need to move from a reactive and experience-based production planning approach towards a more structured and data-driven decision-making process [1].

The BPM framework is particularly suitable in this context, as it enables the identification of inefficiencies within existing processes and supports the development of improved operational strategies [11]. In the case of DermaPharm, where production planning is influenced by demand variability, capacity constraints, and shelf-life limitations, a systematic framework is required to ensure that improvements are both analytically grounded and practically applicable [32].

3.1.1 BPM Life-Cycle Overview

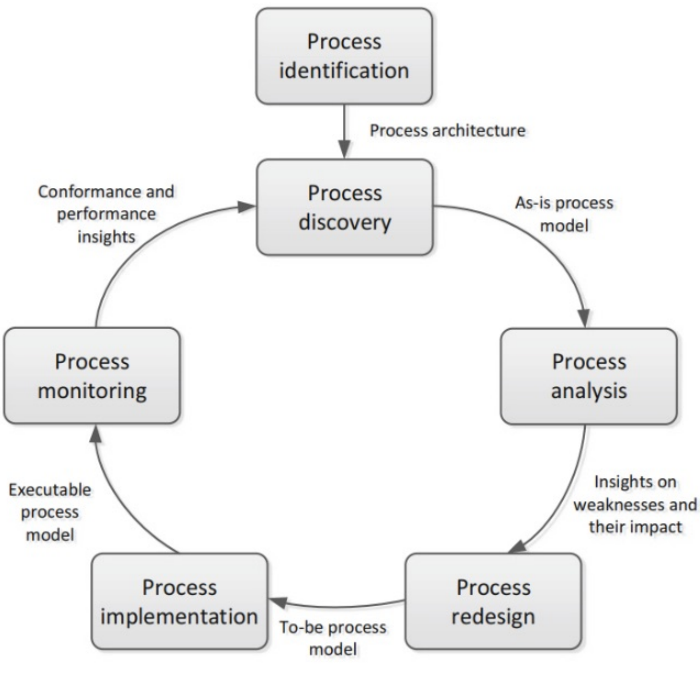

Figure 3.1
Visualization of the BPM Life-Cycle Phases [11]

Figure 3.1 illustrates the BPM Life-Cycle, which begins with an initial phase of process identification. In this startup phase, processes relevant to the problem are defined and scoped, laying the groundwork for subsequent steps. Following process identification, an iterative cycle commences, comprising five phases:

- *Process Discovery*: Examining and mapping current processes to establish a baseline.
- *Process Analysis*: Identifying inefficiencies, bottlenecks, and areas for improvement.
- *Process Redesign*: Proposing changes and innovations that address issues uncovered during analysis.
- *Process Implementation*: Executing the redesigned processes within the real-world context.
- *Process Monitoring*: Tracking and evaluating performance to ensure sustained process effectiveness.

The BPM Life-Cycle consists of an initial process identification phase followed by an iterative cycle of five phases: process discovery, process analysis, process redesign, process implementation, and process monitoring. These phases collectively support a structured progression from understanding existing processes to developing and evaluating improved solutions. Within the scope of this thesis, the BPM framework is specifically applied to the production planning and order fulfillment processes at DermaPharm, with particular focus on how demand fluctuations, filling-line constraints, procurement dependencies, and inventory-related considerations influence workload balancing and differentiated MTO/MTS planning decisions[11].

The purpose of applying the BPM Life-Cycle in this project is to ensure a logical and transparent transition from problem identification to solution development. Each phase builds upon the insights generated in the previous phase, thereby creating a coherent analytical flow throughout the project [1].

The Process Identification phase is considered predefined in this project, as the problem area has already been established in collaboration with DermaPharm. The focus is therefore directed towards the subsequent phases of the BPM Life-Cycle.

Within the scope and time constraints of this project, the analysis is limited to the initial phases of the BPM Life-Cycle, namely process discovery, process analysis, and process redesign. These phases enable a detailed understanding of the current production planning approach, the identification of key inefficiencies, and the development of a data-driven decision framework. The later phases as process implementation and process monitoring, are not executed but are instead addressed as part of the discussion and recommendations for future work.

3.1.2 Research Approach

The methodological approach of this thesis is primarily abductive, as the study continuously moves between theoretical understanding and empirical observations throughout the analytical process.

Rather than testing predefined hypotheses deductively, the research iteratively combines literature-based operational concepts with qualitative and quantitative findings from the

DermaPharm case in order to develop a context-specific decision-support framework for differentiated production planning.

The study can further be characterized as an exploratory case study, since the objective is to generate operational understanding and develop practically applicable planning logic within a real-world manufacturing environment characterized by substantial operational complexity and operational uncertainty.

3.1.3 Information and Data Gathering

To establish a comprehensive understanding of the production planning environment at DermaPharm, the study applies a mixed-methods approach combining qualitative and quantitative data sources [7].

The integration of qualitative and quantitative insights is particularly important within production planning contexts, where operational decisions are influenced both by measurable system conditions, such as demand behavior and capacity utilization, and by tacit organizational knowledge embedded within planning practices and decision-making processes [3].

Accordingly, the qualitative methods support contextual and process-oriented understanding, while the quantitative analysis enables systematic evaluation of demand characteristics and operational patterns across the product portfolio. Together, these approaches establish the empirical and analytical foundation for the subsequent framework development and product-level classification analysis.

Qualitative Data Collection

The qualitative data collection is based on semi-structured interviews conducted with key stakeholders at DermaPharm, including representatives from production planning, supply chain, and operations. The purpose of these interviews is to gain insight into the current production planning processes, decision-making practices, and operational challenges [21].

The interviews provide an understanding of how production decisions are made in practice, how demand variability is managed, and how constraints such as capacity and shelf-life influence planning. Furthermore, the qualitative insights contribute to identifying inefficiencies and inconsistencies within the current system that may not be directly observable in quantitative data [3].

Date	**Objective**	**Participant**	**Topics in Focus**
06/02/2026	Initial meeting	Allan Kousted Head of Planning, PT & Logistics	Initial problem identification, current planning challenges, seasonal demand pressure, MTO planning environment and filling-line workload issues
13/02/2026	Production-related interview	Allan Kousted Head of Planning, PT & Logistics	Production process structure, filling-line operations, planning dependencies, operational bottlenecks and production responsiveness
27/02/2026	MTS-related interview	Allan Kousted Head of Planning, PT & Logistics	Hybrid MTO/MTS planning, selective pre-production, workload redistribution, planning flexibility and inventory-related risk
19/03/2026	Data and warehouse interview	Allan Kousted Head of Planning, PT & Logistics	Warehouse processes, inventory structure, shelf-life considerations, inventory visibility and operational data availability
26/03/2026	Data-related interview	Allan Kousted Head of Planning, PT & Logistics	Production flow structure, planning-related data quality, shelf-life filtering, historical demand data, item-number consistency and operational data limitations
31/03/2026	Data and procurement interview	Allan Kousted Head of Planning, PT & Logistics	Procurement dependencies, supplier lead times, raw material planning, purchasing constraints and upstream planning dependencies
01/04/2026	Data-related interview	Allan Kousted Head of Planning, PT & Logistics	Demand data interpretation, workload variability, forecast limitations, operational filtering and candidate selection logic
10/04/2026	Operations-related interview	Allan Kousted Head of Planning, PT & Logistics	Production KPIs, filling-line efficiency, due-date performance, operational disruptions, replanning practices, workload variability, labor flexibility and seasonal demand effects
18/05/2026	Capacity-related interview	Allan Kousted Head of Planning, PT & Logistics	Filling-line bottlenecks, workload redistribution, hybrid MTO/MTS planning, seasonal filling-line pressure, overtime mechanisms and selective pre-production, inventory-related risk

Table 3.1

Overview of conducted interviews and primary analytical focus areas.

Quantitative Data Collection

In addition to the qualitative insights obtained through interviews, facility walkthroughs, and process observations, a quantitative data collection approach is applied to support an objective and data-driven evaluation of the identified operational challenges. The quantitative approach is guided by the findings from the qualitative phase, which inform the selection of relevant operational variables, planning indicators, and analytical performance measures [7].

The quantitative dataset consists primarily of historical ERP-based operational and demand-related data obtained from DermaPharm. The extracted data includes product-level information related to demand volume, order frequency, production quantities, inventory characteristics, and planning-relevant operational variables across the selected analysis period. The purpose of the quantitative data collection is to establish a measurable foundation for evaluating demand behavior, workload concentration, and operational planning conditions within the current predominantly MTO production environment.

To ensure analytical relevance, the extracted dataset was filtered and structured in collaboration with the Head of Planning, PT & Logistics. The data preparation process included removal of incomplete observations, discontinued products, inconsistent item registrations, and records not considered operationally relevant for the scope of the thesis. Furthermore, the dataset was reviewed to ensure consistency between operational practice and analytical interpretation of the extracted ERP information.

The collected data supports the subsequent quantitative evaluation of demand variability, demand continuity, demand volume, and inventory-related constraints across the product portfolio. In particular, the quantitative data collection enables the identification of products exhibiting operational characteristics potentially compatible with differentiated MTO, hybrid, and selective MTS planning strategies [15].

By integrating qualitative operational insights with quantitative ERP-based analysis, the thesis establishes a comprehensive analytical foundation for evaluating differentiated production planning strategies under operational uncertainty. Collectively, the qualitative and quantitative data collection approaches support the development of a structured decision-support framework for product-level MTO/MTS classification within the DermaPharm production environment.

4 Process Discovery

The purpose of the Process Discovery is to examine how the operational dimensions identified in the literature review appear within the current production planning environment at DermaPharm. The chapter focuses specifically on how demand variability, filling-line constraints, inventory-related limitations, and forecast-supported planning influence the existing production planning logic and workload distribution practices.

The objective is to establish a process-oriented understanding of how production planning is currently performed, where operational instability occurs, and which factors constrain planning flexibility within the predominantly MTO-based production environment.

Particular focus is directed toward how seasonal demand concentration, procurement lead times, filling-line dependencies, and limited forecast integration contribute to reactive scheduling behavior and uneven workload distribution across the production system.

This provides the empirical foundation for the subsequent Process Analysis, where the identified operational conditions are further examined in relation to filling-line workload imbalance, inventory-related risk, and product suitability for differentiated MTO/MTS planning strategies [11, 26].

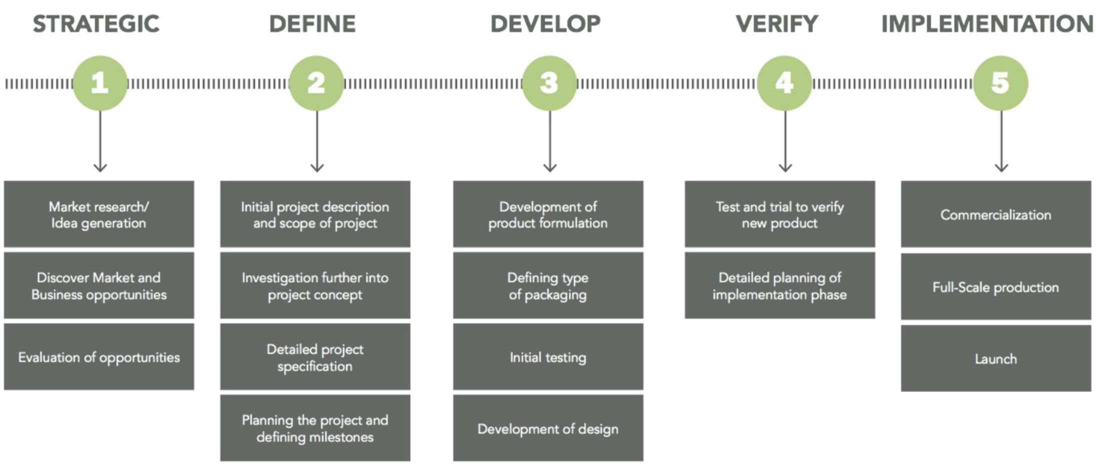

Figure 4.1
Production Planning Dependencies

Figure 4.1 illustrates the upstream organizational dependencies influencing production planning activities at DermaPharm. Although the primary focus of this thesis is production planning rather than product development itself, the figure is included to demonstrate how approval processes, procurement activities, packaging readiness, and compliance-related requirements influence planning responsiveness and production scheduling flexibility.

In practice, production planning is not solely determined by customer demand and filling-line availability, but also by upstream dependencies affecting when production orders can be released into the production system. According to the interviews, production scheduling may be delayed by factors such as formulation approval, packaging validation, customer-specific modifications, procurement lead times, and compliance-related verification activities [5].

Consequently, production planning operates within a constrained environment where scheduling flexibility is influenced both by operational resource availability and by cross-functional dependencies extending beyond the production department itself.

4.1 Current Production Planning System

The current production planning environment at DermaPharm operates predominantly according to a reactive MTO logic, where production activities are initiated based on confirmed customer demand. While this planning approach reduces inventory-related exposure and supports compliance with shelf-life and certification requirements, it simultaneously limits the organization's ability to proactively balance filling-line workload and stabilize production capacity utilization over time.

The planning environment is particularly challenged by seasonal demand concentration within the sun care category, where demand peaks occur within relatively limited periods while production capacity remains comparatively fixed throughout the year. Consequently, production planning frequently involves continuous reprioritization of orders, short-term scheduling adjustments, and reactive workload redistribution across filling lines.

The interviews further indicate that production planning flexibility is constrained not only by customer demand variability, but also by procurement lead times, filling-line allocation constraints, packaging availability, and limited forecasting integration within the current planning setup.

As a result, the organization operates within a planning environment characterized by a structural trade-off between responsiveness, workload balancing, and inventory-related risk.

A key characteristic of the planning environment is that production decisions are not solely driven by demand volume and customer orders, but also by certification requirements, traceability obligations, and limited shelf-life. DermaPharm's product portfolio includes products subject to certifications such as the Nordic Swan Ecolabel, ECOCERT/COSMOS, and the Danish Asthma and Allergy Association. These requirements influence production timing, inventory policies, and replenishment flexibility, thereby making the planning environment more constrained than conventional consumer goods manufacturing environments [28, 31].

4.1.1 Organizational Context of Production Planning

To establish an overall understanding of the operational environment influencing production planning at DermaPharm, the organizational context surrounding planning activities was examined based on interviews, facility walkthroughs, and internal operational documentation.

Appendix Figure A.1 provides a high-level overview of the organizational functions connected to the production system, including procurement, warehouse operations, production, development, and compliance-related activities. The overview illustrates that production planning operates within a broader cross-functional environment where multiple organizational functions collectively influence planning conditions A.2.

In practice, production planning is affected not only by customer demand and filling-line availability, but also by raw material availability, packaging readiness, procurement lead times, and compliance-related approval activities. Consequently, planning flexibility is influenced by dependencies extending beyond the production department itself.

The purpose of the overview is therefore to establish contextual understanding of the operational environment within which production planning activities are embedded. The subsequent sections focus more specifically on scheduling practices, workload balancing challenges, and operational planning constraints identified at DermaPharm.

4.1.2 Demand Creation and Upstream Commercial Dependencies

In addition to operational and procurement-related dependencies, commercial activities also influence production planning conditions and workload concentration.

Appendix Figure A.7 illustrates the BtC marketing and campaign planning process at DermaPharm. The overview demonstrates how marketing campaigns, promotional activities, seasonal initiatives, and product launches influence demand timing and workload concentration within the production environment.

Consequently, demand variability is not solely generated through external customer purchasing behavior, but may also originate from internally initiated commercial activities contributing to concentrated order patterns and seasonal workload pressure.

The interviews further indicate that the current production environment operates predominantly according to a MTO logic supplemented by limited forecast-driven and stock-based planning elements. According to management, selective MTS production currently functions primarily as a short-term planning buffer rather than as a dominant production strategy, contributing approximately 5% planning flexibility within the existing operational setup A.8.

Management further emphasized that increased flexibility through selective pre-production could support improved filling-line workload redistribution and reduce operational planning pressure during seasonal peak periods A.5.

4.2 Order-Driven Production Planning Process

The current production planning process at DermaPharm is predominantly initiated by incoming customer orders. Once a customer order is received, the requested delivery timing is evaluated against available filling-line capacity and current production schedules. Subsequently, the organization assesses whether the required raw materials and packaging components can be procured within the requested delivery horizon.

If procurement lead times exceed the required delivery timing, production orders must either be postponed or continuously reprioritized within the existing production schedule. Consequently, production planning is constrained not only by overall resource availability, but also by the interaction between demand timing, supplier lead times, material availability, and filling-line-specific production constraints [29, 32].

An additional operational complexity is that DermaPharm operates with 18 different filling lines, where not all products can be produced across all lines A.2. As a result, even when overall production resources appear available, the relevant filling line may already be occupied or operationally constrained.

The interviews indicate that production planning therefore becomes a highly dynamic short-term scheduling activity characterized by continuous reprioritization of production orders in response to fluctuating customer demand, material availability, and operational bottlenecks. This contributes to reduced planning stability, limited operational flexibility, and increased planning complexity, particularly during periods of seasonal demand concentration and elevated filling-line workload pressure A.8.

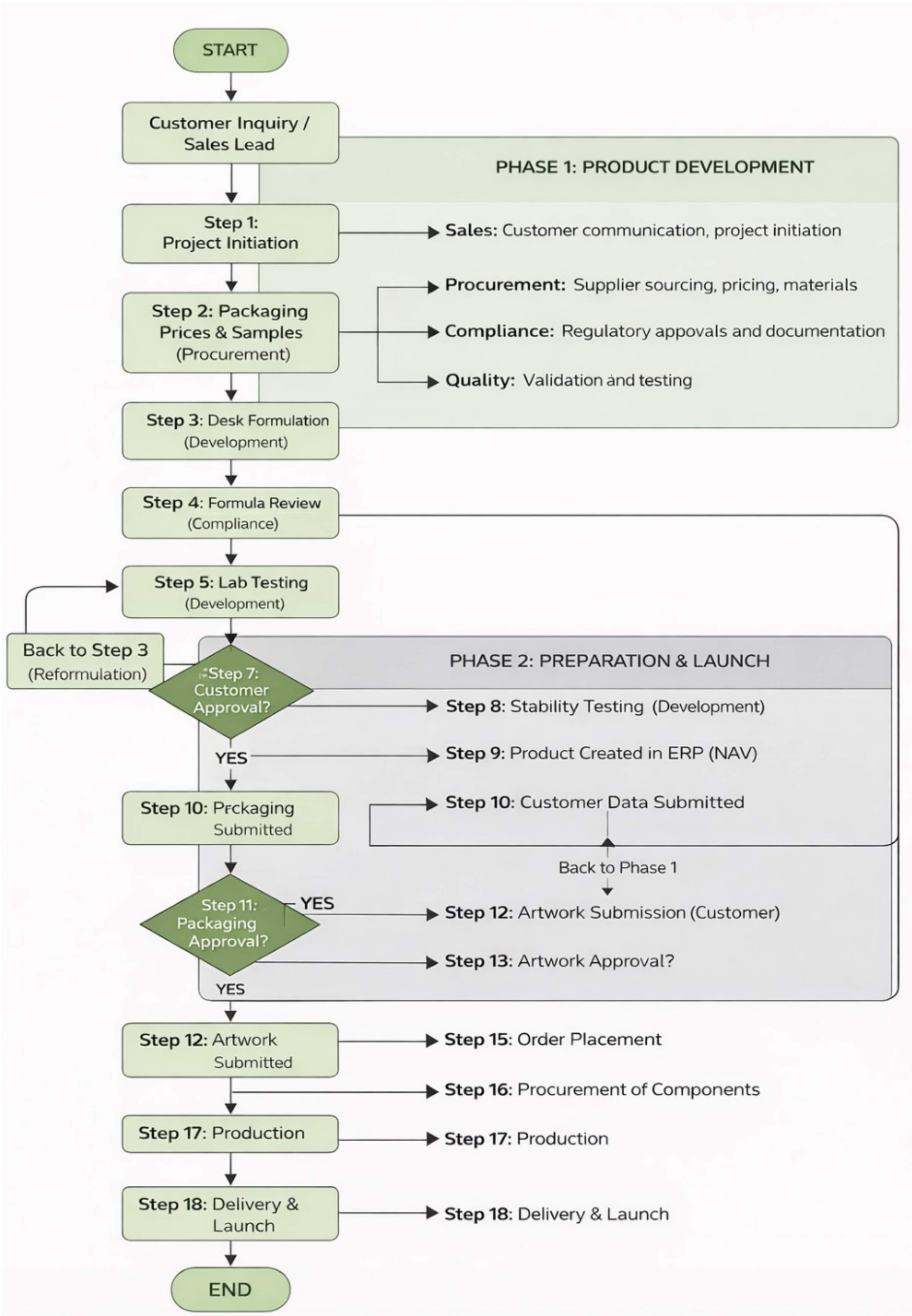

Figure 4.2

Order Fulfillment and Planning Dependencies

Figure 4.2 illustrates the operational dependencies preceding production order release at DermaPharm. The model highlights how production planning activities are influenced by upstream approval stages, procurement activities, packaging validation, and customer-specific verification processes before production can be finalized and scheduled.

In particular, formulation approval, packaging approval, and procurement readiness may delay production order release and reduce short-term planning flexibility. Consequently, production scheduling remains partially reactive, as production activities cannot always be finalized until upstream dependencies have been resolved [5].

The figure therefore illustrates how production planning responsiveness is influenced not only by filling-line capacity and demand timing, but also by organizational lead times and approval-related dependencies affecting scheduling flexibility.

4.2.1 Physical Production and Material Flow

In addition to the planning flows, the physical production and material flows within the facility were mapped in order to identify operational dependencies and bottleneck interactions affecting production responsiveness and workload balancing.

Appendix Figure A.2 illustrates the physical movement of materials and products between warehouse operations, mixing activities, filling operations, packaging processes, and finished goods storage.

The mapped flow highlights substantial operational interdependence between warehouse operations, mixing activities, and filling lines. In particular, the filling operations function as a central coordination point connecting upstream mixing activities with downstream packaging and warehousing processes.

Consequently, operational instability and workload concentration within the filling environment may propagate throughout the broader production system during periods characterized by high demand intensity.

The interviews further indicate that this order-driven planning logic becomes particularly problematic during seasonal peak periods. In the case of sun care products, demand is highly concentrated within the spring months, while production capacity remains relatively fixed throughout the year A.2, A.6.

According to management, the operational objective is therefore not solely to maximize short-term output during peak periods, but rather to achieve a more balanced workload distribution throughout the year in order to reduce seasonal overload situations and improve planning stability A.5.

4.3 Forecast-Supported and MTS Elements

Although the current planning system is predominantly MTO-based, the interviews reveal that selected products and customers already exhibit planning behavior resembling forecast-supported and partially MTS-oriented logic.

This is particularly evident for high-volume and more predictable products, as well as for customers providing sufficiently reliable forecasts to support procurement planning and capacity reservation in advance A.3.

The Matas case was explicitly mentioned as an example of a customer whose forecasting behavior makes certain products suitable candidates for more forecast-driven planning logic. However, the interviews also emphasize that stable historical sales alone are insufficient as a planning basis, since observed sales patterns may reflect delayed deliveries, supplier constraints, or operational disturbances rather than actual market demand A.5.

The customer and order-fulfillment analysis further supports the observation that parts of the current planning environment already operate according to partially forecast-driven logic.

The data provided by DermaPharm showed that several major customers provide forecast information through formal forecasts, Electronic Data Interchange (EDI), or customer order portals, while only a smaller share relies entirely on manual order placement.

In total, the overview identified ten customers providing forecast-related planning input in some form, including forecast files, EDI integration, or portal-based demand visibility.

Additionally, the customer overview revealed that multiple customers are already managed according to hybrid or partially MTS-oriented replenishment principles rather than strict reactive MTO logic. These findings indicate that elements of proactive planning, demand anticipation, and pre-production already exist within the operational environment, despite the overall planning system remaining predominantly MTO-based.

Consequently, the findings reinforce that the managerial challenge at DermaPharm is not whether forecast-driven planning should exist, but rather how forecast-supported and selective MTS principles can be applied more systematically and consistently across products and customers with suitable operational characteristics.

For own-label products, DermaPharm is already considerably more willing to accept inventory-related risk. According to the interviews, approximately 80% of own-label sun care production is produced during autumn and held for later seasonal demand, while the remaining share is kept flexible for spring demand A.2.

This indicates that the company already differentiates between product categories within its planning logic and accepts a higher degree of stock-based production where demand predictability and operational conditions make the associated risk manageable.

For private-label products, however, the same planning logic is more difficult to apply, as it requires customer willingness to accept earlier production and the associated capital commitment A.5.

This distinction suggests that the relevant managerial issue is not whether DermaPharm should move entirely from MTO to MTS, but rather how to identify which products are operationally suitable for selective stock-based production under specific conditions.

Importantly, the interviews indicate that the purpose of selective MTS production is not inventory accumulation itself, but rather strategic workload redistribution across time. In practice, partial pre-production is viewed as a mechanism for reducing seasonal filling-line pressure and improving planning stability rather than maximizing inventory availability A.8.

4.4 Capacity Balancing and Seasonal Planning Constraints

A central discovery within the current planning environment is that capacity balancing represents a major operational challenge. The seasonality of sun care products creates substantial peaks in filling-line demand, while both labor availability and machine capacity remain relatively stable throughout the year A.3.

The interviews further indicate that the primary operational bottleneck is not located within the mixing operations, but rather within the filling activities during seasonal peak periods.

During high season, large batches of standardized sun care products can be produced relatively efficiently within the mixing process. However, operational pressure increases significantly within the filling operations when the production mix shifts toward many smaller product variants, shorter production runs, and increased setup frequency.

Consequently, the operational challenge is not solely related to total production capacity, but more specifically to filling-line flexibility, setup intensity, and the organization's ability to smooth workload concentration across time.

4.4.1 Facility-Level Operational Flow and Bottleneck Structure

To further understand the operational dependencies affecting planning responsiveness and workload balancing, facility-level flow mapping was conducted based on internal layout drawings and operational walkthroughs.

The operational flow mappings presented in Appendix Figures A.4 and A.5 visualize how production flows physically move through the facility and identify operational interaction points between warehouse, mixing, and filling activities.

The mappings illustrate that filling operations constitute a central coordination point between warehouse replenishment, mixing operations, and outbound logistics. This reinforces the interview findings identifying filling-line workload concentration as one of the primary operational bottlenecks during high-demand periods.

Furthermore, the interviews indicate that workload pressure within the filling operations may propagate upstream toward mixing operations and downstream toward packaging and warehouse activities during seasonal peak periods.

As a partial response, the company currently applies variable weekly working hours to slightly increase labor capacity during the busiest months. This arrangement is implemented according to the Danish Industry (DI) framework for variable weekly working hours, allowing DermaPharm to redistribute labor availability across fluctuating workload periods. However, the interviews indicate that this mechanism only provides limited relief and does not fundamentally resolve the mismatch between seasonal demand concentration and fixed production resources [8], A.5.

The interviews further reveal that DermaPharm currently applies three primary mechanisms to manage short-term capacity pressure:

- temporary labor through the use of external workers,
- variable weekly working hours,
- and extended customer lead times during peak periods.

However, management emphasized that these mechanisms only provide limited operational flexibility. In particular, the effectiveness of temporary labor is constrained by workforce specialization and operational complexity within the filling operations, where excessive reliance on inexperienced workers may reduce overall operational efficiency A.8.

Similarly, variable working hours primarily redistribute labor availability rather than fundamentally resolving seasonal workload concentration. When these mechanisms become insufficient, the organization instead smooths demand operationally by extending customer lead times during peak periods.

Another important finding is that the planning problem does not only concern the filling department. The interviews highlight substantial interdependence between mixing and filling operations. Large production batches can support filling efficiency and reduce pressure on the mixing operation, whereas many smaller batches create imbalance and make it difficult for mixing to supply filling at the required pace A.2.

This becomes particularly problematic after the high season, when the production mix shifts from large-volume sun care products toward many smaller branded and private-label orders. During such periods, the filling operation may appear to have available capacity, while the mixing operation becomes the actual operational bottleneck.

Consequently, the assessment of MTO versus MTS suitability cannot be reduced solely to customer demand behavior. It must also account for the interaction between product variety, batch size, line allocation, and upstream mixing dependencies [29, 32].

Process Analysis 5

The purpose of the Process Analysis is to examine how the current production planning environment at DermaPharm contributes to planning instability, uneven workload distribution, and limited operational flexibility. Building on the findings from the Process Discovery, the analysis investigates how demand behavior, operational constraints, planning practices, and inventory-related limitations collectively influence the effectiveness of the current planning setup.

Rather than evaluating isolated operational issues, the chapter focuses on the structural interactions embedded within the production system and examines the operational conditions under which differentiated MTO, hybrid, and selective MTS planning strategies become operationally relevant.

The analysis combines qualitative interview findings with quantitative sales and product data in order to establish a data-driven understanding of:

- how demand variability influences filling-line workload and capacity utilization,
- where operational bottlenecks and planning instability emerge,
- and which operational and product-related characteristics influence the feasibility of forecast-supported production planning.

The objective is therefore not to determine whether MTO or MTS is universally preferable, but rather to identify the operational conditions under which selective MTS production may contribute to improved planning stability without creating disproportionate inventory-related risk.

5.1 Root-Cause Analysis

The Process Discovery demonstrated that the current planning environment at DermaPharm is characterized by continuous reprioritization, fluctuating workloads, and limited planning flexibility. To identify the underlying causes of these operational challenges, a root-cause analysis was conducted based on interview findings, process observations, and patterns identified within the sales and item-card data.

The analysis indicates that the observed planning instability does not originate from isolated operational failures, but rather from the interaction between seasonal demand concentration, constrained production flexibility, reactive planning behavior, and inventory-related limitations.

5.1.1 Fishbone Diagram

Figure 5.1 illustrates the primary operational factors contributing to planning instability and filling-line workload imbalance within the current production planning environment.

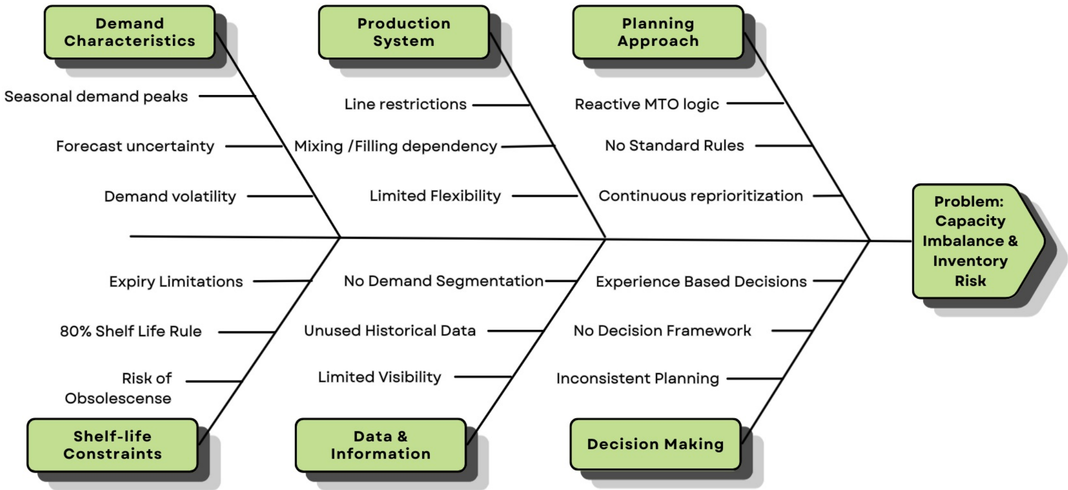

Figure 5.1

Fishbone diagram illustrating the primary operational factors contributing to planning instability and filling-line workload imbalance at DermaPharm.

The fishbone analysis identifies six interconnected categories contributing to instability within the current planning environment: demand characteristics, production system constraints, planning practices, shelf-life limitations, data utilization, and decision-making structure.

Together, these categories illustrate that planning instability at DermaPharm is created through the interaction between demand uncertainty, limited production flexibility, and constrained planning responsiveness.

Demand Characteristics

Demand-related challenges primarily concern seasonal demand concentration, forecast uncertainty, and significant variation in demand behavior across products.

In particular, sun care products generate substantial workload peaks during spring periods, while demand remains considerably lower throughout the remainder of the year. Interview findings indicate that this seasonal concentration repeatedly creates filling-line overload during peak periods while simultaneously contributing to underutilized production capacity during off-season periods.

The quantitative sales analysis supports this observation. More than 6,000 sales transactions and over 500 item numbers were identified as sun care-related products, confirming that seasonal products represent a substantial share of the production portfolio.

The findings therefore indicate that workload distribution varies significantly across time and product categories, creating fundamentally different planning requirements within the portfolio.

Production System Constraints

The analysis further demonstrates that the operational impact of demand variability is amplified by structural constraints within the production system.

Although DermaPharm operates multiple filling lines, products cannot be allocated freely across resources due to line-specific restrictions, setup requirements, and product-line compatibility limitations. Consequently, overall available production capacity does not necessarily translate into operational flexibility.

The interviews further highlighted dependencies between mixing and filling operations, where bottlenecks shift dynamically depending on product mix, batch structure, and setup frequency.

In practice, this means that operational imbalance is not solely caused by insufficient capacity, but rather by the interaction between product variety, line allocation constraints, setup intensity, and upstream process dependencies.

Planning Practices

The current planning setup operates predominantly according to reactive order-driven logic, where production activities are initiated primarily after confirmed customer demand is received.

As a result, production schedules are continuously adjusted in response to incoming customer orders, changing delivery priorities, procurement lead times, and material availability.

The interviews indicate that this creates a planning environment characterized by short planning horizons, reactive decision-making, and continuous production reprioritization. Consequently, planning decisions become highly dependent on operational experience and tacit planner knowledge rather than standardized planning logic and structured decision criteria.

The findings further indicate that the absence of differentiated planning rules limits the organization's ability to distinguish between predictable and highly volatile products within the planning process.

This reduces the organization's ability to proactively smooth workload distribution and selectively apply forecast-supported planning for products with more stable demand behavior.

Shelf-Life Constraints

The analysis further demonstrates that inventory-related risk significantly constrains the feasibility of forecast-supported production planning.

Several customer agreements require that products retain at least 80% remaining shelf-life upon delivery. Consequently, producing products too early may improve internal capacity utilization while simultaneously reducing the commercial usability of finished inventory.

The item-card analysis further revealed that approximately one-third of transaction lines relate to products where expiry-on-product requirements are explicitly specified.

This indicates that shelf-life limitations affect a substantial share of the portfolio and must therefore be incorporated directly into production planning decisions.

Data Utilization and Decision-Making

Although historical sales and product data are available, the analysis indicates that these data are currently not translated into structured planning logic or systematic product segmentation.

Planning decisions are primarily experience-based and rely heavily on individual planner knowledge rather than standardized classification criteria, demand segmentation, or quantitative decision-support mechanisms.

As a result, products with fundamentally different demand characteristics are frequently managed according to similar planning principles despite having substantially different planning requirements.

This limits the organization's ability to proactively distinguish between products suitable for reactive MTO planning, hybrid replenishment strategies, or selective MTS production.

5.1.2 Why-Why Analysis

A Why-Why analysis was conducted in order to identify the underlying operational mechanisms contributing to planning instability and uneven workload distribution within the current production planning environment at DermaPharm.

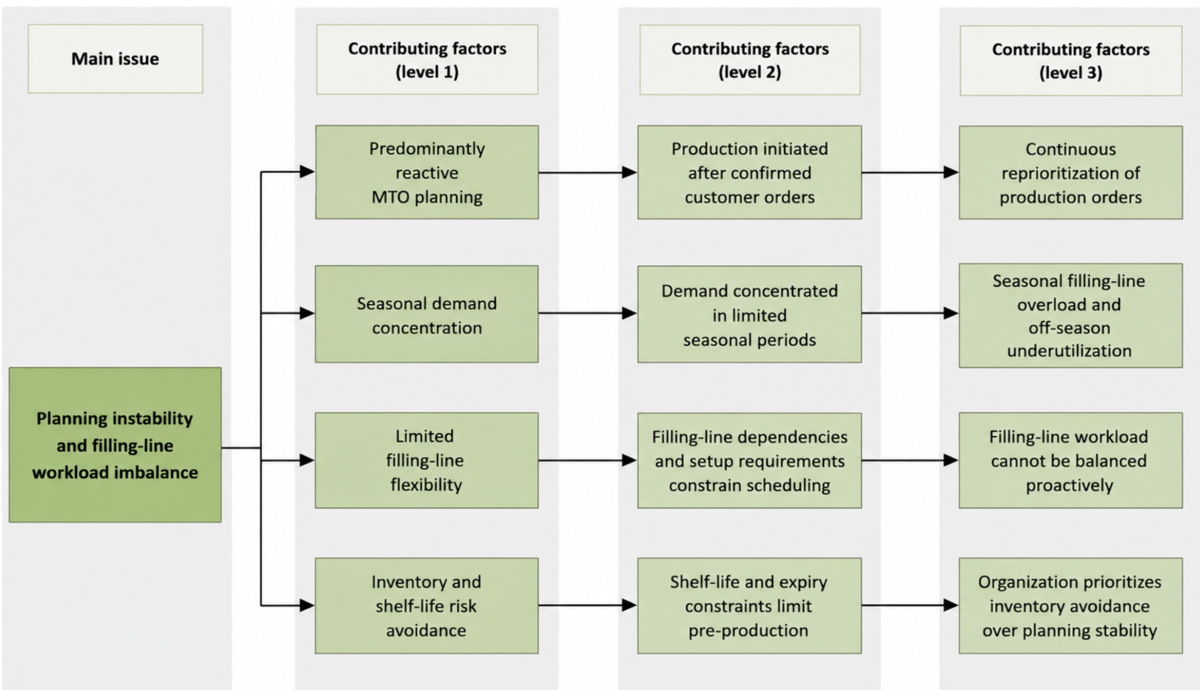

Figure 5.2

Why-why diagram illustrating the operational mechanisms contributing to planning instability and filling-line workload imbalance at DermaPharm.

As illustrated in Figure 5.2, the observed planning instability at DermaPharm originates from several interconnected operational mechanisms reinforcing reactive planning behavior.

The current production planning environment is predominantly based on reactive MTO logic, where production activities are initiated primarily after confirmed customer demand is received. While this approach minimizes inventory exposure and reduces the risk associated with expiry-sensitive products, it simultaneously causes demand fluctuations to translate directly into concentrated production workload during seasonal peak-demand periods.

At the same time, demand within several product categories, particularly sun care products, is highly seasonal and concentrated within relatively limited production periods. Consequently, workload becomes unevenly distributed across time, creating peak-period overload, continuous production reprioritization, and reduced planning flexibility during high-demand periods, while production resources remain comparatively underutilized during off-season periods.

The analysis further demonstrates that operational flexibility is constrained by dependencies between mixing and filling operations, line-specific restrictions, and setup-related limitations, which collectively reduce the organization's ability to proactively rebalance workload once demand peaks materialize.

As a result, the production system becomes increasingly dependent on reactive scheduling adjustments and short-term operational decision-making during periods characterized by elevated workload pressure.

Simultaneously, inventory-related risk avoidance reinforces the reactive planning behavior. Shelf-life limitations, expiry-related requirements, and concerns regarding tied-up capital reduce the willingness to produce products in advance of confirmed demand.

Consequently, the organization prioritizes minimizing inventory exposure even in situations where selective pre-production could contribute to improved planning stability, smoother workload distribution, and reduced seasonal capacity pressure.

From a broader production planning perspective, the findings indicate that the core challenge at DermaPharm is fundamentally related to managing operational uncertainty within a constrained and highly seasonal production environment.

Seasonal demand concentration, limited production flexibility, inventory-sensitive products, and reactive planning logic collectively create a planning system in which operational instability increases as planning complexity and product variety grow.

Together, these mechanisms create the central operational trade-off addressed throughout this thesis:

- avoiding inventory exposure increases planning instability and filling-line workload imbalance,
- while improving planning stability requires accepting a controlled level of inventory-related risk.

Therefore, the analysis indicates that the selection of the DermaPharm production strategy should not be treated as a binary choice between MTO and MTS. Instead, the findings support the need for a differentiated product-level classification framework capable of balancing demand predictability, operational constraints, workload balancing requirements, and inventory-related exposure.

5.2 Quantitative Product Classification and Demand Analysis

5.2.1 Analytical Approach

The purpose of this chapter is to evaluate which products within the DermaPharm portfolio exhibit operational characteristics compatible with selective MTS production. Building on the findings from the Process Discovery and Process Analysis, the chapter quantitatively examines how historical demand behavior relates to the current predominantly MTO-based planning environment.

The analysis focuses on identifying products where forecast-supported production may contribute to improved workload balancing and reduced short-term planning pressure without creating disproportionate inventory-related risk.

Rather than evaluating all products uniformly, the analysis examines differences in:

- demand stability,
- demand volume,
- sales continuity,
- inventory-related risk,
- and operational production feasibility.

The purpose is therefore not to identify perfectly stable MTS products, but rather products exhibiting comparatively stronger operational suitability for selective pre-production relative to the remaining portfolio.

To support this evaluation, the analysis is structured into five sequential analytical steps:

- data preparation and filtering,
- demand variability analysis,
- demand volume assessment,
- operationalization of potential MTS candidates,
- and quantitative MTS candidate scoring.

Together, these analytical steps establish the quantitative foundation for the subsequent redesign phase, where the identified operational dimensions are translated into a structured decision-support framework for differentiated production planning.

5.2.2 Data Preparation and Filtering

The quantitative analysis combines sales transaction data with product master data in order to connect historical demand behavior with product-specific operational characteristics and inventory-related constraints.

The datasets were linked through item number, allowing demand patterns to be analyzed together with product-specific information such as expiry requirements, shelf-life conditions, and operational production limitations.

To ensure analytical relevance, several filtering steps were applied:

- only finished goods were included,
- internal transactions were excluded,
- return transactions were removed,
- and products with explicit expiry constraints were excluded during the initial screening phase.

This filtering reflects the operational conditions identified during the interviews, where products without stamped expiry requirements were considered more operationally suitable for early production due to lower inventory-related exposure.

Products with insufficient sales history were additionally excluded in order to improve robustness within the variability calculations and reduce distortion caused by sporadic demand behavior.

The initial dataset contained approximately 2,360 products. Following the filtering process, the dataset was reduced to approximately 300 operationally relevant products with sufficient demand history and planning relevance to support meaningful analysis.

This reduction enabled the analysis to focus on products with meaningful influence on filling-line workload and overall capacity utilization, while excluding highly inactive or operationally insignificant products.

5.2.3 Demand Variability Analysis

To evaluate production planning suitability across products, demand behavior was analyzed on an aggregated monthly level.

Monthly aggregation was selected in order to reduce short-term transactional fluctuations and align the analysis with the tactical production planning horizon applied within the organization.

For each product, the following quantitative metrics were calculated:

- total demand,
- mean monthly demand,
- standard deviation,
- coefficient of variation (CV),
- and number of active sales months.

The coefficient of variation was used as the primary normalized measure of demand variability:

$$CV_i = \frac{\sigma_i}{\mu_i} \tag{5.1}$$

where CV_i represents the coefficient of variation for product i, σ_i represents the standard deviation of monthly demand for product i, and μ_i represents the mean monthly demand for product i.

The coefficient of variation expresses demand variability relative to the average demand level. This makes it suitable for comparing products with different demand volumes, since a product with high absolute variation may still be relatively stable if its average demand is also high.

Products with lower CV values therefore exhibit more stable demand behavior, while higher CV values indicate greater demand volatility and reduced forecast reliability.

From a production planning perspective, high demand variability increases the difficulty of forecasting future workload requirements and therefore reduces the operational suitability of forecast-supported production planning.

However, the analysis further demonstrated that variability measures cannot be interpreted independently from sales continuity and operational relevance. Products with very limited sales activity may display distorted variability measures despite having limited influence on overall production workload.

Additionally, the interviews revealed that demand fragmentation occasionally occurred due to changes in item numbers across otherwise equivalent products. To reduce this distortion, products with equivalent functionality were manually consolidated where possible.

5.2.4 Demand Volume Assessment

To identify products with the greatest operational significance, a demand volume assessment was conducted based on total historical demand volume.

Products were ranked according to cumulative demand contribution in order to distinguish high-impact products from low-volume products with limited influence on overall production workload.

The analysis demonstrated that a relatively limited subset of products accounts for a substantial share of total demand volume within the portfolio.

This finding is operationally significant because high-volume products contribute most heavily to filling-line workload and overall capacity utilization. Consequently, even limited improvements in planning strategy for a relatively small subset of products may significantly influence workload balancing and planning stability across the production system.

The findings therefore indicate that demand stability alone is insufficient when evaluating MTS suitability. Products must additionally demonstrate operational relevance in terms of workload contribution and production volume.

5.2.5 Operationalization of Potential MTS Candidates

To support the quantitative evaluation of product-level MTO/MTS suitability, an initial screening of the portfolio was conducted based on the operational dimensions identified throughout the Process Discovery and Process Analysis.

The screening process focused on identifying products exhibiting demand characteristics potentially compatible with selective MTS production. In particular, the preliminary identification considered:

- recurring demand activity,
- sales continuity across multiple periods,
- identifiable seasonal or repeatable demand patterns,
- comparatively stronger demand predictability relative to the remaining portfolio,
- and limited observable inventory-related exposure.

Products characterized by highly irregular demand, sporadic ordering behavior, low demand frequency, or substantial demand volatility were considered less operationally suitable for forecast-supported production and were therefore excluded from the preliminary MTS candidate group.

The operationalization does not represent a final classification decision, but rather an initial analytical filtering process intended to identify products suitable for further quantitative evaluation.

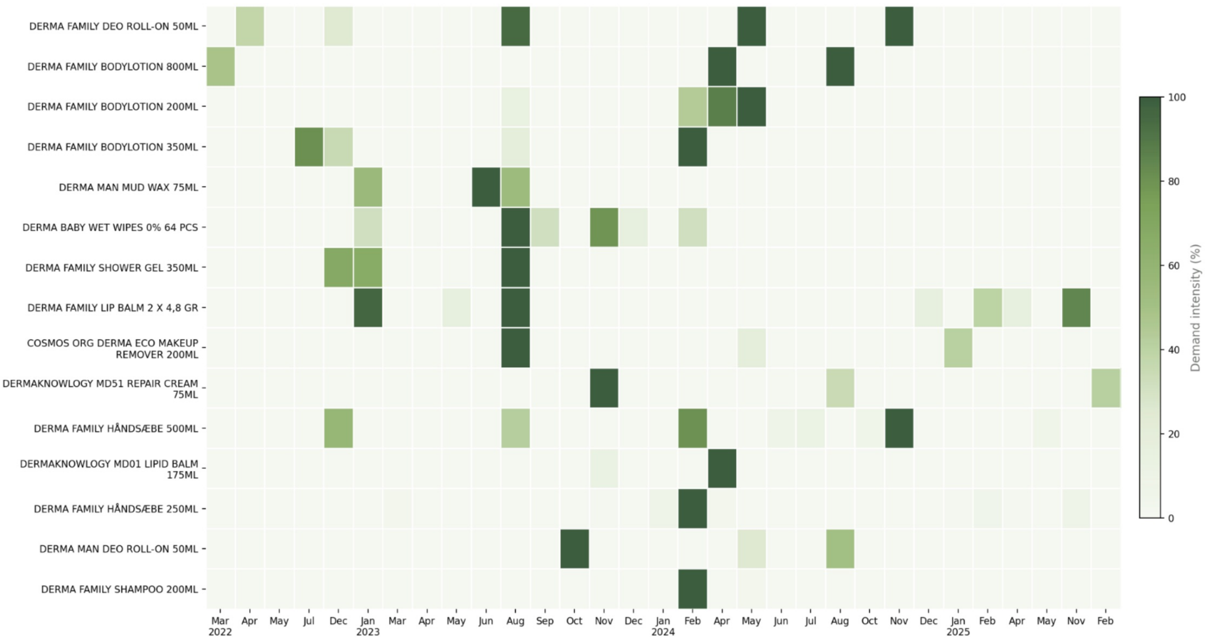

Figure 5.3
Visualization of the monthly demand distribution for the preliminary product group identified through the initial MTS suitability screening process.

Figure 5.3 visualizes the monthly demand distribution for products identified as preliminary MTS candidates.

The heatmap illustrates that several non-seasonal products exhibit relatively continuous demand across multiple periods, while others display concentrated but recurring seasonal demand peaks.

Compared to highly volatile products, these demand patterns indicate a greater degree of predictability and therefore stronger operational suitability for proactive production planning.

Importantly, the visualization further demonstrates that seasonality does not necessarily eliminate MTS potential. While several products exhibit demand concentration within specific periods, the recurring nature of these peaks suggests that portions of the demand may still be operationally forecastable and therefore suitable for selective pre-production.

5.2.6 MTS Candidate Scoring

To support a structured identification of products with stronger operational suitability for selective MTS production, a quantitative scoring model was developed based on five operational dimensions identified throughout the Process Discovery and Process Analysis:

- demand stability,
- demand volume,
- sales continuity,
- inventory-related risk,
- and operational production feasibility.

The purpose of the scoring model is to translate the identified operational dimensions into a structured and transparent comparison framework capable of supporting differentiated production planning decisions across the product portfolio.

Demand stability influences forecast reliability and planning predictability, demand volume reflects workload impact and operational relevance, while sales continuity evaluates whether demand occurs sufficiently regularly to support proactive production planning.

In addition, inventory-related risk reflects the operational exposure associated with pre-production, including shelf-life limitations and expiry-related considerations. Finally, production feasibility reflects the operational flexibility associated with producing the product within the existing production environment, including filling-line flexibility and batch-related planning conditions.

For each product, rankings were calculated within each individual dimension. Products exhibiting comparatively lower demand variability, higher demand volume, stronger sales continuity, lower inventory-related exposure, and greater operational flexibility received stronger rankings relative to the remaining portfolio.

Subsequently, an aggregated MTS suitability score was calculated as:

$$MTSScore_i = D_{s,i} + V_{s,i} + C_{s,i} + I_{s,i} + P_{s,i} \tag{5.2}$$

where:

- $D_{s,i}$ represents the demand stability score for product i,
- $V_{s,i}$ represents the demand volume score for product i,
- $C_{s,i}$ represents the sales continuity score for product i,
- $I_{s,i}$ represents the inventory-risk score for product i,
- and $P_{s,i}$ represents the production-feasibility score for product i.

Lower total scores indicate comparatively stronger operational suitability for selective MTS production.

The scoring model therefore combines demand predictability, workload relevance, recurring sales activity, inventory-related exposure, and operational flexibility into a single comparative assessment framework.

Importantly, the purpose of the model is not to produce deterministic planning decisions or mathematically optimal classifications. Instead, the scoring model was intentionally designed as a transparent and operationally interpretable decision-support mechanism capable of supporting differentiated planning assessments across products with substantially different operational characteristics and demand behavior.

The model should therefore be interpreted as a structured prioritization framework intended to support managerial evaluation and production planning decisions rather than replace operational judgment and business-specific considerations.

5.2.7 Selection of Final Candidates

The scoring model produced a ranked overview of products exhibiting comparatively stronger operational suitability for selective MTS production based on the combined assessment of demand stability, demand volume, sales continuity, inventory-related exposure, and operational feasibility.

To further validate the quantitative ranking, the highest-ranked products were subsequently evaluated through monthly demand visualization and interview-based operational assessment. This additional evaluation was conducted in order to assess whether the identified demand patterns also appeared operationally manageable within the current production planning environment.

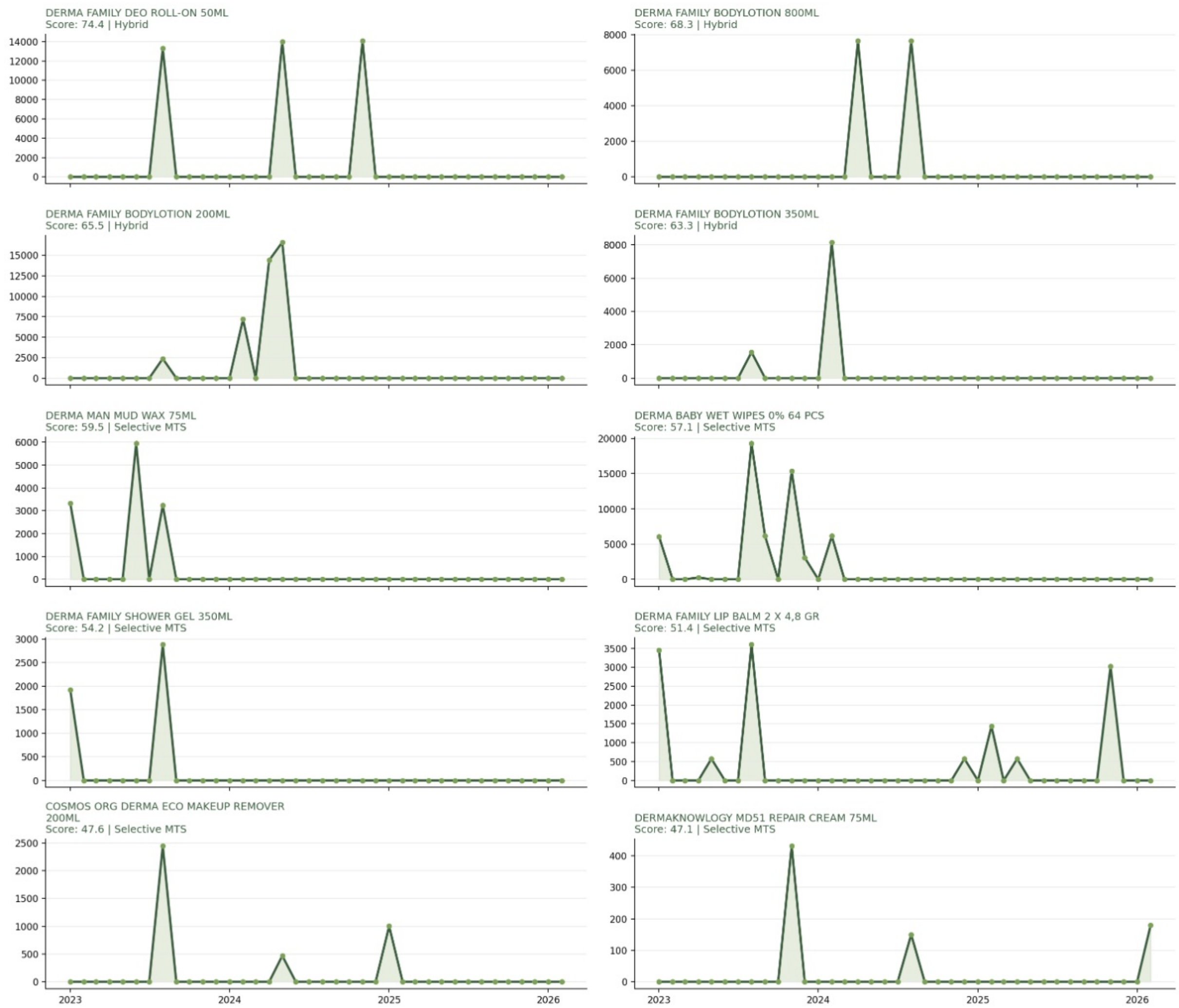

Figure 5.4

Monthly demand development for selected top-ranked MTS candidates. Each curve illustrates aggregated monthly demand across the analyzed period.

Figure 5.4 illustrates the historical monthly demand development for selected top-ranked products identified through the scoring model.

The visualization demonstrates that several products exhibit recurring and comparatively stable demand behavior across the analyzed period, while others display concentrated but repetitive seasonal demand patterns rather than highly irregular volatility.

This distinction is operationally important because different demand structures imply different planning requirements and varying suitability for proactive production planning.

Consequently, the analysis distinguishes between products potentially suitable for:

- selective seasonal pre-production,
- hybrid replenishment approaches,
- and more continuous forecast-supported production planning.

The assessment therefore considered not only absolute demand stability, but also whether demand behavior appeared sufficiently recurring, predictable, and operationally manageable to support some degree of proactive production planning without creating disproportionate inventory-related exposure.

Approximately ten products were identified as particularly relevant for further evaluation within the redesign phase.

Overall, the findings indicate that selective MTS implementation may be operationally feasible for parts of the portfolio, provided that inventory-related constraints remain manageable and product characteristics are evaluated individually rather than through uniform planning rules.

5.2.8 Key Findings from the Quantitative Analysis

The quantitative analysis demonstrates substantial variation in demand behavior, workload contribution, and operational predictability across the DermaPharm product portfolio.

While several products exhibit highly volatile or intermittent demand patterns more compatible with reactive MTO planning, other products demonstrate sufficiently recurring or predictably seasonal demand behavior to support selective forecast-supported production planning.

The findings therefore indicate that the current predominantly MTO-based planning logic does not fully reflect the operational differences that exist across the portfolio.

The analysis further demonstrates that a relatively limited subset of products contributes disproportionately to overall operational workload and filling-line utilization. Consequently, selective planning adjustments for a comparatively small product group may significantly influence workload balancing and planning stability across the broader production environment.

Importantly, the findings indicate that operational suitability for selective MTS production cannot be determined solely through demand stability or production volume independently.

Instead, suitability depends on the interaction between:

- demand predictability,
- workload relevance,
- sales continuity,
- inventory-related constraints,
- and operational production flexibility.

The analysis therefore supports the argument that production strategy selection at DermaPharm should be differentiated at product level rather than managed according to a uniform reactive MTO logic across the entire portfolio.

5.2.9 Methodological Considerations

Several methodological limitations should be acknowledged.

First, excluding products with explicit expiry constraints simplifies the initial identification of potential MTS candidates but may simultaneously exclude products potentially suitable for hybrid planning approaches under controlled inventory conditions.

Second, removing return transactions improves demand clarity but omits information related to customer return behavior and downstream demand instability.

Third, changes in item numbers may influence measured demand continuity despite manual SKU consolidation efforts.

Fourth, inventory-related risk and production feasibility were operationalized through qualitative and interview-supported assessment rather than through fully quantified optimization parameters due to limitations in available operational data.

Finally, the scoring model should be interpreted as a structured decision-support mechanism rather than a deterministic optimization model. Final planning decisions must therefore continue to incorporate operational knowledge, customer-specific requirements, and managerial assessment.

5.2.10 Sub-Conclusion

The quantitative analysis demonstrates that substantial differences exist in demand behavior, workload contribution, inventory-related exposure, and operational predictability across the DermaPharm product portfolio.

While several products exhibit highly volatile or intermittent demand patterns more compatible with reactive MTO planning, other products demonstrate sufficiently recurring or predictably seasonal demand behavior to support selective forecast-supported production.

Importantly, the findings indicate that operational suitability for selective MTS production cannot be determined through demand volume or variability independently. Instead, suitability depends on the interaction between demand predictability, operational relevance, sales continuity, inventory-related exposure, and operational production flexibility.

The analysis therefore establishes the quantitative foundation for the subsequent redesign phase, where the identified operational dimensions are translated into a structured decision-support framework for differentiated production planning.

Problem Definition 6

The Initial Problem Identification introduced the preliminary operational challenges associated with the current production planning environment at DermaPharm and established the initial analytical direction of the thesis. Through the subsequent Process Discovery, Process Analysis, and quantitative product evaluation, these initial observations have now been further examined, validated, and operationally specified.

The analyses demonstrate that the inefficiencies within the current production planning environment are not caused by isolated operational issues, but rather by structural characteristics embedded within the interaction between demand behavior, production constraints, inventory-related limitations, and the current reactive planning logic.

More specifically, the findings reveal that the predominantly reactive MTO production environment contributes to substantial operational instability during periods of fluctuating demand. While the current planning logic effectively limits inventory-related exposure, it simultaneously restricts the organization's ability to proactively balance workload distribution and stabilize production capacity utilization across time.

The Process Discovery further demonstrated that production planning at DermaPharm is highly interconnected with upstream and downstream operational processes, including procurement, development, warehousing, and filling-line operations. As a result, production instability propagates across the broader operational system rather than remaining isolated within individual departments.

The Process Analysis subsequently identified that seasonal demand concentration, filling-line dependencies, setup intensity, and limited operational flexibility collectively contribute to uneven workload distribution, continuous production reprioritization, and reduced planning stability during seasonal peak periods.

Furthermore, the quantitative analysis demonstrated substantial variation in demand behavior across the product portfolio. While several products exhibit highly volatile or intermittent demand patterns more compatible with reactive MTO planning, other products display relatively stable or predictably seasonal demand behavior potentially capable of supporting more proactive and forecast-supported planning approaches.

At the same time, the findings also demonstrate that inventory-related constraints remain highly significant within the DermaPharm production environment. Shelf-life limitations, expiry-related requirements, certification constraints, and tied-up capital collectively reduce the feasibility of extensive pre-production and increase the operational risk associated with forecast-driven production.

Consequently, the findings indicate that DermaPharm is faced with a structural operational trade-off between:

- responsiveness and planning stability,
- inventory-related risk and operational flexibility,
- and reactive demand fulfillment versus proactive workload balancing.

The analyses further demonstrate that the current planning environment lacks a structured and transparent mechanism for distinguishing between products with fundamentally different operational characteristics. As a result, planning decisions rely heavily on experience-based judgment and tacit operational knowledge rather than systematic and data-driven planning criteria.

Accordingly, the findings indicate that the central managerial challenge is not whether DermaPharm should operate exclusively according to either MTO or MTS principles, but rather how differentiated planning strategies may be selectively applied across products with different operational characteristics and demand behavior.

Based on the identified operational conditions and analytical findings, the central managerial problem addressed within the study is therefore formulated as follows:

> ***How can DermaPharm improve planning stability and reduce filling-line workload imbalance without introducing disproportionate inventory-related risk?***

To address the identified managerial problem, the following research questions are investigated:

- *RQ1: Which product and demand characteristics most significantly influence product-level suitability for MTO, hybrid, and selective MTS planning?*
- *RQ2: How can the impact of differentiated production planning on filling-line workload balancing and operational performance be quantitatively evaluated?*
- *RQ3: How can the trade-off between planning stability, filling-line workload balancing, and inventory-related risk be structured into a decision-support framework for differentiated production planning?*

Together, the research questions support the transition from exploratory problem identification toward the development of a structured decision-support framework capable of supporting differentiated production planning decisions within the DermaPharm production environment.

6.1 Operational Decision Criteria

Based on the refined problem definition and the findings from the literature review, Process Analysis, and quantitative product evaluation, a set of operational decision criteria was identified for evaluating product-level suitability for differentiated production planning strategies.

The identified criteria include:

- **Demand stability:** Products with recurring and relatively stable demand patterns are generally more suitable for forecast-supported production approaches.
- **Demand volume:** High-volume products contribute more significantly to filling-line utilization and therefore provide greater potential for workload smoothing and capacity balancing.
- **Sales continuity:** Products with continuous demand across multiple periods provide greater forecast reliability than highly intermittent products.
- **Shelf-life constraints:** Products with strict expiry-related requirements increase inventory-related exposure and reduce the feasibility of extensive pre-production.
- **Operational flexibility:** Products capable of being produced across multiple filling lines provide greater operational flexibility within the production environment.
- **Supplier lead time and material availability:** Long or uncertain procurement lead times increase the need for proactive planning and inventory positioning.

Together, these operational criteria establish the analytical foundation for evaluating differentiated planning suitability within the subsequent redesign phase.

6.2 Conceptual Decision Framework

Based on the identified operational criteria and analytical findings, a conceptual decision framework was developed to support the classification of products according to their operational suitability for MTO, hybrid, or selective MTS planning strategies.

The framework is based on two primary analytical dimensions:

- demand variability and predictability,
- and inventory-related risk.

These dimensions are combined into a two-by-two classification matrix illustrated in Figure 6.1.

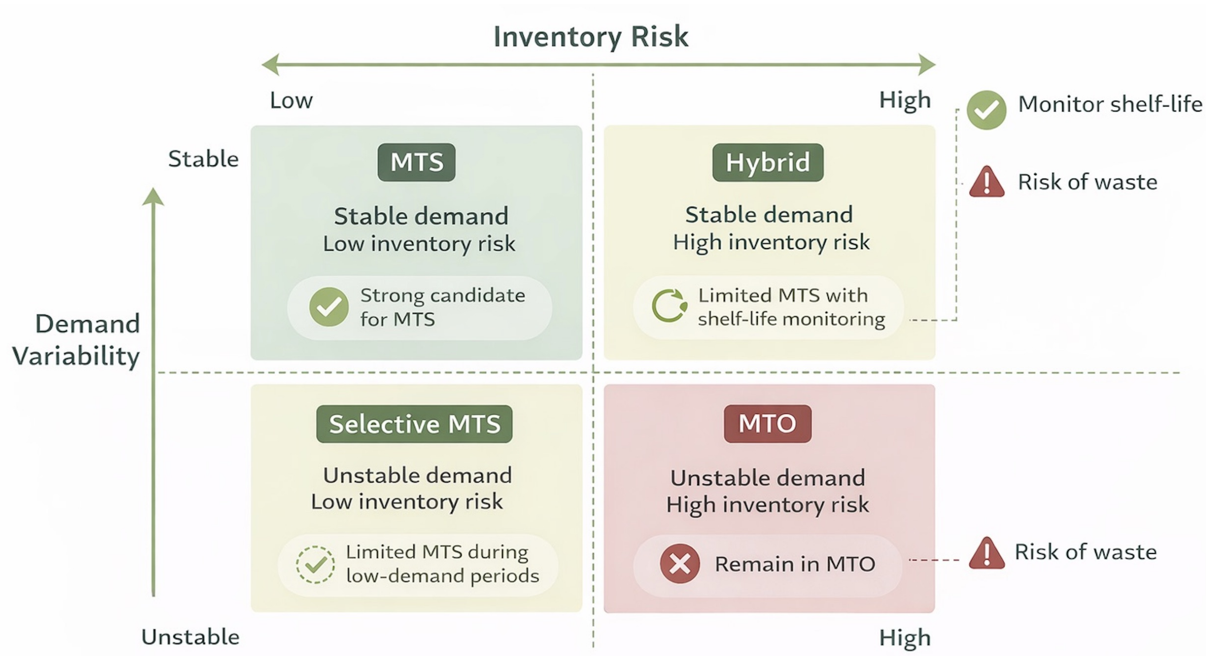

Figure 6.1
Conceptual framework for product-level MTO/MTS classification.

The four resulting categories can be interpreted as follows:

- **Low demand variability / Low inventory risk:** Products within this category exhibit relatively recurring and predictable demand behavior combined with operational conditions associated with limited inventory exposure. In this study, low inventory risk is operationalized through factors such as longer effective shelf-life horizons, lower expiry sensitivity, stable historical demand patterns, and reduced risk of excess inventory accumulation. Consequently, these products represent the strongest candidates for selective MTS production, as they may be produced proactively with comparatively limited risk of obsolescence, expiry-related waste, or tied-up inventory.
- **Low demand variability / High inventory risk:** These products exhibit relatively predictable demand behavior but remain constrained by operational characteristics associated with elevated inventory exposure, such as limited shelf life, certification-related restrictions, customer-specific formulations, or higher risk of inventory obsolescence. Consequently, these products are considered more suitable for hybrid planning approaches involving limited and controlled pre-production rather than extensive stock-based production.
- **High demand variability / Low inventory risk:** Products within this category exhibit uncertain or fluctuating demand patterns, but relatively limited inventory-related exposure. Although forecast accuracy remains lower, the operational consequences of holding inventory are less severe, which may support selective and temporary pre-production during low-demand periods in order to improve workload balancing and filling-line utilization.
- **High demand variability / High inventory risk:** These products combine high demand uncertainty with substantial inventory-related exposure. In practice, this includes products characterized by intermittent demand, short shelf life, customer-specific requirements, or elevated risk of obsolescence and expiry-related loss. Consequently, these

products are generally more suitable for reactive MTO planning approaches.

The purpose of the framework is not to replace managerial decision-making, but rather to provide a structured and transparent decision-support mechanism capable of improving consistency within production planning decisions.

Compared to the current predominantly experience-based planning environment, the framework enables a more systematic evaluation of products based on measurable operational characteristics and thereby reduces reliance on tacit planner knowledge and subjective decision-making.

The framework therefore establishes the conceptual foundation for the subsequent redesign phase, where the identified operational dimensions are integrated into a structured product-classification and planning-support model.

6.3 Synthesis of Analytical Findings

Based on the Process Discovery, Process Analysis, and quantitative product evaluation, the findings collectively indicate that production planning at DermaPharm is fundamentally influenced by the interaction between demand behavior, operational bottleneck constraints, planning flexibility, and inventory-related risk exposure.

The analysis demonstrates that the current predominantly reactive MTO production environment contributes to reduced planning stability due to seasonal demand concentration, reactive short-term scheduling, procurement dependencies, and limited possibilities for proactive filling-line workload balancing.

In particular, the findings reveal that planning instability is not solely caused by fluctuating customer demand, but emerges from interconnected dependencies between commercial activities, procurement lead times, filling-line constraints, and regulatory planning requirements.

Simultaneously, the quantitative analysis demonstrates that products within the portfolio exhibit substantially different operational characteristics in terms of demand continuity, demand variability, sales concentration, and inventory-related exposure. While certain products display highly volatile and intermittent demand patterns, other products exhibit more stable and recurring demand behavior potentially compatible with forecast-supported or selective MTS planning approaches.

The findings further indicate that production strategy suitability cannot be evaluated uniformly across the product portfolio. Instead, the operational suitability of MTO, hybrid, and selective MTS planning depends on the interaction between demand predictability, workload balancing potential, shelf-life constraints, inventory-related risk, and operational production flexibility.

Consequently, the analysis supports the need for a differentiated and product-level production planning framework capable of systematically classifying products according to their operational characteristics and planning conditions.

This establishes the analytical and conceptual foundation for the subsequent Process Redesign phase, where the identified operational dimensions are translated into a structured decision-support framework for differentiated MTO, hybrid, and selective MTS planning at DermaPharm.

6.4 Delimitations

To maintain analytical focus and methodological consistency, several delimitations are defined for this thesis.

First, the study is limited to operational production planning within the existing DermaPharm production environment, with particular focus on differentiated MTO, hybrid, and selective MTS planning strategies. Consequently, the thesis does not investigate detailed technical production aspects such as formulation development, chemical process optimization, equipment engineering, or machine-level optimization.

Second, regulatory requirements, certification standards, and quality assurance procedures are treated as fixed operational constraints rather than variables subject to redesign. The purpose of the thesis is therefore not to evaluate regulatory frameworks themselves, but rather to examine how production planning decisions operate within such constraints.

Third, the study focuses on the analytical development of a decision-support framework and does not include full organizational implementation of the proposed redesign. Accordingly, ERP integration, organizational change management, employee training, implementation costs, and long-term operational performance measurement are considered outside the scope of the thesis.

Fourth, the quantitative analysis is based exclusively on internal operational and historical ERP-based data provided by DermaPharm. External market factors such as competitor behavior, macroeconomic developments, weather uncertainty, and broader consumer market dynamics are therefore not explicitly incorporated into the analysis.

Fifth, the study assumes that the existing production system remains structurally unchanged throughout the analysis. This includes current filling-line configurations, staffing structures, warehouse setup, and overall production capacity. The thesis therefore focuses on improving planning decisions within the current operational environment rather than redesigning the physical production system itself.

Furthermore, detailed workforce optimization, simulation-based capacity modeling, and complete financial optimization are not included within the scope of the study due to limited availability of sufficiently detailed operational data. Consequently, labor flexibility, setup complexity, and bottleneck behavior are analyzed primarily from a process-oriented and operational-planning perspective rather than through detailed mathematical optimization or simulation modeling.

Finally, the study adopts a product-level analytical perspective in which planning suitability is evaluated based on aggregated demand behavior and operational product characteristics. Therefore, highly granular operational variations such as individual customer agreements, short-term campaign deviations, and isolated procurement disruptions are not explicitly modeled within the framework.

These delimitations ensure a focused and analytically manageable investigation of differentiated production planning within the defined operational context of DermaPharm.

Process Redesign 7

Based on the findings from the Process Discovery, Process Analysis, and quantitative product evaluation, the purpose of the Process Redesign is to develop a differentiated production planning approach capable of improving planning stability and reducing filling-line workload imbalance while maintaining controlled inventory-related exposure within DermaPharm.

The previous analyses demonstrated that the current predominantly reactive MTO planning logic contributes to operational instability due to demand variability, seasonal demand concentration, limited operational flexibility, and continuous short-term production reprioritization. At the same time, the analyses also demonstrated that the product portfolio contains substantial variation in demand behavior, inventory-related risk, and operational suitability for forecast-supported production.

Consequently, the redesign does not propose a complete transition from MTO to MTS, but instead introduces a differentiated hybrid planning approach in which products are managed according to their operational characteristics, demand behavior, and inventory-related constraints.

Building on the analytical findings presented in Chapter 6, the redesign translates the identified operational dimensions into a structured decision-support and planning framework capable of supporting differentiated product-level planning decisions across reactive MTO, hybrid, and selective MTS planning strategies.

The redesign further aims to reduce the dependency on short-term reactive scheduling by enabling portions of production demand to be proactively planned and redistributed across lower-demand periods where operationally feasible.

7.1 Operationalization of the Decision Framework

Building on the conceptual decision framework developed in Section 6.2, the redesign operationalizes the classification logic into a practical production planning mechanism capable of supporting differentiated planning decisions within the existing DermaPharm production environment.

Rather than managing all products according to a uniform reactive MTO logic, products are classified according to:

- demand variability,
- demand continuity,
- operational relevance,
- and inventory-related exposure.

Based on this classification, products are assigned to differentiated planning streams consisting of:

- reactive MTO planning,
- hybrid planning approaches,
- and selective MTS planning.

Within the redesigned environment, planners evaluate products according to the identified operational criteria prior to production scheduling. Products classified as suitable for selective MTS planning are incorporated into forecast-supported planning activities, while products characterized by high uncertainty or elevated inventory-related exposure remain managed according to reactive MTO principles.

The purpose of the redesigned framework is therefore not to replace managerial judgment, but rather to support more structured, transparent, and operationally consistent planning decisions across products with substantially different operational characteristics.

7.2 Operational Decision Rules

To operationalize the classification framework, a set of decision rules was developed based on the findings from the quantitative analysis and interview findings from DermaPharm.

7.2.1 Rule 1: Selective MTS Candidates

Products should be considered strong candidates for selective MTS production if they demonstrate:

- relatively low demand variability,
- high operational demand volume,
- recurring and continuous sales activity,
- and limited inventory-related exposure.

These products contribute significantly to filling-line utilization and may therefore support proactive workload redistribution across time.

7.2.2 Rule 2: Seasonal Pre-Production Candidates

Products with concentrated but recurring seasonal demand may be considered suitable for selective pre-production if:

- seasonal demand peaks are sufficiently predictable,
- production can be shifted toward lower-demand periods,
- and inventory can be maintained within acceptable shelf-life limits.

This is particularly relevant for selected Derma regular and sun care products, where portions of annual production may potentially be redistributed toward autumn and off-season production periods.

7.2.3 Rule 3: Reactive MTO Products

Products should remain primarily managed according to reactive MTO principles if they exhibit:

- highly irregular or intermittent demand,
- low sales continuity,
- substantial customer-specific variation,
- or high inventory-related exposure caused by expiry constraints or regulatory requirements.

For these products, reactive production remains operationally preferable due to the elevated operational and financial risks associated with early production.

7.2.4 Rule 4: Hybrid Planning Products

Products positioned between the primary categories may be managed using hybrid planning approaches where:

- a limited base volume is pre-produced,
- while remaining demand is fulfilled reactively through MTO planning.

This allows partial workload smoothing while maintaining flexibility toward uncertain demand fluctuations.

Together, these operational rules ensure that production decisions are aligned with both operational constraints and demand behavior rather than applying uniform planning logic across the entire product portfolio.

7.3 Application Within the DermaPharm Production Environment

The developed framework is directly applicable within the current DermaPharm production environment.

The quantitative analysis identified a subset of products exhibiting relatively stable or predictably seasonal demand behavior combined with comparatively low inventory-related risk. These products therefore represent operationally suitable candidates for selective MTS production.

In particular, selected seasonal products may potentially be produced proactively during lower-demand periods and held as inventory until seasonal customer demand materializes, provided that shelf-life limitations remain operationally manageable.

At the same time, products characterized by highly unstable demand patterns, customer-specific requirements, or substantial expiry-related constraints remain more suitable for reactive MTO planning.

Consequently, the findings support the conclusion that the operationally preferable production strategy is not a complete transition from MTO to MTS, but rather a differentiated hybrid planning approach where products are managed according to their operational characteristics and planning suitability.

7.4 Redesigned Production Planning Logic

Based on the identified inefficiencies and the developed classification framework, a redesigned production planning logic is proposed.

The current planning environment at DermaPharm is predominantly reactive and highly dependent on incoming customer orders, resulting in continuous production reprioritization, fluctuating filling-line utilization, and unstable workload distribution.

The redesigned planning logic introduces differentiated planning streams where products are managed according to their operational classification and demand characteristics.

7.4.1 Current-State versus Future-State Planning

Within the current-state planning environment, production is initiated primarily in response to confirmed customer orders, with limited use of forecasting and minimal proactive pre-production. Consequently, production capacity becomes highly dependent on short-term demand fluctuations and seasonal workload peaks.

Within the redesigned future-state environment, planning activities are divided into two primary operational streams:

- **Selective MTS Planning Stream**
  Products with relatively stable or predictably seasonal demand behavior are forecasted and partially produced proactively during lower-demand periods in order to smooth workload concentration and improve capacity balancing.
- **Reactive MTO Planning Stream**
  Products characterized by high demand uncertainty, customer-specific requirements, or substantial inventory-related risk continue to be produced reactively upon confirmed customer demand.

This separation allows portions of production demand to be strategically decoupled from short-term order fluctuations while maintaining operational responsiveness toward uncertain demand behavior.

7.4.2 Redesigned Planning Process

The redesigned planning process follows four primary operational steps:

1. **Product Classification**
   Products are classified according to demand variability, sales continuity, operational relevance, and inventory-related risk.
2. **Forecast Generation**
   Forecasts are generated for products classified as suitable for selective MTS production.
3. **Pre-Production Planning**
   Forecast-supported products are scheduled proactively during lower-demand periods in order to smooth filling-line workload concentration.
4. **Reactive Order Scheduling**
   Remaining products continue to be planned according to reactive MTO principles based on confirmed customer orders.

This creates a more structured and differentiated planning environment where production decisions are aligned with operational conditions rather than solely driven by short-term demand signals.

7.5 Filling-Line Workload Smoothing Through Selective MTS Production

To illustrate the operational implications of selective MTS production, a workload smoothing scenario was developed for selected Derma regular products identified as strong MTS candidates through the quantitative scoring model.

The purpose of the scenario is to illustrate how selective MTS production may contribute to workload redistribution and improved filling-line workload balancing across the production environment.

Under the current predominantly reactive MTO setup, production demand becomes concentrated within relatively short high-demand periods, resulting in filling-line overload, overtime requirements, and increased planning pressure.

Within the proposed smoothing scenario, portions of annual demand are instead produced proactively during lower-demand periods and stored until customer demand materializes. This enables parts of production to be partially decoupled from short-term order fluctuations and seasonal demand concentration.

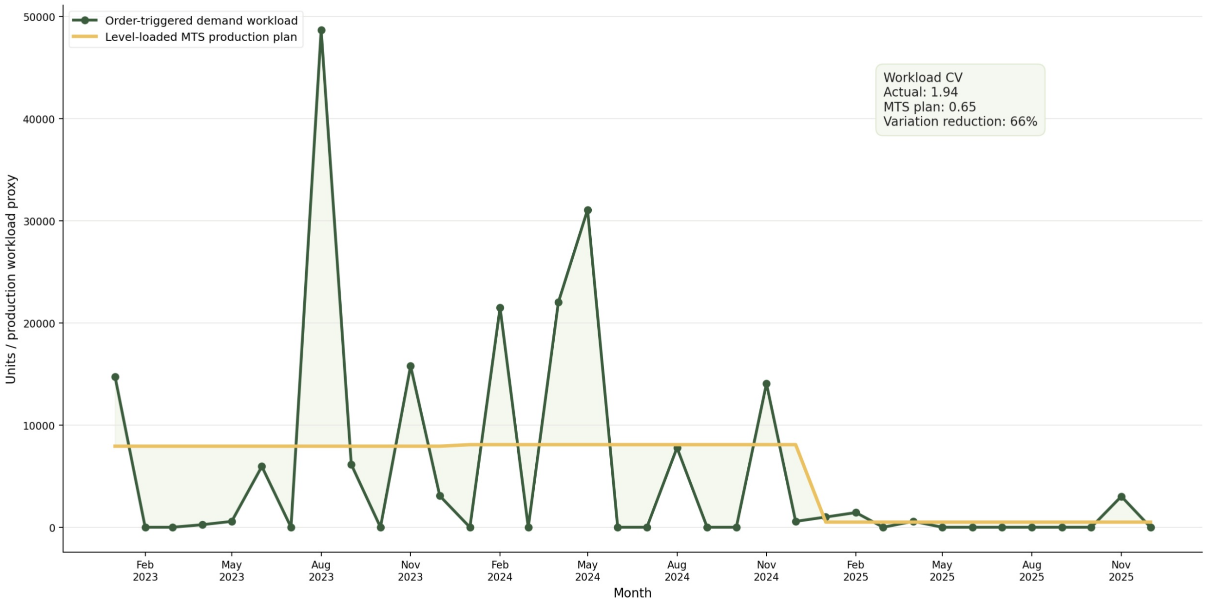

Figure 7.1

Capacity smoothing scenario for selected Derma regular products illustrating how selective MTS production may redistribute workload and reduce seasonal filling-line pressure.

Figure 7.1 illustrates how selective MTS implementation may contribute to a more balanced utilization of production resources by reducing workload concentration during seasonal peak periods.

Compared to the current reactive MTO environment, the scenario reduces fluctuations in monthly production requirements and creates a more stable operational workload profile across the year.

This is particularly relevant within the DermaPharm production environment, where seasonal demand peaks currently create significant operational pressure on filling lines, workforce allocation, and planning activities.

By shifting selected production volumes away from peak periods, the proposed hybrid planning approach may reduce the need for overtime, temporary capacity adjustments, and continuous reactive rescheduling.

Consequently, selective MTS production should not solely be understood as an inventory strategy, but rather as a workload redistribution and planning stabilization mechanism capable of improving operational flexibility while maintaining controlled inventory exposure.

7.6 Comparison of Differentiated Planning Streams

Planning Element	Selective MTS Stream	Reactive MTO Stream
Trigger	Forecast-supported demand and product classification	Confirmed customer order
Planning Logic	Proactive planning based on historical demand and expected seasonality	Reactive planning based on incoming customer demand
Production Timing	Production scheduled proactively during low-demand periods	Production initiated after order confirmation
Inventory Position	Finished goods partially held in stock prior to demand realization	Finished-goods inventory minimized
Primary Objective	Capacity balancing and workload smoothing	Inventory-risk minimization and responsiveness
Primary Risk	Inventory exposure and shelf-life limitations	Bottlenecks, overtime, and planning instability

Table 7.1
Comparison of the redesigned Selective MTS and Reactive MTO planning streams

The redesigned planning environment therefore combines proactive and reactive planning principles within a differentiated operational structure capable of balancing workload smoothing, planning flexibility, and inventory-related risk exposure.

Rather than replacing the existing MTO environment entirely, the redesign introduces selective forecast-supported planning where operationally feasible while maintaining reactive responsiveness for products characterized by high uncertainty or elevated inventory-related risk.

7.7 Quantitative Product-Classification Framework and Sensitivity Analysis

7.7.1 Purpose of the Quantitative Framework

While the previous sections established a conceptual decision framework for differentiated MTO, hybrid, and MTS planning strategies, the purpose of the present section is to operationalize the framework through the development of a quantitative product-classification and decision-support model.

The objective of the model is to translate operational product characteristics and demand behavior into measurable decision criteria capable of supporting systematic and data-driven production planning decisions within the DermaPharm production environment.

More specifically, the framework seeks to support the practical implementation of the redesigned hybrid planning logic by identifying which products are operationally suitable for:

- reactive MTO planning,
- selective MTS production,
- hybrid planning approaches,
- or more stable forecast-driven production.

Compared to the current predominantly experience-based planning process identified throughout the Process Discovery and Process Analysis, the quantitative framework enables a more transparent, structured, and analytically grounded evaluation of planning suitability across products with substantially different operational characteristics.

Furthermore, the framework supports sensitivity analysis in order to evaluate how changes in demand variability, forecast reliability, shelf-life assumptions, and operational pressure influence the robustness of the resulting product classifications.

Consequently, the framework does not merely represent a theoretical classification exercise, but rather functions as a practical operational decision-support mechanism capable of supporting future implementation of differentiated planning strategies within the existing DermaPharm production environment.

7.8 Utilization of the Quantitative Scoring Model

To operationalize the proposed redesign framework, a quantitative scoring model was developed in Chapter 5, to evaluate product-level suitability for selective MTS production. The model translates the operational criteria identified throughout the Process Analysis and quantitative product evaluation into a structured and comparable scoring logic.

The scoring model integrated five operational dimensions:

- demand stability,
- demand volume,
- sales continuity,
- inventory-related risk,
- and production feasibility.

Each product is evaluated across the five dimensions and assigned a score reflecting its relative operational suitability for selective forecast-supported production. The combined suitability score is calculated as:

$$MTSScore_i = D_{s,i} + V_{s,i} + C_{s,i} + I_{s,i} + P_{s,i} \tag{7.1}$$

where:

A lower total score indicated stronger operational suitability for selective MTS production. This reflects that products with stable demand, meaningful workload contribution, continuous sales activity, limited inventory-related exposure, and feasible production conditions are more suitable for proactive planning than products with volatile demand, low operational relevance, or high inventory-related risk.

The purpose of the scoring model is not to produce deterministic production decisions, but rather to establish a structured and transparent comparison mechanism capable of supporting differentiated planning decisions across the product portfolio.

7.8.1 Demand Stability

Demand stability was evaluated using the coefficient of variation (CV), calculated as the ratio between the standard deviation of monthly demand and the mean monthly demand:

$$CV_i = \frac{\sigma_i}{\mu_i} \tag{7.2}$$

where CV_i represents the coefficient of variation for product i, σ_i represents the standard deviation of monthly demand for product i, and μ_i represents the mean monthly demand for product i.

The coefficient of variation expresses demand variability relative to the average demand level, which makes it suitable for comparing products with different demand volumes. Products with lower CV values exhibit more stable demand behavior and are therefore generally considered more suitable for forecast-supported production.

However, products characterized by highly seasonal but recurring demand patterns were evaluated separately, since high seasonal variation does not necessarily imply low forecastability. In such cases, recurring seasonal peaks may still support selective pre-production if the timing and magnitude of demand are sufficiently predictable and inventory-related constraints remain manageable.

7.8.2 Demand Volume

Demand volume was included to ensure that the framework prioritizes products with significant operational influence on filling-line utilization and overall production workload.

Products with high annual demand provide greater potential for workload redistribution and capacity balancing through selective MTS production.

7.8.3 Sales Continuity

Sales continuity evaluates how consistently products are sold across time periods.

Products with recurring sales activity across multiple months are considered more suitable for selective MTS production than products characterized by highly intermittent or sporadic demand patterns.

7.8.4 Inventory-Related Risk

Inventory-related risk was evaluated primarily based on shelf-life limitations, expiry-related requirements, and operational inventory exposure.

Products with strict remaining shelf-life requirements or explicit expiry-date constraints were assigned lower MTS suitability due to increased risk of obsolescence, waste, and tied-up capital.

Conversely, products without significant expiry-related limitations were considered more operationally suitable for selective pre-production, provided that demand predictability remained sufficiently stable.

7.8.5 Production Feasibility

Production feasibility evaluates the operational flexibility associated with producing a given product.

Products capable of being produced across multiple filling lines and supporting larger production batches were considered more suitable for selective MTS production due to their ability to support workload balancing and reduce operational pressure during seasonal peaks.

7.9 Product Classification Results

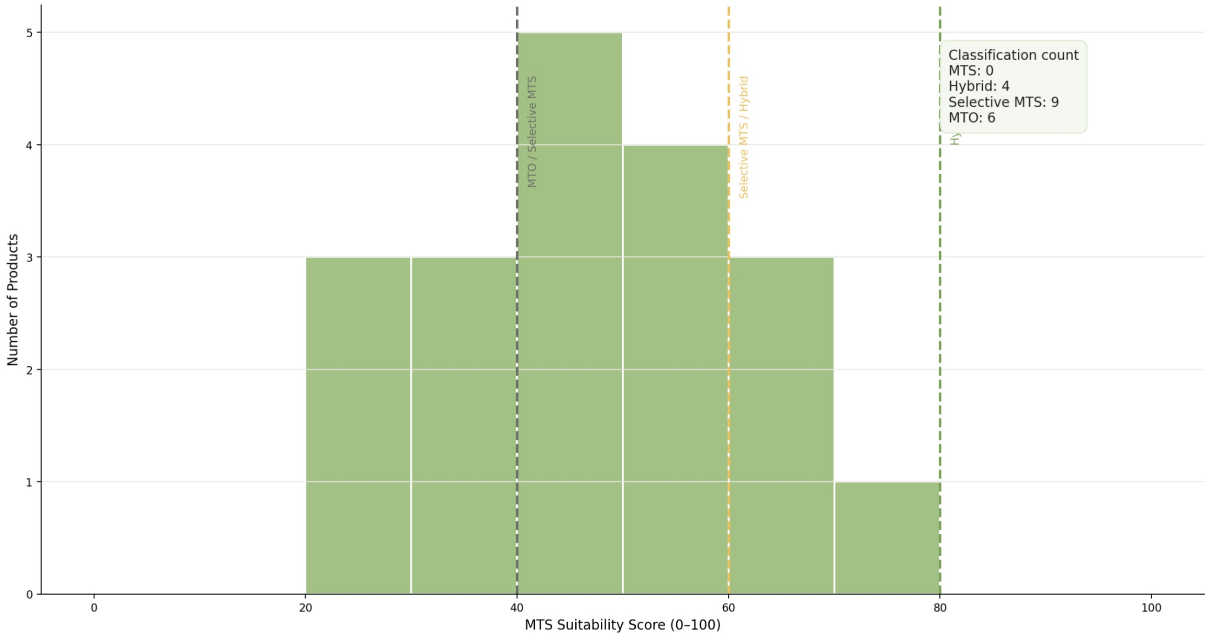

Figure 7.2

Distribution of calculated MTS suitability scores across the analyzed product portfolio.

Figure 7.2 illustrates the distribution of the calculated MTS suitability scores across the analyzed product portfolio.

The score distribution demonstrates substantial variation in operational characteristics across products and confirms that the portfolio is highly heterogeneous with respect to planning suitability.

Products with lower scores generally exhibit more stable demand patterns, higher sales continuity, and lower inventory-related exposure, thereby representing stronger candidates for forecast-driven production.

Products with higher scores are characterized by increased demand variability, lower forecastability, or greater inventory-related risk, making them more operationally suitable for reactive MTO planning.

The distribution therefore reinforces one of the central findings of the thesis: that a uniform production planning strategy is operationally suboptimal and that planning decisions should instead be differentiated according to product-level operational characteristics.

By translating operational planning considerations into measurable decision criteria, the scoring model operationalizes the proposed redesign framework and strengthens the analytical rigor of the decision-support system.

7.10 Monthly Demand Validation and Candidate Evaluation

The scoring model was subsequently applied to the filtered DermaPharm product portfolio in order to identify products with the highest suitability for selective MTS production.

Each product was evaluated according to the operational dimensions identified throughout the analysis, including:

- demand stability,
- demand volume,
- sales continuity,
- inventory-related risk,
- and operational feasibility.

Based on the combined suitability scores, products were classified into operational planning categories representing different levels of MTS suitability.

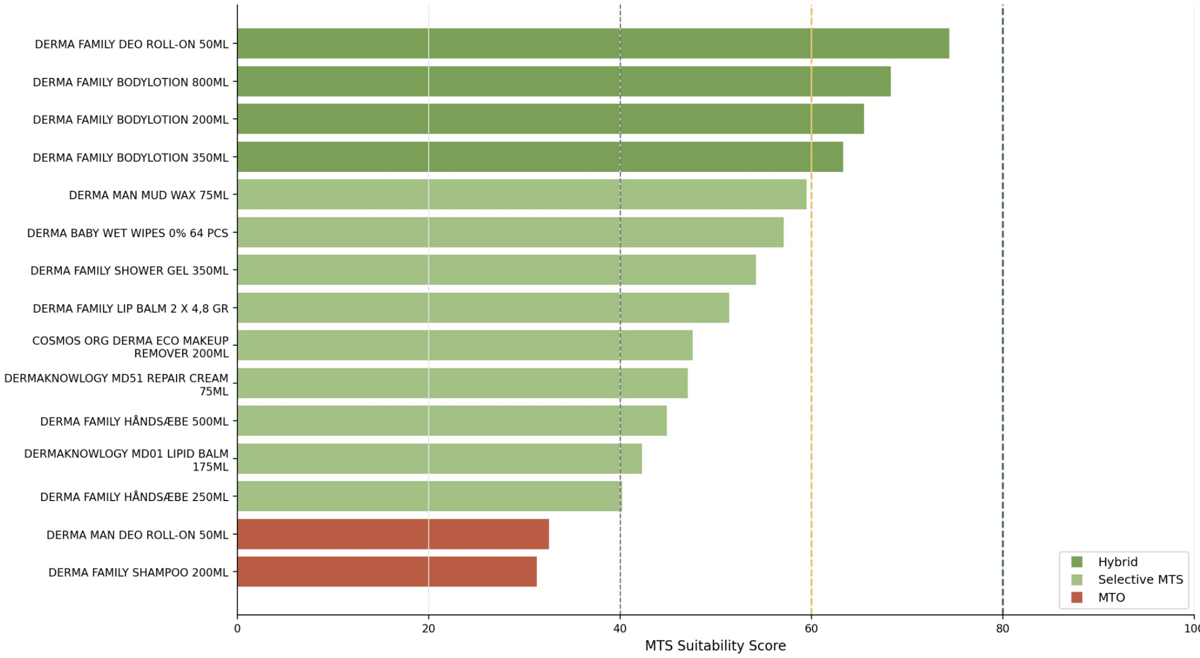

Figure 7.3

Quantitative classification of selected Derma regular products based on calculated MTS suitability scores.

Figure 7.3 illustrates the calculated suitability scores for selected Derma regular products identified as strong candidates for selective MTS production. The results indicate that several Derma regular products exhibit relatively stable and recurring demand behavior combined with comparatively manageable inventory-related exposure. In particular, products such as Derma Family Deo Roll-On, Derma Family Bodylotion variants, and Derma Family Shower Gel demonstrate comparatively strong suitability for forecast-driven production due to their recurring sales activity, relatively stable demand patterns, and operational feasibility for pre-production.

At the same time, products classified within the Hybrid and Selective MTS categories demonstrate that forecast-driven production does not necessarily require full transition toward pure MTS logic. Instead, selective and partial pre-production may support workload balancing while maintaining controlled inventory-related exposure. Products classified within the MTO category exhibit lower suitability caused by increased demand variability, lower sales continuity, or greater operational uncertainty, thereby reinforcing the continued need for reactive order-driven production for parts of the portfolio.

Overall, the results validate the central assumption of the redesign framework: that production planning strategies should be differentiated according to operational product characteristics rather than applied uniformly across the entire portfolio.

Criterion	Purpose in the scoring model
Demand volume	Identifies products with significant operational impact on production workload
Demand stability (CV)	Evaluates forecastability and demand variability
Sales continuity	Measures recurring sales activity across time periods
Inventory-related risk	Assesses exposure to shelf-life limitations and inventory obsolescence
Production feasibility	Evaluates operational flexibility and suitability for workload balancing

Table 7.2
Operational criteria included in the quantitative MTS suitability framework

7.11 Operational Product Classification Matrix

Based on the combined suitability scores, products were subsequently classified into differentiated planning categories.

Score Range	Recommended Strategy
80–100	MTS
60–79	Hybrid
40–59	Selective MTS
0–39	MTO

Table 7.3
Classification thresholds for differentiated MTO/MTS planning strategies

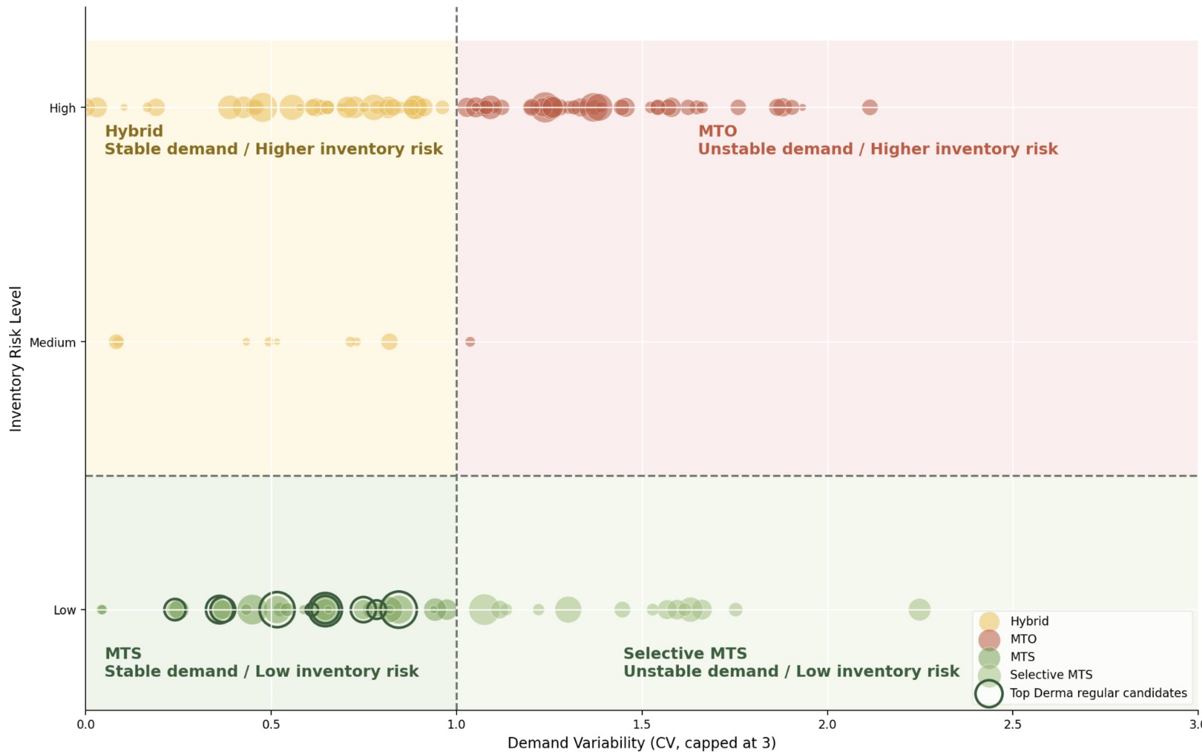

Figure 7.4

Operational product-classification matrix based on demand variability and inventory-related risk. Bubble size reflects total demand volume. Circled products represent the strongest Derma regular candidates for selective MTS production.

Figure 7.4 operationalizes the conceptual redesign framework by combining demand variability and inventory-related risk into a structured analytical classification model.

Products positioned toward the lower-left region of the matrix exhibit relatively stable demand patterns and comparatively low inventory-related exposure, making them stronger candidates for selective MTS production.

Conversely, products positioned toward the upper-right region exhibit both high demand uncertainty and substantial inventory-related exposure, thereby supporting continued reactive MTO planning.

Bubble size reflects total operational demand volume and thereby incorporates operational significance into the classification logic. Larger products therefore represent greater potential impact on capacity balancing and workload smoothing.

The circled products represent the strongest Derma regular candidates identified through the scoring model and subsequent operational validation. These products demonstrate recurring demand behavior, relatively stable sales activity, and operational conditions supportive of selective pre-production during low-demand periods.

The classification matrix therefore transforms the previously conceptual framework into a practical operational decision-support mechanism capable of supporting implementation-oriented production planning decisions.

7.12 Sensitivity Analysis

To evaluate the robustness and practical applicability of the developed framework, a sensitivity analysis was conducted on the highest-ranked Derma regular products identified through the quantitative scoring model. The purpose of the analysis was to evaluate how changes in operational assumptions influence product classifications and overall MTS suitability. Since production planning decisions are inherently affected by uncertainty, the analysis specifically examined how changes in:

- demand variability,
- forecast reliability,
- inventory carrying assumptions,
- remaining shelf-life,
- and seasonal capacity pressure

influence the stability of the resulting classifications.

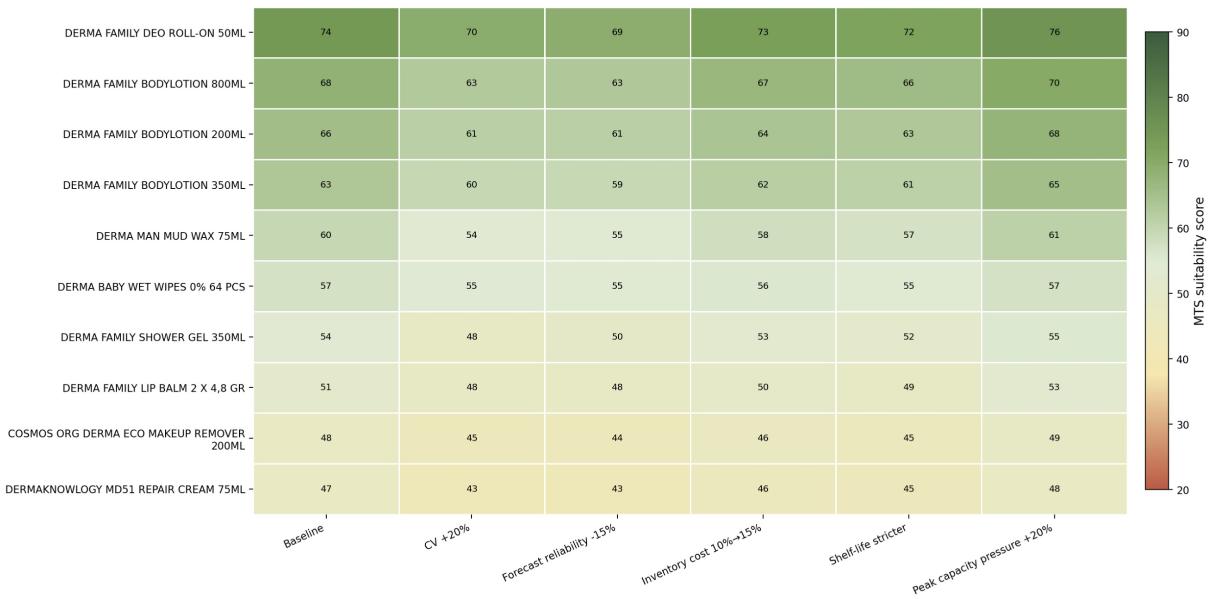

Figure 7.5

Sensitivity analysis of selected Derma regular products under varying operational assumptions.

Figure 7.5 demonstrates that products characterized by relatively stable and recurring demand patterns maintain comparatively strong MTS suitability across most evaluated scenarios, even when operational assumptions become less favorable.

Conversely, products positioned near the Hybrid and Selective MTS thresholds exhibit greater classification sensitivity under changing assumptions, particularly when forecast reliability decreases or inventory-related constraints become more restrictive. The analysis further indicates that forecast reliability and shelf-life limitations represent the most influential operational factors affecting MTS suitability within the DermaPharm production environment. Consequently, products with moderate suitability scores require continuous managerial evaluation before being transitioned toward forecast-driven production. At the same time, the analysis demonstrates that products characterized by recurring demand behavior, strong sales continuity, and limited inventory-related exposure remain comparatively robust candidates for selective MTS production across most evaluated operational scenarios.

The sensitivity analysis therefore strengthens the practical applicability of the framework by demonstrating that the proposed classifications remain relatively stable under operational uncertainty rather than depending on a single static set of assumptions.

7.13 Validation of the Framework

The developed framework was validated through triangulation between quantitative analysis, operational process observations, and qualitative interview findings from DermaPharm.

First, the resulting product classifications were compared with current planning practices and operational experiences identified during the interviews.

Second, the identified MTS candidates were evaluated against products already partially managed according to forecast-driven logic within the current planning environment.

Third, the sensitivity analysis was used to evaluate whether the framework produced relatively stable classifications under varying operational assumptions.

Together, this triangulation strengthens the robustness, analytical consistency, and practical applicability of the developed decision-support framework.

7.14 Implementation Perspective and Operational Impact

The developed framework establishes a practical foundation for transitioning from a predominantly reactive production planning environment toward a more differentiated and data-driven hybrid planning approach.

In practice, implementation would involve integrating the classification framework into existing planning activities and ERP-supported decision processes.

More specifically, implementation could proceed through the following operational phases:

1. **Initial Product Segmentation**
   Existing products are classified according to demand variability, inventory-related risk, operational feasibility, and sales continuity.
2. **Pilot Implementation**
   A limited group of highly suitable products is transitioned toward selective forecast-driven

production during lower-demand periods.

3. **Forecast Integration**
   Forecast generation and demand monitoring are integrated into operational planning activities for selected MTS candidates.
4. **Continuous Classification Review**
   Product classifications are continuously monitored and adjusted according to changes in demand behavior, operational conditions, and inventory-related constraints.

Operationally, the framework supports:

- improved workload balancing across filling lines,
- reduced seasonal production pressure,
- reduced need for reactive rescheduling,
- improved planning stability,
- improved production responsiveness,
- and more transparent planning decisions.

Importantly, the framework demonstrates that selective MTS production should not primarily be viewed as an inventory-maximization strategy, but rather as a controlled workload redistribution mechanism capable of stabilizing operational planning while maintaining acceptable inventory exposure.

Consequently, the framework provides DermaPharm with a structured operational mechanism for balancing the trade-off between planning responsiveness, workload balancing, and inventory-related risk within a regulated manufacturing environment.

7.15 Sub-Conclusion

The quantitative product-classification framework transforms the previously conceptual redesign model into a practical and implementation-oriented operational decision-support system.

The framework demonstrates that production strategy suitability is multidimensional and depends on the interaction between demand behavior, operational flexibility, inventory-related exposure, and production feasibility.

Furthermore, the sensitivity analysis confirms that forecast reliability and shelf-life limitations remain central determinants of MTS suitability, thereby reinforcing the need for differentiated planning strategies within regulated manufacturing environments.

Overall, the developed framework supports a transition from reactive and experience-based production planning toward a more analytical, structured, and data-driven hybrid planning environment capable of improving planning stability and reducing filling-line workload imbalance while maintaining controlled inventory-related risk.

8 Implementation Considerations

Although the proposed decision-support framework demonstrates potential for improving workload balancing and planning stability at DermaPharm, successful implementation depends on several organizational, operational, and data-related considerations.

First, the implementation of differentiated MTO, hybrid, and selective MTS planning requires a transition from predominantly experience-based planning practices toward a more structured and data-driven decision process. This implies that production planning decisions must increasingly rely on continuously updated operational data related to demand behavior, inventory exposure, and filling-line utilization rather than solely on reactive short-term scheduling adjustments.

A central implementation consideration therefore concerns data availability and data quality. The framework relies on accurate historical demand data, consistent product registrations, and reliable operational information obtained from the ERP system. During the analysis, several data inconsistencies and product-registration issues were identified, including inactive item numbers, inconsistent demand histories, and operational records not fully aligned with current planning practices. Consequently, implementation of the framework would require ongoing data governance and continuous validation of planning-relevant master data in order to maintain analytical reliability and decision quality.

In addition, implementation would require organizational coordination across multiple functional areas. As demonstrated throughout the Process Discovery, production planning at DermaPharm is influenced not only by customer demand and filling-line availability, but also by procurement lead times, warehouse capacity, packaging availability, compliance requirements, and development-related activities. The framework therefore cannot function as an isolated planning tool within the production department alone. Instead, effective implementation depends on cross-functional collaboration between planning, procurement, warehouse operations, production, compliance, and commercial functions.

Another important consideration concerns the operational risks associated with increased forecast-driven production. Although selective MTS production may contribute to improved workload balancing and reduced planning pressure, forecast inaccuracies may simultaneously increase exposure to inventory-related risks such as expiry, tied-up capital, and excess stock. This is particularly important within regulated skincare manufacturing environments characterized by shelf-life limitations and certification-related constraints. Consequently, the framework should not be interpreted as supporting large-scale stock-based production, but rather as enabling selective and controlled pre-production for products demonstrating operational suitability for forecast-driven planning.

For this reason, implementation should preferably follow a gradual and iterative approach. Rather than introducing differentiated planning strategies across the entire product portfolio simultaneously, the framework could initially be tested on a limited group of operationally suitable products characterized by relatively stable demand, lower inventory-related risk, and recurring sales patterns. Such a pilot-oriented implementation approach would reduce operational risk while allowing the organization to evaluate the practical effects on filling-line workload balancing, inventory exposure, and planning stability before broader adoption.

Furthermore, the classification framework should not be considered static. Product demand patterns, market conditions, promotional activities, and operational constraints may change over time, influencing product suitability for MTO, hybrid, or MTS planning. Consequently, the classification criteria and associated thresholds require continuous review and periodic recalibration to ensure ongoing operational relevance.

Finally, implementation also requires managerial ownership and organizational acceptance. Since the framework challenges the existing predominantly reactive planning logic, successful adoption depends on whether planners and operational decision-makers perceive the framework as practically applicable and operationally trustworthy. Accordingly, managerial involvement and organizational alignment become important prerequisites for integrating the framework into daily planning practices.

Overall, the implementation considerations demonstrate that differentiated MTO/MTS planning should not be understood solely as a technical classification problem, but rather as an organizational and operational transition requiring continuous coordination between data quality, planning practices, operational constraints, and managerial decision-making.

8.1 Expected Operational Implications

The proposed redesign is expected to contribute to several operational improvements within the existing DermaPharm production environment.

Most importantly, the differentiated hybrid planning approach may contribute to:

- more balanced capacity utilization across the year,
- reduced filling-line workload concentration during peak periods,
- reduced need for reactive rescheduling,
- improved planning stability,
- improved production responsiveness,
- and more structured production planning decisions.

In addition to the operational improvements, the findings also indicate potential economic implications related to improved workload balancing and capacity utilization.

By shifting selected production volumes toward lower-demand periods, the organization may reduce operational pressure associated with overtime, temporary labor adjustments, and short-term capacity expansion during seasonal peaks.

At the same time, the redesign explicitly limits inventory-related exposure by restricting selective MTS production to products demonstrating operational suitability for forecast-driven production.

Although the thesis does not include a complete financial optimization model, the findings indicate that differentiated planning strategies may support a more balanced trade-off between operational stability and inventory-related risk within the existing production environment.

Overall, the redesign enables DermaPharm to move from a predominantly reactive production planning environment toward a more proactive, structured, and data-driven planning approach capable of supporting improved operational scalability and planning stability while maintaining controlled inventory exposure.

9 Discussion

The findings of this study demonstrate that the production planning challenges at DermaPharm cannot be understood as isolated operational inefficiencies, but rather as structural consequences embedded within the configuration of the planning system itself. The interaction between seasonal demand concentration, constrained filling-line flexibility, regulatory requirements, and shelf-life limitations creates a planning environment characterized by persistent operational tension between responsiveness, capacity stability, and inventory-related risk.

The analysis reveals that the current predominantly MTO planning logic provides important operational advantages within a regulated manufacturing environment. In particular, the strategy supports compliance requirements, reduces inventory exposure, and minimizes risks related to expiry and tied-up capital. However, the findings simultaneously demonstrate that the existing planning structure amplifies operational instability during seasonal peak periods. Because production activities are initiated reactively in response to confirmed customer demand, workload concentration becomes highly synchronized with short-term demand fluctuations, resulting in intensified pressure on filling operations, increased rescheduling frequency, overtime dependence, and reduced planning transparency.

Importantly, the study demonstrates that the operational problem at DermaPharm is not fundamentally caused by insufficient total production capacity, but rather by temporal workload concentration and limited planning flexibility across time. This distinction is central. The empirical findings indicate that production resources remain underutilized during certain periods while simultaneously becoming critically overloaded during seasonal peaks. Consequently, the core managerial challenge is not simply capacity expansion, but the redistribution and stabilization of operational workload within an environment constrained by shelf-life requirements and operational uncertainty.

At the same time, the findings confirm that a complete transition toward MTS production would be operationally inappropriate within the current context. The dermatological and pharmaceutical skincare environment is characterized by strict expiry limitations, customer-specific compliance requirements, and remaining shelf-life obligations on delivered products. Under such conditions, aggressive forecast-driven production introduces substantial exposure to obsolescence, inventory depreciation, and unnecessary capital binding. The findings therefore reinforce that operational efficiency improvements cannot be pursued independently of inventory-related risk exposure.

The thesis consequently confirms the existence of a fundamental and unavoidable operational trade-off. While forecast-driven production may improve workload smoothing, responsiveness, and production continuity, it simultaneously increases inventory-related exposure and forecasting dependency. Conversely, a purely reactive MTO strategy minimizes inventory risk but restricts the organization's ability to proactively stabilize filling-line workload and absorb seasonal fluctuations. Rather than identifying a universally superior planning strategy, the study therefore demonstrates that production strategy selection must be approached as a context-dependent balancing problem shaped by operational uncertainty, bottleneck structure, and product-specific characteristics.

Within this context, the proposed decision-support framework contributes by operationalizing production strategy selection into a differentiated and data-driven classification approach. Instead of treating the product portfolio uniformly, the framework evaluates products according to measurable operational dimensions including demand variability, demand continuity, demand volume, and inventory-related exposure. This enables selective application of MTS principles to products characterized by sufficiently stable and predictable demand patterns, while preserving MTO planning for products associated with higher uncertainty or elevated inventory risk.

The findings further demonstrate that the primary value of selective MTS implementation is not inventory accumulation itself, but rather the strategic redistribution of operational workload across time. This distinction is particularly important. The purpose of selective stock-based production is not to maximize inventory availability, but to reduce seasonal filling-line pressure and improve planning stability without disproportionately increasing inventory exposure. Accordingly, the study reframes selective MTS production as a workload-balancing mechanism rather than purely an inventory strategy.

From a theoretical perspective, the findings support existing literature emphasizing the relevance of hybrid MTO/MTS systems in environments characterized by demand uncertainty and operational constraints [16, 26]. However, the study extends current literature by demonstrating how regulatory constraints, shelf-life requirements, and bottleneck positioning significantly influence the operational feasibility of differentiated planning strategies within pharmaceutical skincare manufacturing environments. In particular, the findings suggest that traditional MTO/MTS classifications remain insufficient when inventory-sensitive products and operational bottlenecks interact simultaneously within highly regulated production systems.

Furthermore, the thesis contributes theoretically by positioning MTO/MTS strategy selection not merely as a forecasting or inventory optimization problem, but as an uncertainty-management and workload-distribution problem. The study therefore extends existing hybrid planning literature by emphasizing the importance of integrating demand characteristics, operational bottleneck structures, and inventory sensitivity into a unified product-level decision architecture.

An additional theoretical implication concerns inventory positioning relative to bottleneck structure. Classical decoupling-point literature frequently advocates upstream inventory positioning in order to minimize value-added inventory exposure. However, the empirical findings from DermaPharm indicate that such principles may become operationally insufficient when the primary bottleneck is positioned downstream within filling operations rather than upstream within mixing activities. Under these conditions, upstream inventory alone does not substantially relieve the operational pressure constraining production responsiveness. This suggests that inventory positioning decisions should be evaluated relative to actual operational bottleneck structures rather than generalized inventory-minimization logic alone.

From a managerial perspective, the findings demonstrate that applying a uniform planning logic across heterogeneous product portfolios may unintentionally generate avoidable operational instability. Products characterized by stable and predictable demand behavior do not necessarily require the same reactive planning treatment as highly uncertain or customer-specific products. Consequently, differentiated planning strategies may enable organizations to improve workload stability, reduce planning pressure, and increase operational responsiveness without fundamentally compromising inventory control.

The findings further highlight the managerial importance of integrating forecasting, planning, procurement, and inventory management into more coordinated decision-making structures. The current planning environment at DermaPharm remains heavily dependent on reactive adjustments, short-term reprioritization, and tacit planning knowledge embedded within individual planners. While such experience-based decision-making provides operational flexibility, it simultaneously increases organizational vulnerability and reduces planning transparency. The proposed framework therefore contributes not only operationally, but also organizationally, by supporting a transition toward more standardized, transparent, and analytically grounded planning practices.

However, successful implementation would likely require substantial organizational alignment across production, procurement, sales, and planning functions. Transitioning toward more forecast-supported planning structures may challenge existing organizational routines and introduce resistance related to forecast uncertainty, inventory exposure, and changes in established planning practices. Consequently, differentiated planning implementation should not be understood solely as a technical optimization initiative, but rather as a broader organizational transformation involving governance structures, decision ownership, and cross-functional coordination mechanisms.

Several limitations must nevertheless be acknowledged. First, the analysis is based primarily on historical operational and sales data, which may not fully capture future market developments, changing customer behavior, or structural shifts in demand patterns. Second, the proposed framework has not been implemented operationally, meaning that the identified effects remain analytically and conceptually evaluated rather than empirically validated through full-scale implementation. Third, certain financial dimensions — including detailed inventory carrying costs, overtime costs, and service-level penalties — were only partially available and therefore could not be modeled comprehensively within the quantitative framework.

Despite these limitations, the findings strongly indicate that differentiated production planning possesses substantial potential for improving operational stability within regulated manufacturing environments characterized by seasonal demand concentration and inventory-sensitive products. Overall, the thesis demonstrates how integrating demand behavior, bottleneck structures, and inventory-related constraints into a unified decision-support framework may enable more proactive, balanced, and strategically aligned production planning under operational uncertainty.

9.0.1 Theoretical Implications

The findings of this thesis contribute to the broader MTO/MTS literature by supporting the view that production strategy selection should not be treated as a binary operational choice, but rather as a dynamic product-level decision problem shaped by operational uncertainty.

In particular, the study demonstrates how demand variability, constrained production flexibility, and inventory-sensitive products collectively influence the suitability of forecast-driven production within regulated manufacturing environments.

The findings further suggest that hybrid planning systems require structured classification mechanisms capable of balancing planning responsiveness against planning stability. Within this context, the developed framework contributes by operationalizing these trade-offs into a practical decision-support architecture integrating demand characteristics, operational constraints, and inventory-related risks.

Consequently, the thesis extends existing hybrid planning literature by positioning MTO/MTS classification as an uncertainty-management problem rather than solely a capacity-planning problem.

9.0.2 Operational Bottlenecks and Inventory Positioning

An important finding emerging from the empirical analysis concerns the relationship between bottleneck positioning and inventory strategy selection.

Classical production and decoupling-point literature frequently suggests that inventory should preferably be positioned upstream in the production process where value addition remains relatively low. Within such logic, bulk inventory is often preferred over finished-goods inventory in order to reduce inventory-related exposure.

However, the findings from DermaPharm indicate that this assumption does not necessarily align with the operational realities of the production system.

The empirical analysis demonstrates that the primary operational bottleneck is located within the filling operations rather than within the mixing activities during seasonal peak periods. Consequently, inventory positioned solely at bulk level would not significantly reduce the operational pressure experienced within the filling environment.

This finding suggests that inventory positioning and production strategy selection should be evaluated relative to the actual operational bottleneck structure of the production system rather than exclusively through generalized inventory-minimization principles.

9.0.3 Managerial Implications

The findings of this thesis have several managerial implications for production planning within regulated manufacturing environments.

First, the results indicate that applying a uniform MTO strategy across the entire product portfolio may create unnecessary operational instability when parts of the portfolio exhibit relatively stable and predictable demand patterns. Introducing selective MTS elements for suitable products may therefore support smoother production flows, improved capacity utilization, and reduced planning pressure during seasonal peaks.

Second, the study highlights the importance of product differentiation in production planning. Products should not be planned according to identical principles, but instead classified based on demand behavior, forecastability, and inventory-related risk. In practice, this requires closer integration between sales forecasting, production planning, and inventory management functions.

Third, the findings demonstrate that planning decisions should not be evaluated solely from a capacity perspective. Inventory-related risks, shelf-life constraints, lead-time performance, and capital binding must also be incorporated into decision-making processes to ensure economically sustainable and operationally feasible implementation.

Fourth, the study emphasizes the managerial importance of balancing short-term responsiveness with long-term planning stability. The current reactive planning approach increases dependence on overtime, rescheduling, and short-term adjustments during peak periods. A more differentiated planning strategy may therefore contribute to reduced operational stress and improved planning transparency.

Finally, the proposed framework supports a transition toward more data-driven decision-making. By introducing structured product classification criteria, the framework reduces reliance on experience-based judgment and supports more consistent and objective planning decisions across the organization.

9.0.4 Organizational Implications

Beyond the operational planning implications, the findings also indicate broader organizational consequences associated with transitioning toward differentiated production planning.

The proposed framework reduces dependence on purely experience-based planning by introducing more standardized and transparent decision criteria. However, successful implementation would require organizational alignment across planning, procurement, production, and sales functions.

Furthermore, the transition toward more forecast-driven planning may introduce organizational resistance related to inventory exposure, forecast uncertainty, and changes in existing planning practices. Consequently, implementation should not be understood solely as a technical planning adjustment, but as a broader organizational change involving governance, data utilization, and cross-functional coordination.

10 Conclusion

This thesis investigated how differentiated production planning can support improved capacity balancing and operational stability within a regulated pharmaceutical skincare manufacturing environment characterized by seasonal demand variation, constrained production flexibility, and inventory-related risk.

The study was motivated by the operational challenges observed within the current production planning environment at DermaPharm, where the predominantly MTO planning logic creates recurring workload concentration, planning instability, and limited flexibility in response to seasonal demand fluctuations. In particular, the analysis demonstrated how highly concentrated demand within the sun care category generates substantial production pressure during peak periods while simultaneously contributing to underutilized resources during off-season periods.

Through the Process Discovery and Process Analysis, the thesis showed that these challenges cannot be understood as isolated operational inefficiencies, but rather as consequences of structural interactions between demand characteristics, operational constraints, and inventory-related limitations embedded within the production system itself. The findings revealed that the central planning challenge at DermaPharm is fundamentally characterized by a multi-dimensional operational trade-off between capacity responsiveness and inventory exposure.

On the one hand, the existing MTO-oriented planning approach minimizes exposure to obsolescence, expiry-related risk, and tied-up capital by aligning production closely with confirmed customer demand. On the other hand, the same reactive planning logic limits the organization's ability to proactively distribute workload across time, thereby increasing planning pressure, bottleneck formation, and short-term rescheduling during high-demand periods.

Conversely, the analysis demonstrated that selective MTS production may contribute to smoother workload distribution and improved production stability, but only under conditions where demand behavior and inventory-related constraints remain operationally manageable. The findings therefore indicate that the planning problem should not be interpreted as a binary strategic choice between MTO and MTS, but rather as a product-level classification problem requiring differentiated planning logic across the portfolio.

Building on this analytical foundation, the thesis developed a structured decision-support framework for product-level MTO/MTS classification within a regulated manufacturing context. The framework integrates the operational dimensions identified throughout the study, including demand variability, demand continuity, demand volume, production-related constraints, shelf-life limitations, and inventory-related exposure.

By translating these dimensions into measurable classification criteria, the framework operationalizes the relationship between demand predictability, operational feasibility, and inventory risk within the production planning process. In doing so, the study moves beyond experience-based planning logic toward a more systematic, transparent, and analytically grounded approach to production strategy selection.

The quantitative analysis combined historical sales transactions, product master data, interview findings, and operational process observations in order to evaluate product-level planning suitability across the DermaPharm portfolio. The analysis demonstrated substantial heterogeneity in demand behavior across products. While several products exhibited highly intermittent or volatile demand patterns incompatible with forecast-driven production, other products demonstrated comparatively stable or predictably seasonal demand behavior capable of supporting selective MTS implementation.

To operationalize the framework, a quantitative scoring model was developed based on demand stability, demand volume, and sales continuity. The model enabled a structured ranking of products according to their operational suitability for selective forecast-driven production planning.

The results showed that several products within the Derma regular portfolio exhibit sufficiently stable demand patterns and manageable inventory-related risk to support proactive production prior to confirmed customer orders. In particular, products characterized by recurring demand, continuous sales activity, lower relative variability, and limited expiry-related exposure emerged as the strongest candidates for selective MTS implementation.

Furthermore, the sensitivity analysis demonstrated that the developed framework remains comparatively robust under changing operational assumptions, including increased demand variability, reduced forecast reliability, inventory-related limitations, and increased capacity pressure. Products characterized by structurally stable demand behavior consistently maintained stronger MTS suitability across multiple scenarios, whereas products positioned near classification thresholds exhibited greater sensitivity to operational uncertainty.

This finding is particularly important, as it demonstrates that the framework is capable not only of identifying potential MTS candidates, but also of distinguishing between operationally robust and conditionally feasible classifications. Consequently, the framework supports differentiated planning decisions under uncertainty rather than static deterministic categorization.

The capacity balancing analysis further illustrated the operational implications of selective MTS implementation within the existing production environment. The analysis demonstrated that forecast-driven pre-production of selected products may contribute to smoother workload distribution across the year by shifting portions of production volume away from highly concentrated peak-demand periods.

As a result, the proposed hybrid planning approach may reduce bottleneck intensity, overtime dependency, reactive schedule adjustments, and short-term planning pressure without requiring significant structural changes to the existing production system. Importantly, the findings indicate that even limited implementation of selective MTS production may generate meaningful operational improvements due to the strong concentration of workload among a relatively small subset of high-volume products.

The thesis therefore concludes that the most operationally suitable planning strategy for DermaPharm is not a complete transition from MTO toward fully forecast-driven production. Instead, the findings strongly support the implementation of a differentiated hybrid planning approach in which products are classified individually according to their demand behavior, operational characteristics, and inventory-related constraints.

This conclusion aligns with the broader literature on hybrid production systems while extending existing research into a regulated pharmaceutical skincare manufacturing context characterized by expiry limitations, certification requirements, and seasonal demand concentration.

From a theoretical perspective, the thesis contributes to the existing MTO/MTS literature by integrating demand-related and inventory-related considerations into a unified product-level classification framework applicable to regulated manufacturing environments. The study further contributes by operationalizing the MTO/MTS trade-off into a quantitatively supported and practically applicable decision-support approach capable of supporting differentiated production planning under operational uncertainty.

From a practical perspective, the developed framework provides DermaPharm with a structured analytical tool for supporting more proactive and data-driven planning decisions. The framework increases transparency in production strategy selection, reduces dependence on purely experience-based planning practices, and establishes a foundation for improved capacity balancing while maintaining controlled inventory-related exposure.

Several limitations should nevertheless be acknowledged. First, the analysis is based primarily on historical sales behavior and therefore does not fully capture future market developments, changing customer behavior, or external disruptions affecting demand patterns. Second, the study focuses on analytical and conceptual validation rather than full-scale organizational implementation. Consequently, the long-term operational impact of the proposed framework remains dependent on future adoption, continuous monitoring, and organizational integration within the planning function.

Despite these limitations, the findings strongly indicate that differentiated and selective MTS implementation represents a feasible and operationally valuable planning alternative within the current DermaPharm production environment.

Although the study is grounded in the DermaPharm case, the findings may have broader relevance for regulated manufacturing environments characterized by demand uncertainty, constrained production flexibility, and inventory-sensitive products. In particular, the findings suggest that hybrid planning systems become increasingly relevant in environments where operational stability depends on balancing responsiveness, capacity utilization, and inventory exposure simultaneously.

The findings further demonstrate that the operational challenge at DermaPharm is not primarily related to insufficient overall production capacity, but rather to seasonal workload concentration within the filling operations.

Consequently, the role of selective MTS production is not simply to increase inventory availability, but to strategically redistribute workload across time in order to reduce peak-period pressure and improve planning stability.

Overall, the thesis demonstrates that production strategy selection within regulated manufacturing environments should be approached as a structured product-level uncertainty-management problem rather than as a binary strategic choice between MTO and MTS.

By integrating demand-related uncertainty, operational constraints, and inventory-related risk into a unified analytical and decision-support framework, the study contributes both theoretically and practically to the development of more differentiated, stable, and operationally balanced production planning systems.

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Appendix A

A.1 Production Flow

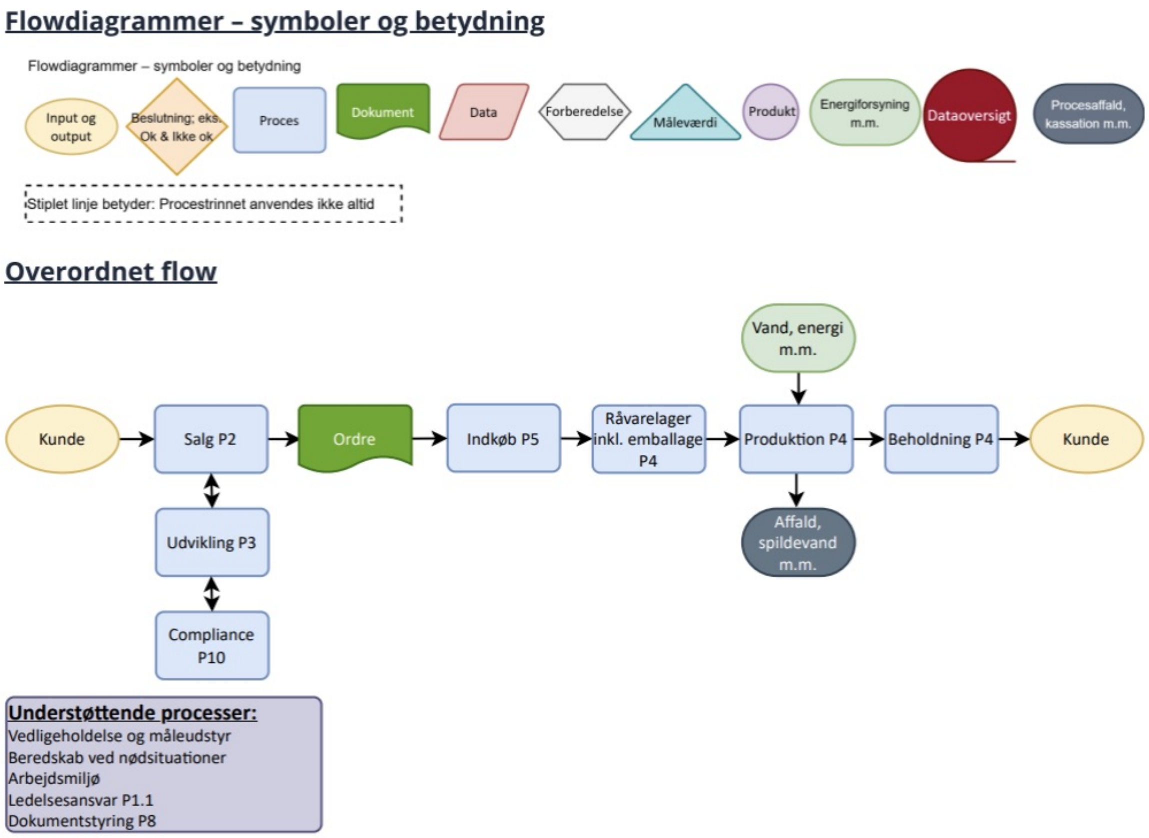

Figure A.1
Overall Process Flow and Symbols

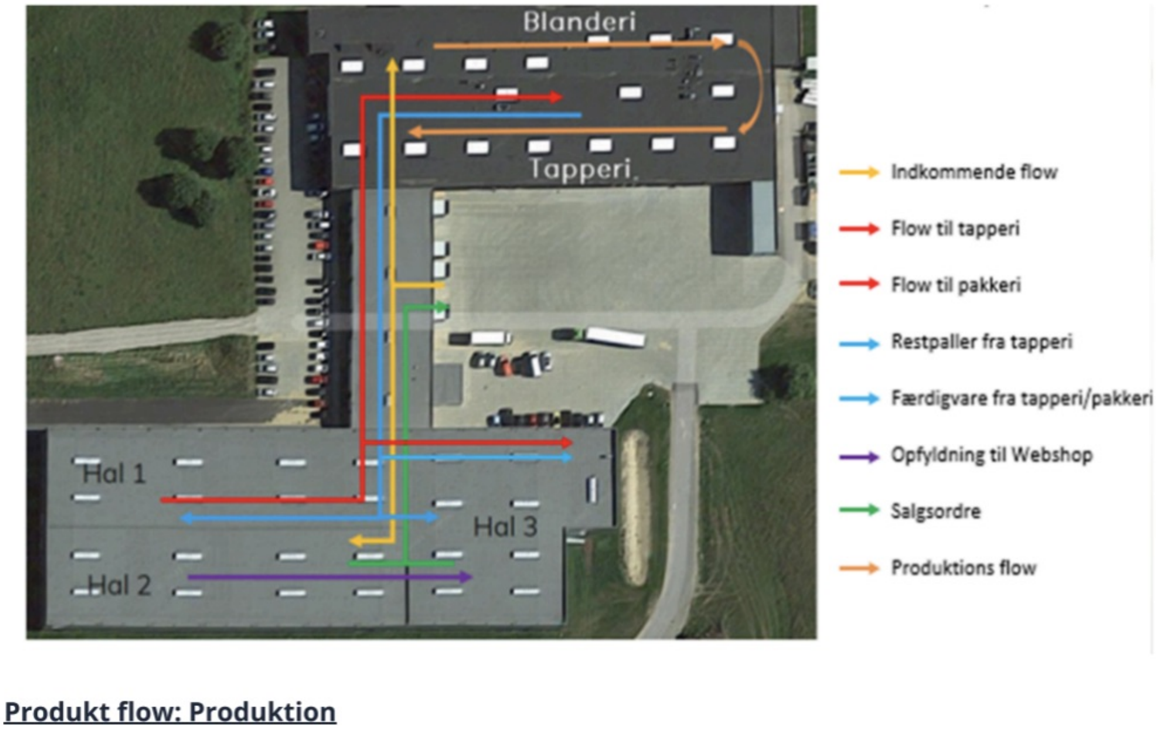

Figure A.2
Production Flow

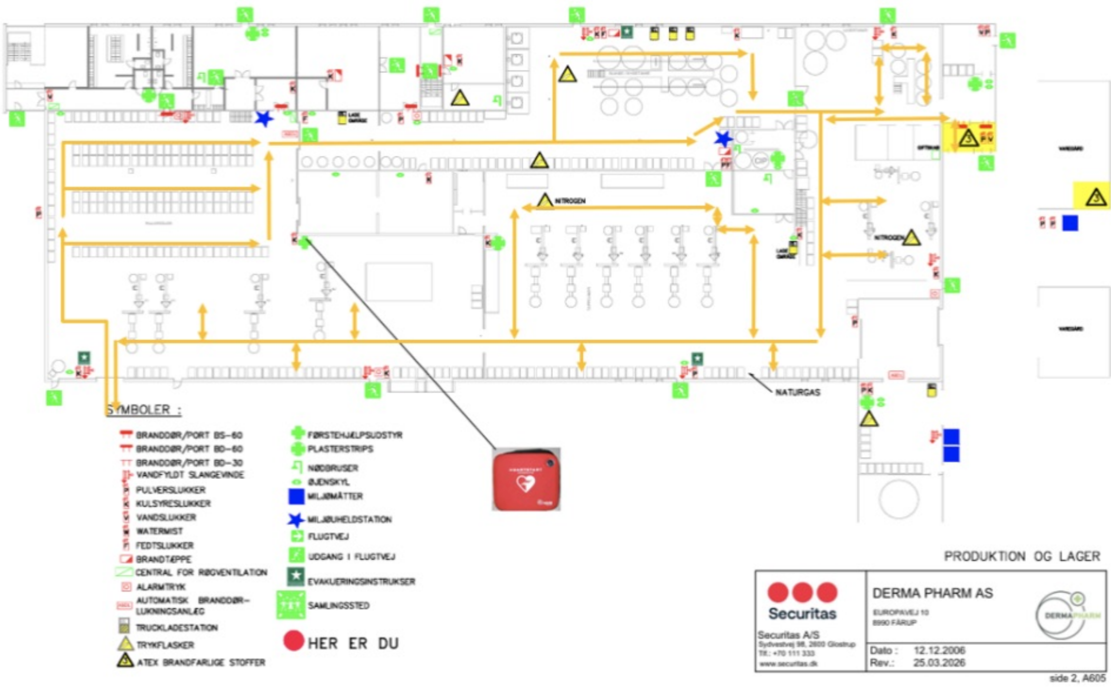

Figure A.3
Production Flow 2

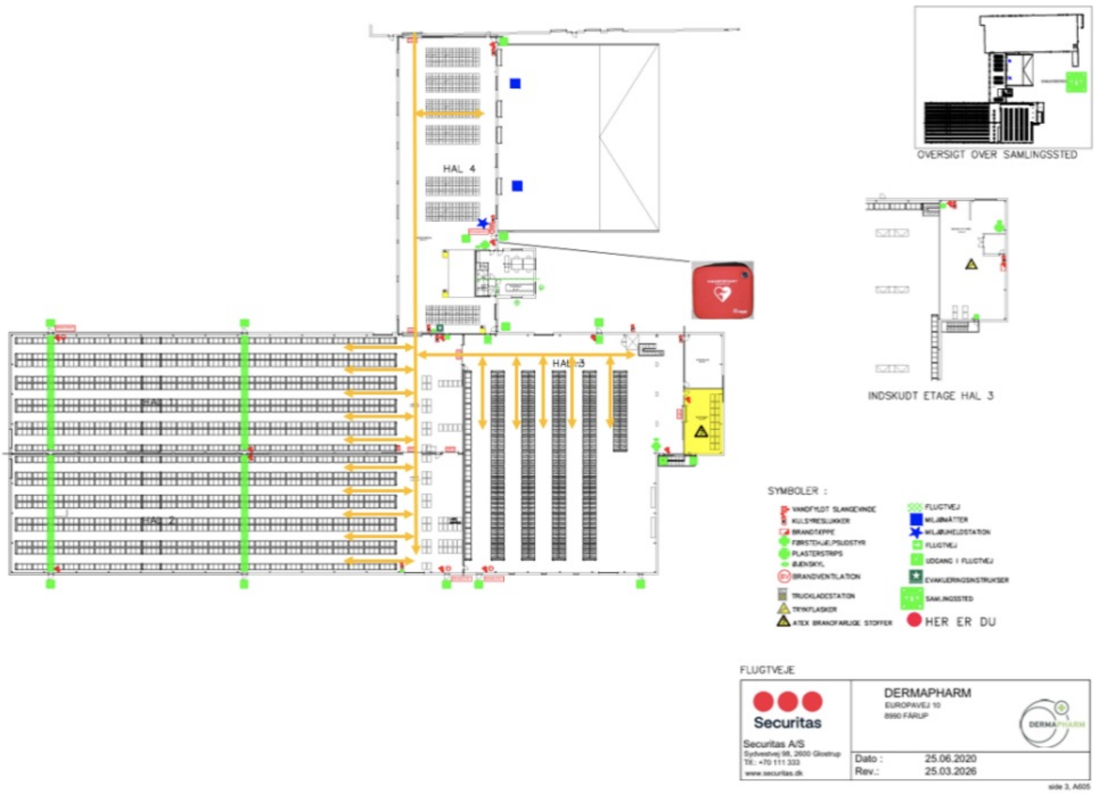

Figure A.4
Production Flow 3

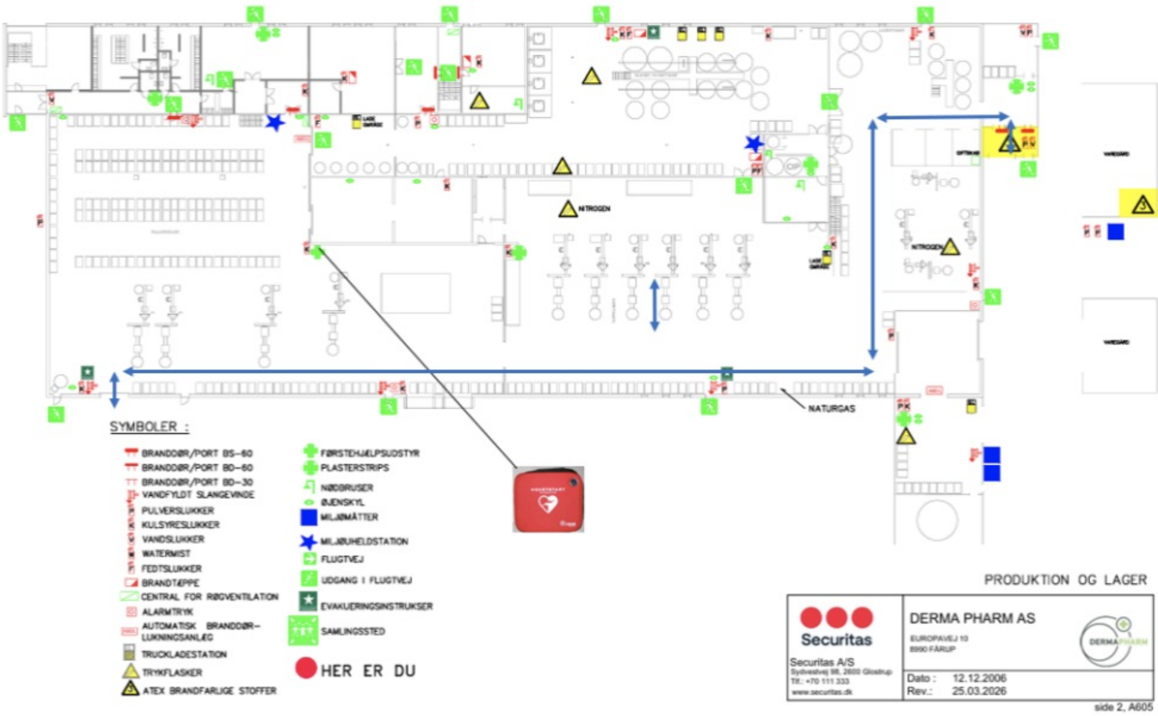

Figure A.5
Production Flow 4

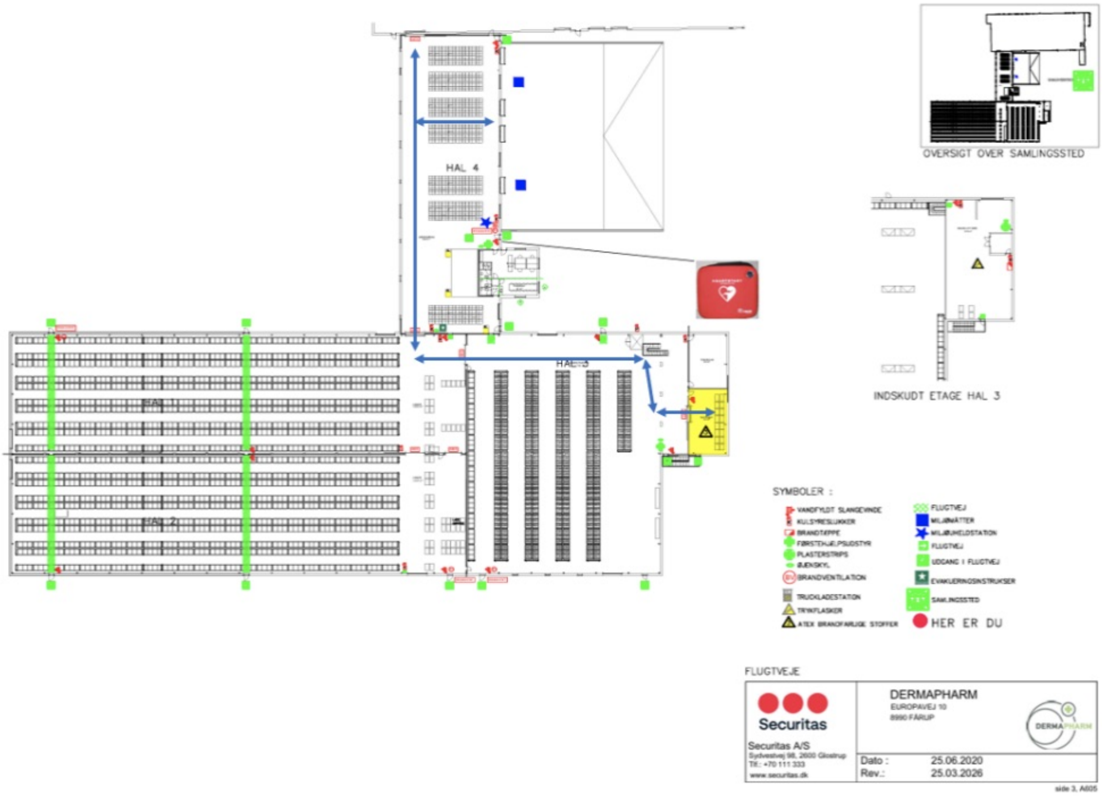

Figure A.6
Production Flow 5

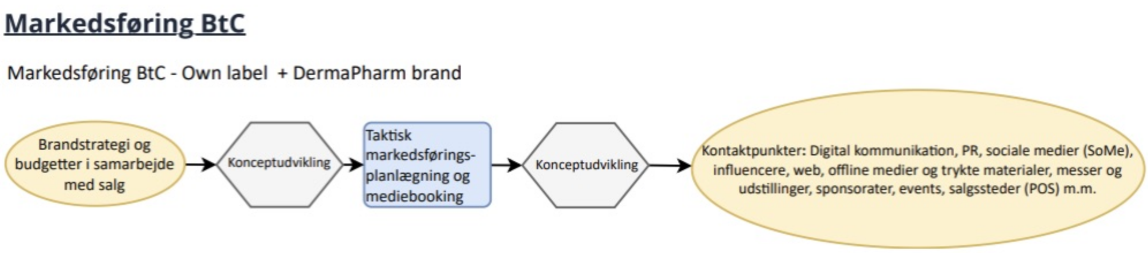

Figure A.7
Marketing BtC

A.2 Intial Meeting with Head of Planning, PT & Logistics

Allan Kousted, Head of Planning, PT & Logistics – DermaPharm A/S, Fårup
Date: Conducted on February 6, 2026

Hvordan påvirker sæsonudsving – særligt inden for solprodukter – jeres kapacitetsudnyttelse hen over året?

AK: Solprodukter er ekstremt sæsonbetonede. Efterspørgslen ligger primært i forårsmånederne, hvor produkterne skal være tilgængelige hos kunderne. Vores kapacitet – både maskiner og medarbejdere – er i princippet konstant fra januar til december, men efterspørgslen er det ikke.

Ideelt set ønsker jeg en mere jævn kapacitetsudnyttelse hen over året. Jeg ønsker ikke maskiner, der kun anvendes intensivt i tre-fire måneder og derefter står stille resten af året. Det giver ikke mening investeringsmæssigt.

Det samme gælder medarbejderne. Jeg ønsker ikke at ansætte medarbejdere i en kort periode og derefter afskedige dem igen. Det er hverken organisatorisk eller økonomisk hensigtsmæssigt.

Hvilke konkrete værktøjer anvender I for at håndtere spidsbelastningen i højsæsonen?

AK: En af de løsninger, vi anvender, er VUA – Varierende Ugentlig Arbejdstid. Det er en ordning, der er forankret i vores overenskomst. Ordningen betyder, at medarbejderne i en periode arbejder flere timer om ugen og afspadserer disse timer på et senere tidspunkt.

Fra første uge i januar og frem til påske arbejder medarbejderne i produktionen tre til fire ekstra timer om ugen. Det giver en mindre kapacitetsforøgelse i den periode, hvor belastningen er højest. Efterfølgende afspadseres timerne, blandt andet ved at vi lukker produktionen tre dage op til påske.

Ordningen giver ikke en dramatisk kapacitetsforøgelse, men den skaber en vis fleksibilitet i de travle måneder.

Har I overvejet at producere tidligere og opbygge lager for at udjævne kapaciteten?

AK: Det er i princippet den anden mulighed – at producere før sæson og lægge varer på lager. Men det indebærer flere udfordringer.

For det første binder det likviditet. Hvis vi producerer i efteråret til salg i foråret, har vi kapital bundet i lager i en længere periode.

For det andet er der holdbarhedsproblematikken. Nogle solprodukter har en udløbsdato, mens andre i stedet har et krukkemærke (PAO – Period After Opening). Hvis et produkt har en holdbarhed på mere end 30 måneder, behøver det ikke en udløbsdato, men skal i stedet mærkes med et krukkemærke.

Udfordringen opstår især ved produkter med udløbsdato. Eksempelvis kræver Matas, at der er minimum 80% af holdbarheden tilbage ved modtagelse. Hvis vi producerer for tidligt, risikerer vi at reducere restholdbarheden, før produktet når slutkunden. Det gør tidlig produktion risikabel – både likviditetsmæssigt og kommercielt.

Hvor stor en andel af jeres samlede produktion udgør solprodukter?

AK: Vi producerer cirka 15,5 millioner enheder årligt. Solprodukter udgør omkring 25–30% af volumen, svarende til cirka 4–5 millioner enheder.

Målt på værdi udgør solprodukter cirka en tredjedel til halvdelen af den samlede produktionsværdi. Det betyder, at sol fylder relativt mere økonomisk end volumemæssigt.

Hvordan er jeres produktportefølje overordnet struktureret?

AK: Produktionen kan overordnet opdeles i tre kategorier:

1. Own Label (OL) – vores egne brands som eksempelvis Derma. 2. Private Label – produkter produceret for detailkæder som Coop. 3. Branded Private Label – eksterne brands såsom Rudolf Care eller Lucia Care.

Derudover kan produkterne opdeles i varer med og uden udløb samt i Made-to-Order og Made-to-Stock. Langt størstedelen af produktionen er Made-to-Order.

Hvordan fungerer planlægningen i en overvejende Made-to-Order struktur?

AK: I praksis modtager vi en ordre, hvor kunden ønsker levering i en bestemt uge. Først vurderer vi, om vi kapacitetsmæssigt kan imødekomme ønsket. Derefter undersøger indkøb, om råvarer og emballage kan fremskaffes rettidigt.

Hvis materialerne først kan leveres senere, må produktionen flyttes. Derudover har vi 18 forskellige fyldelinjer, og ikke alle produkter kan produceres på alle linjer. Det betyder, at selvom vi samlet set har kapacitet, kan den specifikke linje være optaget. Det skaber kompleksitet i planlægningen.

Hvordan anvender I Make-to-Stock i jeres planlægning?

AK: Make-to-Stock anvendes som buffer i planlægningen. Hvis vi har ledig kapacitet, kan vi fylde hullerne med MTS-produktion. Omvendt kan vi udskyde MTS, hvis der opstår behov for at prioritere MTO-ordrer.

Vi arbejder med safety stock og genbestillingspunkter på MTS-produkter. I dag giver MTS os omkring 5% fleksibilitet. Hvis vi kunne øge det til 10%, ville det give os væsentligt større manøvrerum i kapacitetsplanlægningen.

Hvilke eksterne faktorer påvirker jeres lead times og leveringssikkerhed?

AK: Det kan være globale forhold som lukningen af Suezkanalen, krigen i Ukraine, ændrede toldsatser eller en generel tendens til reshoring til Europa. Hvis større virksomheder flytter produktion fra Asien til Europa, kan vores europæiske leverandører opleve markant øget efterspørgsel.

Vi kan ikke blot skifte leverandør, da der kræves omfattende godkendelser og certificeringer. Derfor har vi arbejdet med dual sourcing de seneste tre år, hvilket har øget stabiliteten i vores supply chain og i visse tilfælde reduceret omkostningerne.

Derudover kan mere lokale hændelser, såsom maskinnedbrud hos en leverandør, have direkte konsekvenser for vores produktion og dermed vores kunders leveringstid.

A.3 Production Related Interview

Interview with Head of Planning, PT & Logistics

Allan Kousted, Head of Planning, PT & Logistics – DermaPharm A/S, Fårup
Date: Conducted on February 13, 2026

Hvilke overordnede udfordringer oplever I i relation til solprodukter og sæson?

AK: Vi har flere forskellige varekategorier, og de opfører sig forskelligt. Derfor kan man opstille scenarier for de forskellige typer produkter og drøfte, hvordan vi bør håndtere dem fremadrettet. Og du har helt ret: solprodukter er meget sæsonbetonede. Det er især i forårsmånederne, at de skal bruges hos kunden, og det giver et voldsomt kapacitetspres i en relativt kort periode.

Udfordringen er, at vores kapacitet i princippet ligger ret stabilt hen over året – fra januar til december. Maskinparken er der, og medarbejderstaben er der. Derfor ville jeg gerne kunne "fylde noget ned" i den kapacitet, så udnyttelsen bliver mere jævn. Det handler både om at udnytte maskinerne bedre og om at kunne have en medarbejderstyrke, der er nogenlunde konstant. Jeg vil helst ikke have maskiner, der kun kører hårdt om foråret og så står stille resten af året – det giver ikke mening kapacitetsmæssigt. Og jeg vil heller ikke have et setup, hvor vi ansætter folk i seks måneder og derefter afskediger dem igen.

Hvad gør I konkret for at øge kapaciteten i de travle måneder?

AK: En af de muligheder, vi bruger i dag, er VUA – Varierende Ugentlig Arbejdstid. Det ligger i vores overenskomst. Det betyder i praksis, at medarbejderne arbejder nogle ekstra timer i nogle uger og så får de timer fri i andre uger.

Vi bruger det typisk fra første uge i januar og frem til påske, hvor alle medarbejderne i produktionen arbejder tre til fire ekstra timer om ugen. Det løfter kapaciteten en lille smule i den periode, hvor presset er størst. De timer skal så afspadseres senere, så i en anden periode falder kapaciteten tilsvarende lidt.

Det smarte er, at jeg også kan styre, hvornår afspadseringen ligger. Vi har blandt andet valgt, at tre dage op til påske lukker vi fabrikken – produktionslukket – og der kan vi "brænde" nogle af timerne af. Der kan også ligge en ekstra dag eller to senere. Det er ikke en kæmpe løsning, men det giver os lige lidt ekstra kapacitet, når der er travlt.

Hvad med at producere tidligere og lægge solprodukter på lager?

AK: Det er jo den anden mulighed: at producere tidligere og lægge på lager for at kompensere for sæsonen. Men der er nogle klare risici ved det. Først og fremmest binder det likviditet – det er en udfordring i sig selv.

Derudover er der holdbarhed. For solprodukter har du nogle varer med udløb og nogle uden udløb.

Om noget er med eller uden udløb afhænger af ingredienserne. Når jeg siger "uden udløb", så betyder det typisk, at holdbarheden er over 30 måneder. Hvis holdbarheden er mere end 30 måneder, betragtes produktet som uden udløbsdato, og i stedet bruger man et krukkemærke (PAO), hvor der for eksempel står 30 måneder, 12 måneder eller 6 måneder. Så behøver man ikke at stemple en udløbsdato på produktet, men krukkemærket skal være der.

Problemet er, hvis du producerer for tidligt på varer, der har udløb. Mange kunder – eksempelvis Matas – har krav om, at der skal være minimum 80% af holdbarheden tilbage, når de modtager varen. Så hvis jeg producerer om efteråret, og varen først skal bruges om foråret, så risikerer jeg allerede at have "spist" 20% af holdbarheden. Så kan kunden i praksis ikke have den stående, eller de kan ikke sælge den videre til fx Matas. Og det gælder også indirekte, hvis vi producerer til en kunde, der selv sælger videre til Matas – så er de også meget opmærksomme på restholdbarheden. Derfor er det farligt at producere for tidligt på varer med udløb.

Hvis produktet er "uden udløb" (altså kun krukkemærke), så er risikoen primært likviditetsbinding – men så kommer næste spørgsmål: hvem tager risikoen? Er det os, der producerer og lægger det på lager for egen regning, eller skal kunden acceptere at købe det tidligere og dermed betale tidligere?

Har I haft succes med at producere sol tidligere for at udjævne belastningen?

AK: Ja, de senere år har vi faktisk haft succes med at lægge en pulje af solproduktion om efteråret, hvor vi ikke har højsæson. På den måde forsøger vi at flytte noget af "sol-toppen" væk fra foråret.

Hvis vi taler om størrelsesordener: sol udgør cirka en tredjedel til halvdelen af værdien af det, vi producerer, men det er cirka 25% målt i antal enheder. Vi producerer omkring 15,5 millioner enheder om året, og sol udgør i størrelsesordenen 4,5 til 5 millioner enheder.

Det, vi forsøger at gøre, er at flytte noget af solproduktionen over i perioder, hvor vi normalt laver mere "almindelig" produktion. I teorien er det den pæne verden. I praksis kræver det, at vi kan få flyttet noget sol til efteråret, og det har vi gradvist lykkes med over de sidste tre år.

Jeg kan ikke huske de præcise tal, men for at give en fornemmelse: vi har måske flyttet noget i størrelsesordenen 10 millioner i et tidligere år og 25 millioner året efter (målt i omsætning/kroneværdi). Pointen er, at vi stille og roligt bygger det op. Men det er ikke bare en planlægningsopgave – det er også en salgsopgave, fordi kunderne skal overbevises om, at det er en god idé at få produceret om efteråret, selvom de så får fakturaen der og binder kapital i lager. Til gengæld undgår de lange lead times i højsæsonen.

Hvad sker der, hvis kunder kommer sent med solordrer i højsæsonen?

AK: Når vi er i højsæson om foråret, så er min kapacitet ofte allerede booket. Hvis en kunde kommer i april og siger: "Solen skinner helt vildt, kan I ikke lige producere noget sol?", så er svaret ofte, at det er for sent, fordi vi allerede har fyldt kapaciteten op.

Det betyder, at kunder kan opleve lange lead times, når de kommer i den periode, hvor vi allerede er presset af solproduktion. Og det gælder også kunder, der har "almindelige" produkter, fordi de også kan blive skubbet, når sol fylder så meget.

Mange af vores kunder har både solprodukter og almindelige produkter i deres portefølje – eksempelvis større kunder som Coop eller branded private label-kunder som Rudolf Care. Når vi så siger til dem, at nu er der højsæson og vi kører meget sol, så kan deres andre produkter også få længere lead time. Det bliver et incitament for dem til at sige: “Okay, jeg får produceret en del af min sol om efteråret”. Det behøver ikke være alt, men måske 50%, så man har noget på plads.

Hvilke faktorer kan ellers skabe leveringsproblemer og udsolgte situationer?

AK: Det kan selvfølgelig være lead time hos os, men det kan også være noget så simpelt som en ingrediens, emballage eller en komponent, der ikke kan skaffes. Og det kan også skyldes globale forhold.

Hvis Suezkanalen bliver påvirket, og skibe skal sejle rundt om Afrika, så får du pludselig en meget længere lead time. Krigen i Ukraine kan lægge pres på leverandører i nærområder. Told eller handelsbarrierer kan ændre, hvor virksomheder placerer deres produktion, og vi ser også en tendens til, at nogle virksomheder flytter produktion tættere på Europa i stedet for Fjernøsten.

Det kan give europæiske leverandører markant flere ordrer. Hvis en stor aktør fx flytter flaskeforsyning fra Kina til en europæisk leverandør, så får den leverandør pludselig langt flere ordrer, og det kan give os længere lead times – og dermed også vores kunder.

Og vi kan ikke bare skifte leverandør fra den ene dag til den anden. Med de produkter vi laver – både kemisk og emballagemæssigt – kræver leverandørskift godkendelser og certificeringer. Der er et hav af krav, før vi overhovedet vil tage en ny leverandør ind.

Hvordan arbejder I med at reducere forsyningsrisiko?

AK: Dual sourcing – altså ikke at lægge alle æg i én kurv – er meget relevant. Vi har kørt et dual sourcing-projekt over de sidste tre år, og det har været rigtig godt. Vi har fået en mere stabil supply chain, og på nogle varer har vi også sparet penge.

Men forstyrrelser kan også være lokale. Vi havde for nylig et maskinnedbrud hos en label-leverandør (All4Labels syd for Randers). Labels har normalt kort lead time, og derfor har vi typisk ikke labels på lager. Så da de fik nedbrud, fik det direkte konsekvens for vores produktion og dermed vores kunder.

Hvis vi skulle skifte label-leverandør hurtigt, skulle vi flytte artwork og finde en ny leverandør, der kunne levere hurtigt – og der er ikke mange, der bare har plads inden for 14 dage. Og vi har brugt den leverandør i mange år, så det er ikke trivielt.

Hvorfor har I 18 forskellige fyldelinjer, når fleksibilitet også kunne være en løsning?

AK: Vi har 18 forskellige tappe-/fyldelinjer. Man kunne godt spørge, om det er “dumt”, og hvorfor vi ikke bare har færre, mere fleksible linjer. Det er faktisk en god pointe: hvis maskinerne var mere fleksible og kunne køre flere forskellige produkter, kunne vi måske nøjes med færre linjer og investere i færre maskiner – og dermed udnytte dem bedre på tværs af produktporteføljen.

Men selv med fleksibilitet kommer vi ikke helt uden om, at der er en sæson i det. Sæsonudsvingene er der, så spørgsmålet er stadig: hvordan løser man det bedst?

Hvordan oplever du planlægningsudfordringen i en Made-to-Order struktur?

AK: Langt det meste er Made-to-Order. Det betyder, at jeg i praksis sidder og venter på, at der kommer en ordre ind. Når ordren kommer, kigger jeg først på, hvornår kunden ønsker levering. Hvis kunden ønsker uge 1, lægger jeg den ind. Men så kan indkøb sige, at de ikke kan skaffe materialerne før uge 4, og så flytter vi ordren.

Samtidig er planlægningen afhængig af den specifikke linje. Selv om vi samlet set har kapacitet, kan den relevante maskine være optaget. Så planlægningen bliver en proces, hvor man hele tiden flytter rundt, mens ordrer "drypper" ind.

Derfor kunne det være interessant at identificere varer og kunder med stabilt aftræk. Hvis sandsynligheden for, at en ordre kommer inden for samme måned, er høj, kan man argumentere for at planlægge det som Make-to-Stock. Det giver mulighed for at fylde "huller" i kapacitetsplanen.

Det er også det, vi gør i dag: når vi kommer tæt på en produktionsuge og kan se, at der ikke kommer flere ordrer ind, og indkøb alligevel ikke kan nå at skaffe materialer til nye ordrer, så kan vi fylde hullet med Make-to-Stock. På mange Make-to-Stock varer har vi safety stock på komponenter, så vi kan producere uden at vente på indkøb.

Make-to-Stock giver os i dag måske cirka 5% fleksibilitet. Hvis dit projekt kan hjælpe med at øge det til 10%, så giver det os markant mere fleksibilitet til at fylde huller ud og producere i størrelser, der giver bedst mening for produktionen. Det ville være guld.

Hvilke data kan du give, som kan understøtte en Pareto-analyse?

AK: Du vil kunne se i de data, jeg sender til dig, hvilke produkter der fylder mest i volumen eller omsætning. Jeg kan også give data på, hvor meget de fylder i produktionen.

Vi kan se på rutedata: hvilken linje varen er produceret på, og med hvilken hastighed. Det gør, at du kan beregne, hvor lang tid en given batch tager. For eksempel kan 10.000 enheder af én vare tage en hel dag, mens 10.000 af en anden vare kun tager to timer. Det kan du bruge til at analysere både volumen, værdi og kapacitetsbelastning.

Hvis en kundes aftræk er stabilt, hvad betyder emballagen så i en Make-to-Stock tankegang?

AK: Hvis du finder en vare med stabilt aftræk og siger, at den kunne være oplagt som Make-to-Stock, så kommer der et ekstra element: emballagen. Vi kører primært med tuber og flasker. Krukker fylder relativt lidt i forhold til resten. Fordelingen mellem flasker og tuber ligger ofte omkring 45/45, men kan svinge – nogle år er det fx 60/40.

Når jeg siger flaske, mener jeg alle typer flasker – fra større flasker til meget små. Alt, der har cylinderform, tæller reelt som flaske. Tuber kan også være aluminiumstuber.

Min pointe er, at leverandørernes produktion af flasker og tuber er planlagt og kræver omstillinger. Det er typisk sprøjtestøbning, hvor man har en *mold* – en stor form – som er dyr og tager tid at stille ind. Når maskinen først er sat op, kan de producere ekstremt hurtigt, fx 50.000 tuber på kort tid. Den store udfordring hos leverandøren er omstillingstid – ikke selve produktionen.

Det kunne derfor være interessant, hvis du finder en stabil vare, at spørge leverandøren, om de vil holde lageret hos dem. I stedet for at vi bestiller 25.000 eller 50.000 ad gangen, kunne vi sige: "Vi tager

100.000", og så kan leverandøren producere dem i én kørsel, men kun levere 20.000 ad gangen til os. Så flytter vi noget lager ned til leverandøren og får samtidig forsyningssikkerhed.

Men det kræver, at vi har sikkerhed for, at vi reelt aftager de 100.000. Og der bliver styklister vigtige: sandsynligheden for at de 100.000 bliver brugt er langt større, hvis den samme tube eller flaske bruges til flere færdigvarer – fx 8 forskellige – fremfor kun én.

Hvad betyder det, om emballagen er trykt eller etiketteret, og hvordan påvirker regulering udviklingen?

AK: Når vi taler om tuber og flasker, kan de enten være trykte eller etiketterede. Vi ser en tendens til, at man gradvist bevæger sig væk fra tryk og over mod etikettering, blandt andet af hensyn til miljøbetragtninger.

Markedet bevæger sig ikke kun efter mode, men også efter forbrugernes ønsker og regulering – fx EU-regulering om emballage og udvidet producentansvar. Certificeringer som Svanemærket og Astma-Allergi kan også stille skarpere krav, fx til genanvendt materiale. Det kan påvirke, hvordan vi skal tænke emballage og lager fremadrettet.

Hvis emballagen er etiketteret, er den ofte en bedre kandidat til et lager-/forsyningssetup end hvis den er trykt, fordi tryk typisk låser varianten hos leverandøren. Ofte er flasker etiketterede, mens tuber i dag oftest er trykte.

Hvordan kan man motivere kunder til at flytte solproduktion til efteråret?

AK: Downstream, altså ud mod kunden, handler incitamenter både om lead time og risiko, men også om pris. Når vi taler om likviditetsbinding, bliver pris et vigtigt element.

Vi har allerede pristrin, hvor prisen falder ved større mængder. Man kunne overveje at tilbyde en lavere pris, hvis kunder vælger at få produceret solcreme om efteråret. Men så skal vi kunne vurdere, hvor meget vi kan sænke prisen, og hvad vi sparer ved at producere uden for højsæsonen.

Når vi får kapacitetsproblemer, får vi heller ikke altid de ordrestørrelser, der giver bedst mening. I pressede perioder kan jeg begynde at splitte en ordre: kunden bestiller 10.000, men jeg laver måske 5.000 for at holde kunden i gang, og så laver jeg noget til en anden kunde. Det betyder, at jeg bevidst ødelægger den optimale ordrestørrelse, fordi jeg forsøger at tilfredsstille flere kunder samtidig. Det koster på effektiviteten.

Det påvirker også vores OEE (Overall Equipment Effectiveness). Effektiviteten falder, når vi bliver pressede. VUA koster lidt, men de ekstra timer fra faste medarbejdere er typisk mere effektive end vikarer. Når vi alligevel ender i kapacitetspres, bliver løsningen ofte vikarer og ekstra overarbejde, og det trækker effektiviteten ned.

Hvordan anvender I vikarer til at udvide kapaciteten i højsæsonen?

AK: På en typisk tappe-/fyldelinje står der ofte tre personer. To roller er vigtige og kræver kompetence: der skal fyldes i maskinen, tappes, tages prøver, vejes og registreres i systemer. Den tredje rolle – at tage færdigvarer fra båndet og palletere – er mindre kompleks kompetencemæssigt.

Hvis jeg sætter en vikar i den mindst komplekse rolle på flere linjer, kan jeg frigive faste medarbejdere og bruge dem til at starte en ekstra linje op, som jeg ellers ikke kunne køre. På den måde kan jeg med nogle vikarer få en ny linje i gang.

Det er ikke perfekt, fordi vikarer typisk ikke er lige så hurtige som faste medarbejdere, og der er oplæringstid. Men oplæringen i palleteringsrollen er relativt begrænset. Det fungerer bedst i perioder med langvarigt pres, hvor vi kan have de samme vikarer over tre-fire måneder, så de gradvist bliver bedre.

Hvilken ekstra kompleksitet ligger der i planlægningen, når man inddrager blanderiet?

AK: Man kan ikke kun fokusere på tapperiet. Vi har også blanderiet, og de to kapaciteter skal balanceres. I blanderiet er der groft sagt to processer: afvejning og selve blandingen.

Det interessante er, at blandetiden ofte er næsten den samme, uanset om vi laver 1 ton eller 10 ton. Når ingredienserne er kommet i tanken, kan der være en fast blandetid, og den ændrer sig ikke voldsomt med mængden. Afvejningen varierer derimod meget, fordi det tager længere tid at hente og afveje råvarer til større batchstørrelser.

Vi har flere forskellige tanke, fx 1 ton og større tanke (fx 6 ton og 10 ton). Man kan ikke bare lave 2 ton i en 10 tons tank, fordi omrøreren ikke kan nå ordentligt ned; man skal typisk over ca. 4 ton for at få en stabil blanding.

Det betyder, at hvis jeg vil holde tapperiet i gang med få ressourcer i blanderiet, så er det fordelagtigt at lave store batcher. Men det skaber en ny problematik: hvis blanderiet kommer bagud, mangler tapperiet blandinger; hvis blanderiet kommer for langt foran, risikerer vi at have varer stående i tanke, som kan blive for gamle og dermed skal kasseres.

Kunne simulering være en måde at understøtte planlægningsbeslutningerne på?

AK: Simulering kunne være spændende, men det er næsten et projekt i sig selv. Du skal ikke kun modellere flow og balance – du skal også indregne rengøring og tømning af tanke. Når en tank har været brugt, skal den tømmes og gøres ren, og det tager tid, før den er klar igen. I en simulering skal du derfor modellere, hvornår en tank bliver tom, hvornår den rengøres, og hvornår den igen er tilgængelig.

Min pointe med at bringe blanderiet ind er også at vise, at planlægning ikke kun handler om at få tappeordrer ind. Det handler også om, hvor mange kilo der bruges per time i tapperiet – for de kilo skal blandes, og det kræver kapacitet og mandskab i blanderiet.

Hvornår bliver balancen mellem blanderi og tapperi særligt udfordret?

AK: I højsæsonen er det relativt nemt at skabe balance, fordi vi laver store mængder solcreme, ofte samme opskrift, og vi kan lave store batcher i 10 tons tanke. Det giver en god balance.

Men efter højsæsonen – fx i maj – kommer der mange kunder, som har ventet. De kommer ofte med branded private label-produkter og vil have flere forskellige færdigvarer, men i små batcher, fx 1 ton ad gangen. Så går vi fra at lave 10 tons ad gangen til at lave 1 ton, 1 ton, 1 ton osv. Fordi det tager næsten lige så lang tid at blande 1 ton som 10 ton, bliver blanderiet voldsomt presset, og tapperiet kan ikke "fodres" nok. Det er svært at løse.

Har du idéer til, hvordan man kan skabe mere stabilitet og reducere ubalancen?

AK: Jeg har en idé baseret på tidligere erfaring: man kan arbejde med faste "slots". Altså at nogle varianter eller produkttyper kun produceres i bestemte uger. Den tankegang kan overføres til produktionsplanlægning.

Man kunne arbejde med taktstyring, hvor udvalgte varer produceres efter en fast rytme. For eksempel at en færdigvare, der er egnet til Make-to-Stock, altid produceres hver anden uge om mandagen – uanset om der er en konkret ordre eller ej. Så bliver en del af kapaciteten taktstyret, og man ved på forhånd, hvad der skal produceres og i hvilke mængder.

Det betyder også, at man må sige til kunder, der kommer med fem forskellige små batcher på én gang: "Det kan vi ikke lave i samme uge. Det bliver fem forskellige uger." Ellers vælter balancen fuldstændigt.

En anden gevinst ved taktstyring er rutine: hvis man ved, at mandag er 500 ml, bliver medarbejderne bedre til omstillinger, værktøjer og arbejdsgange. I dag er vi meget fleksible, men det koster på stabilitet og effektivitet.

Skal hele produktionen være taktstyret, eller kun en del?

AK: Det skal ikke være hele produktionen. Men man kunne godt sige, at en procentdel af kapaciteten reserveres til faste gentagne produktioner, som lægges på lager, uanset om der ligger en ordre eller ej.

Hvis vi beslutter, at en given linje producerer 500 ml hver mandag, betyder det også, at kun de kundeordrer, der passer til den "kasse", kan lægges der. Og så kan man producere en anden størrelse dagen efter. Pointen er at finde ud af, hvor stor en del af kapaciteten og på hvilke maskiner man gør det, så blanderi og tapperi hænger bedre sammen.

A.4 Made-To-Stock (MTS) Related Interview

Interview with Head of Planning, PT & Logistics

Allan Kousted, Head of Planning, PT & Logistics – DermaPharm A/S, Fårup
Date: Conducted on February 27, 2026

Har I tidligere internt drøftet muligheder for at omlægge varer fra Make-to-Order til Make-to-Stock?

AK: Ja, men problematikken ender næsten altid ved risikoen. Spørgsmålet er: hvem skal bære risikoen, og vil kunderne acceptere det? Eller tør vi selv gøre det? Det er der, diskussionen typisk går i stå. Det handler grundlæggende om en risikobetragtning.

Hvis vi producerer tidligere og lægger varer på lager, så binder vi kapital. Hvis en vare står seks-syv uger længere på lager end normalt, hvad koster det så i likviditet? Og hvad sparer vi til gengæld i produktionen? Den business case har vi reelt aldrig fået lavet ordentligt, og den er heller ikke simpel at lave, fordi kompleksiteten er høj. Derfor har vi indtil videre primært arbejdet ud fra en fleksibel Make-to-Order-betragtning, med enkelte undtagelser.

Er der forskel på jeres risikovillighed afhængigt af produkttype?

AK: Ja, helt klart. På Own Label-produkter er vi langt mere risikovillige. Cirka 80% af vores Own Label-solproduktion producerer vi allerede om efteråret. Her tør vi godt tage risikoen, fordi vi selv ejer brandet og har større sikkerhed omkring mængderne.

Vi estimerer 100% af det forventede behov per varenummer – det kan være 30-40 varenumre med forskellige SPF-typer, sprays, cremer og sunsticks. Så producerer vi 80% om efteråret, og de sidste 20% holder vi fleksibelt i foråret. Hvis vi rammer lidt forkert, har vi i det mindste kun komponenter på lager, og dem kan vi typisk bruge året efter. Det er en relativt begrænset risiko.

På Private Label er situationen en anden. Her skal kunden overbevises om at tage varen hjem på lager og betale tidligere. Og det er væsentligt sværere.

Hvad sker der, hvis kunden ønsker at splitte en optimal produktionsmængde?

AK: Hvis den optimale produktionsmængde er 10.000 stk., og kunden ønsker 5.000 nu og 5.000 senere, så fordobler vi reelt omstillingsarbejdet. I blanderiet betyder det to mindre batch i stedet for én stor. I tapperiet betyder det to omstillinger, to rengøringer osv. Det øger omkostningerne.

Samtidig forventer kunden stadig 10.000-styksprisen. Så produktionsmæssigt er det tab på tab. Kapacitetsmæssigt giver det kun en lille fleksibilitet, men det er ikke betydeligt.

Den optimale løsning er, at kunden deler porteføljen op i stedet: fx fire solvarer, hvor to produceres om efteråret og to om foråret – men i fulde, optimale batchstørrelser.

Hvorfor er det problematisk for kunden at få produceret i efteråret?

AK: Fordi likviditeten skal bæres et sted. Hvis vi producerer og lægger varen på lager hos os uden at fakturere, så har vi brugt pengene uden at få dem ind. Derfor skal varen faktureres, så kunden overtager lageret økonomisk. Det betyder, at kunden binder kapital.

Ingen kunder synes, det er spændende. De accepterer det kun, hvis vi kan overbevise dem om, at de reducerer risikoen for lange lead times og mistede salg. Hvis de står i højsæsonen og ikke har varen, mister de potentielt kampagnesalg. Det er dét incitament, der virker.

Hvilke udfordringer skal man være opmærksom på i de historiske data?

AK: Det, du får fra mig, er historiske produktionsdata. De kan se stabile ud, fordi de viser, hvornår vi producerede og leverede. Men de viser ikke kundens oprindelige behov.

En kunde kan have ønsket levering i uge 1, men vi leverede i uge 4 på grund af kapacitetsmangel eller komponentmangel. Det kan du ikke nødvendigvis se i dataene. Dermed kan en vare fremstå stabil, selvom kundens behov var ustabilt – eller omvendt.

Derudover kan ustabil produktion skyldes maskinnedbrud eller leverandørproblemer, selvom kundens aftræk var stabilt. Den årsagssammenhæng fremgår ikke direkte i datasættet.

Hvordan påvirker designændringer historikken i data?

AK: Hver færdigvare har et 8-cifret varenummer og en tilhørende stykliste med flasker, etiketter, blanding osv. Hvis kunden ændrer fx en etiket fra gul til blå, opretter vi et nyt varenummer.

Selvom produktet reelt er det samme – samme blanding, samme stregkode – så ændres varenummeret af sporbarheds- og lagerstyringshensyn. Det betyder, at historikken splittes. Du får data på X og data på Y, selvom det i praksis er samme produkt.

Jeg kan give dig styklister og blandingsnumre, så du kan forsøge at identificere sammenfald. Hvis to varer deler samme blanding og emballagetype, er sandsynligheden høj for, at det er samme produkt med kosmetisk ændring. Men det kræver kodning og analyse.

Hvem har ansvaret for forecasting?

AK: Nogle kunder, fx Matas, sender forecast. Typisk fire-seks uger før kommer den endelige ordre. Vi kan lægge forecastet ind som en salgsordre i systemet og køre MRP på det, så vi planlægger kapacitet og indkøb.

Men selv hvis kunden leverer forecast, betyder det ikke automatisk, at vi producerer på det. Det er vigtigt at afstemme forventninger.

Når vi kører MRP, oprettes produktionsordrer og indkøbsordrer. Hvis leverandøren bekræfter en senere levering end planlagt, flytter vi salgsordren og informerer kunden. Hele den proces kan du ikke direkte se i datasættet.

Hvordan er planlægningsfunktionen organiseret?

AK: Vi er to personer i planlægning. Mads sidder med den langsigtede kapacitetsplanlægning og MRP. Oliver sidder med detailed scheduling på kort bane – typisk de næste 14 dage – hvor rækkefølge optimeres for at minimere omstillinger.

Derudover koordineres dagligt med produktionen. Hvis en batch ikke frigives fra kvalitetskontrol, eller hvis en linje kører hurtigere/langsommere end forventet, skal planen justeres løbende.

Hvordan påvirker kompetencer og tekniske forhold planlægningen?

AK: Kompetencer spiller en stor rolle. Ikke alle medarbejdere kan betjene alle tanke eller linjer. Nogle er specialiserede i fx 10-tons tanke eller bestemte maskiner som TAP-21.

Derudover har vi PT-funktionen (proces-/produktionsteknik), som analyserer produktionsregler og omstillingstyper. Faktorer som flaskestørrelse, pumpetype, etiket, varm/kold blanding, forblanding, optøning af råvarer osv. påvirker rækkefølgeplanlægningen.

Hvis vi kan reducere omstillingstid med to timer dagligt, har det markant indflydelse på den effektive kapacitet.

Hvor opstår den største værditilvækst i produktionen?

AK: Den største værditilvækst sker, når vi laver blandingen. Flasker og etiketter er relativt billige – fx 3 kr. for en flaske. Men kemiråvarer kan være meget dyre. En olie til et premium-brand kan koste 1.000 kr. literen, mens en billigere variant koster 100 kr.

Så værdien stiger markant, når råvarerne omdannes til færdig blanding og derefter færdigvare. Derfor er lagerbinding i råvarer og blandinger langt mere kritisk end selve emballagen.

Hvilke produkter ønsker I strategisk at producere?

AK: Vi ønsker at producere det svære. En simpel shampoo kan alle producere. Men avancerede solprodukter kræver stærk udviklingskompetence, og det er her, vi differentierer os.

Hvis en kunde kommer med 10 produkter, vil vi ofte helst producere de tre sværeste. Det er dér, vores konkurrencefordel og indtjening ligger. Vi kan ikke konkurrere på volumen og lavpris som producenter af masseprodukter kan. Vi producerer mindre mængder med højere værdi.

Hvad vil du anbefale som første skridt i analysen?

AK: Start simpelt. Find en kandidat med relativt stabilt aftræk og lav en analyse på den. Undersøg, om forecast og faktisk efterspørgsel stemmer overens. Hvis vi kan finde en vare, hvor risikoen er lav, kan vi teste tankegangen der.

Du skal ikke brede det for meget ud fra start. Start småt, og så kan vi altid bygge videre derfra.

A.5 Data and Warehouse Related Interview

Interview with Head of Planning, PT & Logistics

Allan Kousted, Head of Planning, PT & Logistics – DermaPharm A/S, Fårup
Date: Conducted on March 19th, 2026

AK: Jeg vil faktisk gerne starte helt fra bunden, fordi der er noget logik omkring varenummer og data, som du er nødt til at forstå, før du kan arbejde ordentligt med de dataset, du får fra mig. Når du senere sidder med en masse dataudtræk, skal du kunne afkode, hvilken type varer du kigger på, og hvad det betyder i praksis.

Hvad er det?

AK: Lad os starte helt konkret: Jeg går ind i NAV nu. NAV er vores ERP-system. Det er her, vi har varenummer, stamdata, vareposter, salgsleverancer, produktionsafgang osv. Systemet kan være lidt langsomt, men pointen er, at når du får data fra mig, så får du typisk et varenummer med otte cifre, en beskrivelse og en masse øvrige felter. Men de to første ting — nummeret og beskrivelsen — er det, vi tager udgangspunkt i.

Hvordan er jeres varenummer opbygget?

AK: Vores varenummer har otte cifre, og vi har opbygget det med en intern "varenummerologi", hvor de første cifre siger noget om varetypen. For eksempel: noget der starter med **10** er kemiråvarer. Noget der starter med **20** kan være etiketter. Og så fortsætter det opad, så der er en logik, hvor du kan afkode, om det er råvarer, emballage, labels osv.

Når du kommer op på noget, der starter med **40**, så er varen typisk det, vi kalder en *blanding.* Det hænger sammen med, at vi i praksis har tre separate processer: **blanderi**, **taberi** og **pakkeri**. Når blanderiet er færdigt med at producere selve blandingen, så får den et 40-nummer. Det 40-nummer indgår derefter som en komponent i en færdigvare.

Hvad starter færdigvarer så med?

AK: Færdigvarer starter typisk med **5** eller **6**. Og hvis varen starter med **7**, så er det det, vi kalder en *sammenpakke.* Det kan for eksempel være de displays, du så herude. Når displayet er færdigt som en samlet enhed, så har det et 7-nummer.

Hvad betyder det, at nogle varer starter med 5?

AK: Varer der starter med **5** er typisk noget, hvor vi har et ejerskab eller en særlig relation til produktet — det kan du ofte genkende som det, vi kalder *own label.* I NAV kan der også stå OL som indikator. Det vil sige, at det er varer, hvor vi på en eller anden måde selv ejer eller kontrollerer produktet/brandet.

Og hvad betyder det, når varer starter med 6?

AK: Så er vi ovre i *branded/private label.* Vi har også en intern underopdeling i 6-serien (f.eks. 6-0, 6-2, 6-4 osv.), som bruges til at skelne mellem typerne. Hvis vi taler om færdigvarer, der kan være relevante at kigge på i dit speciale, så er det typisk varer, der starter med **5** eller **6**.

Bare lige et spørgsmål: Når man siger private label, betyder det så, at virksomheden har et produkt, og hvis det er brand private label, så er det produktet af virksomheden?

AK: Det er ikke helt så sort/hvidt, men jeg forstår godt, hvad du mener. I praksis kan du tænke det sådan her: *Private label* kan for eksempel være, når en kæde eller distributør (som fx en supermarkedskæde) har mange varer i deres sortiment, og så vælger de at have deres *eget* brand på en vare. Hvis vi tager et eksempel: hvis Coop vælger at have Englemark i sortimentet, så er det et brand, de ejer, og det bliver så produceret hos os. Det vil jeg typisk kalde private label.

Branded private label er mere, når det er en virksomhed, som allerede er et brand i sig selv — fx Rudolf Kær — og som ikke bare er en distributør/kæde, men har et brand-univers og en brandstrategi. Så ja, du har faktisk i store træk ret i din forståelse, men hvis vi skal være knivskarpe på definitionen, kan jeg godt lige dobbelttjekke vores interne begrebsbrug.

Du nævnte også noget med 46-numre. Hvad er det?

AK: Ja, det er vigtigt. Et 46-nummer er en slags *mellemprodukt* eller en variant af færdigvarelogikken. Det kan fx være, at vi producerer en vare i en tube som en 46-vare, og så kommer den senere over i pakkeriet, hvor den bliver lagt i æske, får banderole eller anden pakning, og så bliver den til et 60'er-nummer efterfølgende. Det ser du typisk på Rudolf Kær, hvor vi godt kan producere noget som 46-numre og så gøre dem helt færdige i pakkeriet.

46-numre bliver også brugt til displays. Hvis vi ved, at et produkt skal ind i et soldisplay, giver det ikke mening at pakke varerne i koldkasse først og derefter pakke ud igen for at lægge i displayet. Derfor kan styklister til et soldisplay i stedet indeholde 46-numre, så vi sparer den ekstra håndtering. Det er en praktisk logik i forhold til flow og håndtering.

Okay, så det vigtigste er, at jeg kan afkode typen af vare ud fra varenummeret?

AK: Ja, præcis. Når du sidder med dataudtræk, skal du kunne se et varenummer og forstå: er det en råvare, en etiket, en blanding, en færdigvare, en sammenpakning, eller et mellemprodukt. Det er første skridt.

Hvordan hænger udløb sammen med det her?

AK: Udløb er det næste vigtige. Når du kigger i et varekort i NAV, så kan du se, om varen har automatisk udløb, manuelt udløb, eller ingen udløbslogik på produktet. Det, du får fra mig, kommer sandsynligvis som et Excel-udtræk, hvor du har kolonner som *varenummer*, *beskrivelse* og så relevante stamdatafelter. Vi skal lige finde ud af, hvilke felter du har behov for.

Lad mig give et eksempel: Her kigger jeg på en vare, som har automatisk udløb og en holdbarhed på fx 36 måneder. Det betyder, at når vi modtager eller producerer varen og den får et lotnummer, så beregner systemet automatisk udløbsdatoen ud fra en standard holdbarhed.

Gælder det også færdigvarer, I selv producerer?

AK: Ja. For færdigvarer er mekanismen den samme, men udløbet bliver udløst af produktionen. Hos os arbejder vi med begreberne **afgang** og **forbrug**. Når vi har en produktionsordre, så kører vi *afgang* på produktionsordren, og det betyder, at produktionsordren leverer den færdige vare ind på lager. Samtidig bliver komponenterne på styklisten trukket ud, og det kalder vi *forbrug*. Så: *afgang* = færdigvaren kommer på lager, *forbrug* = underkomponenter bliver brugt.

Når man kører afgang, så bliver der også stemplet en udløbsdato, hvis varen har udløbslogik.

Kan du vise et eksempel?

AK: Ja, her går vi ind på en Rudolf Kær-vare. Den har automatisk udløb, og den står fx til 30 måneder. Så kan vi se, at den er produceret én gang, og her står afgangsdatoen. Du kan også se produktionsordrenummeret, varenummer, beskrivelse og en udløbsdato. Udløbsdatoen er beregnet som 30 måneder fra bogføringsdatoen for afgang. Det vil sige: vi har bogført afgang på en dato, og så lægger NAV automatisk 30 måneder til, og så får du udløbsdatoen.

Men du viste også en vare uden udløb, som alligevel havde en udløbsdato i vareposter. Hvordan hænger det sammen?

AK: Det er en vigtig pointe. Der findes varer, hvor der *ikke* er udløb på selve produktet i den forstand, at kunden ikke nødvendigvis ser et udløb, og varekortet kan være sat op uden udløb på produktet. Men i vores interne lagerstyring stempler vi alligevel en dato i vareposterne for at kunne styre pluk efter FIFO/ældst først.

Forestil dig, at vi har produceret to batches med to måneders mellemrum, og kunden beder kun om halvdelen leveret. Så skal vi sikre, at vi plukker den batch, der er ældst først. For at NAV kan styre pluk korrekt, skal systemet have en slags "alder"-logik. Derfor kan der stå en udløbsdato i vareposter, selvom der ikke nødvendigvis er udløb på produktet i varekortets udløbsfelter.

Så når du får data fra mig, kan du **ikke** bare konkludere, at "alt har udløbsdato". Du skal koble varepost-data sammen med varekort-stamdata, hvor du kan se, om der reelt er udløb på produktet, eller om datoen primært er en intern styringsmekanisme.

Hvilke posteringstyper skal jeg især forstå i data?

AK: I vareposter kan du se posteringstyper som **afgang**, **salg** og **forbrug**. Forbrug betyder, at varen er blevet brugt på en ordre. Afgang betyder, at den er kommet på lager fra produktionen. Og **salg** — især **salgsleverance** — er det, der typisk er vigtigst for dig, når du skal analysere efterspørgsel og udtræk.

Der findes også **salgsreturvarekvittering**. Det betyder, at noget er blevet returneret. Det kan være en reel retur på grund af fejl, men det kan også være en proforma-proces for at rette noget administrativt, fx en pris.

Hvad betyder salgsretur i praksis?

AK: Lad os tage et konkret scenarie: Vi har solgt 100 styk til Rudolf Kær. Senere opdager man, at der var noget galt — det kan være en produktfejl, men det kan også være, at prisen var forkert i stamdata i forhold til det, der var aftalt. Så skal økonomi lave en kreditnota, og derefter sælger vi varerne igen med den korrekte pris. I den proces vil du se en salgsreturordre, som bliver til en salgsreturvarekvittering, og så ser du salget igen.

I sådan en situation kan datoerne også se mærkelige ud, fordi man nogle gange bogfører tilbage i tid for at få det til at ligge i den rigtige måned (fx oktober), selvom rettelsen først sker i november. Derfor kan bogføringsdato alene give et misvisende billede. Når jeg sorterer i løbenummer, kan jeg se den reelle rækkefølge af hændelserne i NAV.

Som hovedregel kan du stole på datoerne, men du skal være opmærksom på, at der kan være enkelte undtagelser, typisk knyttet til prisrettelser og administrative korrektioner. Og hvis du vil være helt korrekt statistisk, bør du tage højde for returposteringer, fordi de kan "cancelle" et salg ud.

Kommer jeg til at sidde i NAV og sortere som du gør her?

AK: Nej, ikke på den måde. Du kommer til at få data fra et Power BI-dataset, som jeg trækker ud til dig. Du kommer ikke til at sidde direkte i NAV og lave udvælgelse. Jeg kan enten give dig et datasæt med alt, eller jeg kan lave et udtræk, hvor jeg kun tager posteringer af typen salg. Det er relativt nemt for mig at filtrere.

Planen er, at jeg giver dig mindst to overordnede datasæt:

- Et stamdata-datasæt, hvor du kan se udløb/ikke udløb og relevante varekortfelter.
- Et transaktions-/historik-datasæt, hvor du kan se hver gang, vi har solgt noget: varenummer, kunde, mængde, dato osv.

Når du har fået data, tager vi et møde, hvor vi åbner Excel-arket sammen, går kolonnerne igennem og oversætter, hvad de betyder, og hvilke du bør bruge i din analyse.

Hvis du intuitivt skulle pege på en produktkategori eller kunde, hvor det giver mest mening at starte et test-case: hvad ville du vælge?

AK: Så ville jeg pege på Matas. Matas er ret gode til at sende forecast, og de er også relativt gode til, at den reelle ordre matcher forecastet. De er ikke Make-to-Stock som sådan, men jeg tillader mig alligevel at disponere efter deres forecast. Det vil sige: jeg laver disponering på underkomponenter, og jeg booker kapacitet baseret på forecastet.

De kommer typisk med et månedligt forecast i starten af måneden. Hvis de sender et forecast for maj, så lægger jeg det ind som behov i starten af maj. Hvis den reelle ordre så kommer senere og først skal bruges midt i maj, så kan det i praksis betyde, at jeg allerede har planlagt produktionen tidligt i måneden. Derfor kan de i adfærd og forecasting være en kandidat for en analyse, der minder om en MTS-tankegang.

Ulempen er, at mange Matas-produkter har udløb. Så selv hvis forecastadfærden er stærk, skal man stadig håndtere risikoen ved at producere for tidligt, hvis holdbarheden bliver spist.

Hvad er det, der gør, at Matas har flere produkter med udløb end fx Rudolf Kær?

AK: Udløb handler i sidste ende om indholdet i blandingen — altså de kemiske komponenter og hvor stabilt produktet er over tid. Hvis produktet indeholder komponenter, der ikke tåler at blive gamle, så skal det have udløb. Derudover ser vi, at mange produkter, der er svanemærkede eller astma-allergi-mærkede, har få eller ingen konserveringsmidler. Så er der ikke noget i produktet, der "slår bakterier ihjel", og så kan man ikke forvente samme holdbarhed.

Der er også naturbaserede ingredienser som olier, der kan ændre karakter over tid. Det behøver ikke handle om bakterier; det kan være temperatur, UV-lys og andre forhold, der gør, at et naturprodukt ændrer sig. Derfor fastlægges udløb typisk tidligt i produktets livscyklus, når man beslutter formulering og krav.

Hvordan hænger kunder og levering sammen? Hvem står for transporten?

AK: Det er forskelligt fra kunde til kunde og afhænger af incoterms. De mest almindelige hos os er **Ex Works** og **DAP**.

Ex Works betyder, at vi producerer, klargør på rampen, og så overtager kunden ansvaret derfra. Hvis der sker noget under transporten, er det kundens ansvar, fordi ansvaret skifter på rampen.

DAP betyder, at vi leverer helt frem til kundens destination (fx Matas' lager), og så er ansvaret vores hele vejen frem til aflevering.

Der kan også være et miks, hvor en kunde har Ex Works som incoterm, men hvor vi alligevel booker transporten hos fx DSV af praktiske årsager. Så får vi en transportfaktura fra DSV, som vi sender videre til kunden, men ansvarsplaceringen ved skade følger stadig incoterm'en.

Jeg vil gerne have det med i opgaven, fordi jeg ikke ved nok om incoterms.

AK: Det giver god mening. Det er relevant i forhold til at forstå, hvad datoer betyder, og hvornår noget reelt er "klar" versus "leveret".

Jeg så, at der står ønskedato og bekræftet leveringsdato. Hvordan skal jeg forstå det?

AK: Godt spørgsmål. I salgsordren kan du se kundens ønskedato, og så kan du se det, der hedder bekræftet leveringsdato. Men her kommer en vigtig detalje: hos DermaPharm er vi lidt "banditagtige" i den forstand, at selvom feltet hedder *bekræftet leveringsdato*, så er den dato, der står i feltet, typisk den dato, hvor varen er **klar på rampe**. Altså ikke nødvendigvis leveret hos kunden. Det er en "snyder", men det er godt set, at du fanger den.

I praksis betyder det, at hvis en ordre har ønskedato 3/3, og vi bekræfter 25/1, så kan det hænge sammen med, at varerne skal være klar på rampen dér for at kunne nå frem i tide (fx til Sverige). Men den præcise transporttid og logik afhænger af incoterms og destination.

A.6 Data Related Interview

Interview with Head of Planning, PT & Logistics

Allan Kousted, Head of Planning, PT & Logistics – DermaPharm A/S, Fårup
Date: Conducted on March 26th, 2026

Kan varer over 30 måneder godt være uden udløbsdato på produktet?

AK: Ja, normalt vil jeg sige, at når varen er over 30 måneder, så er det kun krukkesymbolet, der skal være der. Så behøver der ikke at stå en udløbsdato direkte på varen. Der kan dog være særlige tilfælde, for eksempel ved salg til kommuner, hospitaler eller lignende, hvor der gælder andre regler.

Kan jeg så regne de varer, vi ser her, som varer uden udløb på produktet?

AK: Ja. Helt konkret kan du se det i kolonne E, hvor der står `false` under "udløb på produkt". Hvis der står `false`, så betyder det, at der ikke er stemplet en udløbsdato på varen.

Hvad betyder det, når der ikke står nogen expiration calculation?

AK: Det er et godt spørgsmål. Det kan tyde på, at det er meget gamle varer eller gamle data, muligvis helt tilbage fra 2012. Når vi først opretter en vare i systemet, bliver den ikke slettet igen, så nogle gamle varer bliver stående. Jeg tror faktisk ikke, at de varer dukker op i dine salgsdata. Derfor skal du bruge arket som et opslagsværk og kun koble det sammen med de varer, du rent faktisk har salg på.

Så hvis en vare ikke har expiration calculation, er den sandsynligvis ikke relevant?

AK: Ja, sandsynligvis. Hvis der ikke er en expiration calculation, vil jeg mene, at varen er så gammel, at der ikke længere er noget reelt salg i den. Hvis du alligevel finder varenumre i dine salgsdata, som ikke har udløbsberegning, så send dem gerne til mig, så vil jeg undersøge det nærmere.

Hvornår er det okay at bruge varen til make-to-stock?

AK: Det er kun okay, hvis to ting er opfyldt: For det første skal "udløb på produkt" være `false`. For det andet skal expiration calculation være 30 måneder eller derover. Begge betingelser skal være opfyldt.

Er posting date det samme som salgsdato?

AK: Ja, posting date kan du godt bruge som salgsdato.

Hvad er forskellen på source number og document number?

AK: Source number er kundenummeret, altså debitornummeret. Document number er i princippet nummeret på følgesedlen, men du kan godt antage, at det i praksis svarer til salgsordrenummeret. Der er som regel en én-til-én-sammenhæng, selvom der i sjældne tilfælde kan være flere følgesedler på én ordre.

Kan du forklare lot number?

AK: Ja. Lotnummeret fortæller noget om, hvornår varen er produceret. De første to tal angiver året, varen er produceret i. De næste tre tal angiver dagen på året. De sidste to tal viser, hvilken produktion eller udtagelse det er den dag. På den måde kan du bruge lotnummeret til at finde ud af, hvornår varen er blevet produceret.

Hvad kan jeg bruge lotnummeret til i analysen?

AK: Du kan bruge det til at beregne, hvor længe varen har ligget på lager, før den er blevet solgt. Hvis du kombinerer produktionsdatoen fra lotnummeret med posting date, får du en god indikator for lagerliggetid.

Hvad med location code?

AK: Ud fra det, vi kan se her, har du kun `DEP`. Du har altså ikke webshop med i det her datasæt.

Er der nogle ordrer, jeg skal sortere fra?

AK: Ja. De ordrer, hvor debitornummeret starter med D9, og som hedder noget med intern marketing, intern logistics eller intern private label, skal du betragte som outliers. Det er ikke reelle salg, men interne småordrer, for eksempel til fotoshoots, prøver eller interne formål. De vil forstyrre billedet, hvis du vil analysere stabilitet og frekvens i salget.

Er alle D9-ordrer outliers?

AK: Næsten, men ikke nødvendigvis alle. Der findes enkelte undtagelser, som for eksempel kunden Lins, der faktisk er en reel kunde, selvom kundenummeret starter med D9. Det skyldes sandsynligvis gamle data eller en fejl i forbindelse med migreringen til NAV i 2018.

Hvordan skal jeg tænke om metode og retning i analysen?

AK: Ideen må være, at du finder de varer, som har et relativt stabilt aftræk. Du skal altså identificere varer, hvor salget ikke svinger voldsomt, og hvor der ikke er mange outliers. De varer er mere egnede til forecasting. Hvis en vare samtidig ikke har udløbsdato stemplet på produktet, kan den være en kandidat til make-to-stock.

Hvordan vurderer jeg, om en vare er egnet til forecast?

AK: Jeg vil foreslå, at du summerer salget måned for måned og ser, om varen bliver solgt stabilt over tid. Du skal se efter, om der er sæsonmønstre, eller om varen sælger jævnt. Hvis varen sælger næsten hver måned og ikke kun én gang om året, så er den meget mere relevant at forecast'e på.

Hvad gør jeg, hvis varen ser egnet ud til make-to-stock?

AK: Så kan næste skridt være at vurdere, hvor mange styk der bør produceres til lager. Her skal man også begynde at tænke på risiko: fylder varen meget, kræver den mange pallepladser, eller er den dyr at lægge på lager? Det er den økonomiske og praktiske risiko, man skal have med i vurderingen.

Kan jeg også bruge dataene til at se, om produktionen flyttes til efteråret?

AK: Ja. Du kan identificere solvarer via vareteksten, for eksempel hvis der står SPF eller AFTER. Derefter kan du bruge lotnummeret til at se, hvornår varen blev produceret, og posting date til at se, hvornår den blev solgt. Så kan du se, om varen er produceret i god tid og lagt på lager før højsæsonen.

Er det noget, I allerede gør i praksis?

AK: Ja, især på dermasol-produkter er vi mere risikovillige. Der producerer vi allerede en del om efteråret for at kunne sælge dem efter jul og gennem foråret. Du vil derfor kunne se, at nogle solvarer faktisk er produceret året før, de bliver solgt.

Hvordan finder jeg ud af, om en kunde er make-to-stock-kunde?

AK: Det har jeg sendt dig i en oversigt. Der kan du se, hvilke debitorer der er make-to-stock-kunder. Og det er faktisk ganske få. En make-to-stock-kunde betyder, at vi tillader, at varen står på lager hos os. Hvis det ikke er en make-to-stock-kunde, producerer vi varen og sender den typisk ugen efter.

Hvad med retailpartner på derma?

AK: Retailpartner er en af de store kunder på derma. De fungerer som distributør for os. De holder også lager hos sig selv, men alligevel vil du kunne se, at vi producerer dermasol om efteråret og først sælger det til dem omkring jul og derefter gennem hele solsæsonen.

Er der andet vigtigt, jeg skal tage med?

AK: Det vigtigste er, at du får styr på logikken i dataene og får filtreret de irrelevante observationer fra. Når du er længere i processen og skal arbejde mere med metode eller modeller, så siger du bare til, hvis du vil vende noget.

A.7 Data and Procurement Related Interview

Interview with Head of Planning, PT & Logistics

Allan Kousted, Head of Planning, PT & Logistics – DermaPharm A/S, Fårup
Date: Conducted on March 31, 2026

Jeg har et spørgsmål i forhold til nogle af de store kunder, der sælger gennem offentlige aftaler, som kommuner og hospitaler. Kan det være derfor, at nogle produkter kræver, at udløbsdatoen er stemplet direkte på varen?

AK: Ja, det kan meget vel være derfor. Under normale omstændigheder vil jeg sige, at når et produkt har mere end 30 måneders holdbarhed, så er der ikke krav om, at udløbsdatoen skal stå direkte på selve varen.

Så kan jeg antage, at der ikke står udløb på varen?

AK: Ja. Mere konkret kan du se, at hvis kolonnen for udløb på produkt er markeret som *false*, så er der ikke nogen stemplet udløbsdato på varen.

Jeg har også lagt mærke til, at nogle varer ikke har nogen expiration calculation. Hvad betyder det?

AK: Det er et godt spørgsmål. Det ser ud som om, at nogle af de poster er meget gamle – jeg kan se eksempler, der går helt tilbage til 2012. Jeg tror faktisk ikke engang, at de varer optræder i dine salgsdata.

Grunden er, at når vi opretter en vare i NAV, så sletter vi den ikke igen. Når først noget er oprettet, bliver det i systemet permanent. Derfor er det heller ikke sikkert, at du overhovedet har salg på de varer.

Så jeg skal egentlig bruge filen som et opslagsark for at se, om der er stemplet udløb på produktet, og hvad expiration calculation er?

AK: Ja, præcis. Du skal først identificere de varer, du faktisk har salg på, og derefter bruge arket som reference.

For eksempel fandt jeg en sprit, hvor 250 ml-versionen ikke har nogen expiration calculation, men 100 ml-versionen har. Kan det være, fordi den er udgået?

AK: Ja, ellers vil jeg antage, at den simpelthen er så gammel, at der ikke længere er noget reelt salg på den. Normalt burde der være en expiration calculation, så det er usædvanligt, hvis den mangler.

Hvis jeg finder varer med faktisk salg, men uden expiration calculation, skal jeg så sende dem til dig?

AK: Ja, meget gerne. Så vil jeg gerne undersøge, om det er en fejl, eller om der er en anden forklaring.

Fra vores perspektiv, er det så acceptabelt at tage produkter med som kandidater til lager, hvis de er over 30 måneder?

AK: Ja, men kun hvis der ikke er stemplet nogen udløbsdato på produktet. Hvis der er stemplet en udløbsdato på varen, så er det ikke ligegyldigt. Din betingelse skal derfor både være, at udløb på produkt er *false*, og at expiration calculation er over 30 måneder.

Jeg ville også gerne spørge til posting date. Kan den bruges som salgsdato?

AK: Ja, du kan godt bruge posting date som salgsdato.

Jeg ville gerne have afklaret source number og document number. Er document number i princippet et fakturanummer?

AK: Ikke helt, men næsten. Document number er nummeret på den følgeseddel, der bliver oprettet, når et salg bogføres, eller når varer bliver sendt ud.

Normalt resulterer én salgsordre i én følgeseddel, men i princippet kan den godt resultere i flere. Hvis man for eksempel kun kan bogføre en del af ordren i første omgang og resten senere, så kan der blive oprettet to følgesedler til samme underliggende ordre.

Så document number er teknisk set følgeseddelsnummeret?

AK: Ja. Men i din analyse synes jeg godt, at du kan tillade dig at antage, at ét document number svarer til én salgsordre, fordi den slags undtagelser med delvise bogføringer ikke sker særlig tit.

Og source number?

AK: Source number er debitornummeret – altså kundenummeret.

Så i analysen kan source number behandles som kundenummer og document number som salgsordrenummer?

AK: Ja, det er en rimelig antagelse, selvom document number teknisk set er følgeseddelsnummeret.

Jeg har også noteret lotnummer og expiration. Hvor relevant er lotnummeret for analysen?

AK: Lotnummeret fortæller noget om, hvornår produktet er blevet tappet. Der ligger en fast logik i det. De første to cifre angiver produktionsåret, de næste tre cifre angiver dagen på året, og de sidste to cifre angiver løbenummeret for det lot på den dag.

Så hvis det starter med 21, betyder det 2021?

AK: Ja. Og hvis de næste tre cifre er 355, så betyder det dag 355 i året. Hvis de sidste to cifre er 05, betyder det, at det var dagens femte lot.

Kan lotnummeret bruges analytisk?

AK: Ja, hvis du gerne vil estimere, hvor længe et produkt har ligget på lager, før det blev solgt. Når lotnummeret giver dig produktionstidspunktet, og posting date giver dig salgstidspunktet, kan du beregne, hvor længe varen har ligget på lager inden salg.

I forhold til location code går jeg ud fra, at jeg kun har DP?

AK: Ja, hvis du kun ser DP i filteret, så er det fint. I dine data ser det ud til, at du kun har DP og ikke webshop.

Jeg lagde mærke til poster som intern marketing og lignende. Skal de med i analysen?

AK: Nej, dem skal du som udgangspunkt ikke tage med. De repræsenterer ikke reelle kundesalg. Det kan for eksempel være, at marketing bestiller nogle få enheder til et photoshoot eller et internt formål. De bliver oprettet som salgsordrer i systemet, men analytisk er de ikke relevante som almindelig efterspørgsel.

Så de skal behandles som outliers?

AK: Ja, præcis. De vil kun forstyrre dit billede, når du begynder at kigge på frekvens og salgsstabilitet.

Er det typisk de debitornumre, der starter med D9?

AK: Ja, mange af dem starter med D9 og har navne som intern marketing, intern private label eller product management. Det er typisk meget små ordrer og bør som hovedregel udelukkes.

Så skal alle debitornumre, der starter med D9, udelukkes?

AK: Ikke nødvendigvis. Der findes undtagelser. Du kan for eksempel finde en reel kunde som Lens, der også har et debitornummer, der starter med D9. Den kunde skal stadig medtages.

Hvorfor kan det ske?

AK: Mit bedste bud er, at det skyldes, at kunden er meget gammel, og at der under migreringen til NAV i 2018 er sket noget, som gjorde, at nummeret blev placeret i den serie.

Jeg føler, at jeg får mere og mere klarhed, men samtidig bliver feltet også bredere. Jeg prøver at finde ud af, hvilken metodisk retning jeg skal gå i, og hvordan jeg bedst segmenterer produkterne.

AK: Den grundlæggende idé bør være at identificere, hvilke produkter der har en relativt stabil efterspørgsel. Med andre ord: hvilke produkter svinger ikke voldsomt mellem meget høj og meget lav efterspørgsel. De ustabile produkter vil være langt sværere at forecast'e.

Jeg går ud fra, at du vil aggregere salgsdata på månedsniveau og så se, hvor mange enheder der bliver solgt i januar, februar osv. Det bør hjælpe dig med at vurdere, om efterspørgslen er stabil, eller om produktet er meget sæsonpræget eller uregelmæssigt.

Så første skridt er at identificere produkter med relativt stabile månedlige salg?

AK: Ja. Hvis et produkt bliver solgt nogenlunde hver måned, og mønstret er rimelig stabilt, så kan det være en kandidat til forecasting.

Og hvis det produkt samtidig ikke har stemplet udløbsdato, så kan det være en Make-to-Stock-kandidat?

AK: Ja, præcis. Så kan det være en relevant kandidat til Make-to-Stock.

Hvis et produkt ser ud til at være en god kandidat, vil næste skridt så være at afgøre, hvor meget der skal produceres til lager?

AK: Ja. Når et produkt ser ud til at være en kandidat, er det næste spørgsmål, hvor mange enheder der skal produceres til lager.

Derefter bevæger man sig over i en bredere risikodiskussion: fylder produktet mange pallepladser, er det dyrt, og hvad er den økonomiske risiko ved at producere det til lager? Men fra et forecasting-perspektiv kan du starte med at identificere, om den forventede efterspørgsel sandsynligvis vil materialisere sig med rimelig sikkerhed.

Jeg tænker også på muligheden for at reducere produktionspresset i foråret ved at flytte nogle produkter til efterårsproduktion. Kan det identificeres i data?

AK: Ja, det kan det. Du kan identificere solprodukter via vareteksten. Hvis beskrivelsen indeholder SPF eller aftersun, er det en god indikator på, at det er en solrelateret vare.

Hvis du kombinerer det med lotnummeret og posting date, så kan du se, hvornår produktet er produceret, og hvornår det er solgt. På den måde kan du afgøre, om det er blevet produceret i god tid og lagt på lager.

Så jeg bør kunne se, om det er produceret i efteråret og solgt senere?

AK: Ja. Og det er netop det, du vil se for mange af Dermasol-produkterne. Det er produkter, hvor vi allerede i dag er mere villige til at tage risikoen og producere betydelige mængder i efteråret til salg efter jul og gennem foråret.

Vil det samme mønster også kunne gælde nogle Private Label-kunder?

AK: Ja. Der er også tilfælde, hvor Private Label-produkter ser ud til at være produceret i efteråret og solgt i efteråret eller kort tid derefter. Det er typisk kunder, som vi gradvist har forsøgt at overbevise om at tage imod tidligere leverancer for at undgå pres i højsæsonen.

Hvordan finder jeg ud af, om en kunde er Make-to-Stock eller Make-to-Order?

AK: Jeg har allerede sendt dig en lille oversigt, der viser, hvilke debitorer der er Make-to-Stock-kunder. Der er kun få af dem.

Så Make-to-Stock betyder, at varerne må ligge på lager hos jer?

AK: Ja, præcis. En Make-to-Stock-kunde er en kunde, hvor vi tillader, at produktet ligger på lager hos os. En Make-to-Order-kunde er derimod en kunde, hvor vi producerer og sender varen ud ugen efter.

Og hvordan hænger det sammen med Dermasol og retail partner-setup'et?

AK: Du vil kunne se, at en af de største kunder for Dermasol er retail partner. Vi har et samarbejde med dem, hvor de fungerer som distributør for os og også holder lager.

Alligevel vil du stadig kunne se, at vi producerer Dermasol i efteråret og først begynder at sende det til retail partner omkring jul. Derefter fortsætter leverancerne gennem hele solsæsonen. Ved hjælp af lotnummeret vil du kunne se, at produktet faktisk blev produceret i efteråret året før.

Jeg har taget en masse noter om udløb, posting date, source number, document number, lotnummer osv. Jeg har ikke flere konkrete spørgsmål lige nu, men det kan være, at jeg vender tilbage senere i forhold til metode.

AK: Det er helt fint. Du er meget velkommen til at vende tilbage, hvis der er andet, jeg kan bidrage med – hvad enten det handler om metode, logik eller fortolkning.

A.8 Data Related Interview

Interview with Head of Planning, PT & Logistics

Allan Kousted, Head of Planning, PT & Logistics – DermaPharm A/S, Fårup
Date: Conducted on April 1st, 2026

Gjorde du ikke det sidste år med rundvisningen i produktionen?

AK: Jo, det gjorde vi. Vi startede ved lageret og gik ind i produktionen, og derefter bevægede vi os baglæns gennem flowet.

Kan du kort forklare layoutet igen?

AK: Ja. Den øverste del er blanderiet, og hvis du går rundt, kommer du til tapperiet. De reoler, du ser øverst til venstre, er råvarelageret – det fungerer som en buffer inden blanderiet. Noget tilsvarende gælder også omkring færdigvarelageret.

Er det noget, jeg må bruge i opgaven?

AK: Ja, det er helt fint. Du må gerne bruge det som en overordnet illustration af flowet.

Hvorfor dækker certificeringerne ikke planlægningsdelen?

AK: Det skyldes, at certificeringerne primært er fokuseret på produktkvalitet og sikkerhed. De handler om at sikre, at det vi producerer, lever op til kravene, og at vi har kontrol over vores processer.

Det inkluderer fx kvalitetskontrol, miljøpåvirkning, og hvordan vi håndterer risici som sabotage eller fejl i produktionen. Men hvordan vi planlægger produktionen for at optimere omkostninger eller effektivitet, er ikke en del af certificeringsfokus.

Så planlægning er simpelthen ikke relevant i den sammenhæng?

AK: Nej, det er ikke relevant i forhold til certificeringerne. De er produktfokuserede – ikke optimeringsfokuserede.

Er SOP-instruktioner og interne procedurer relevante for min opgave?

AK: Det kommer an på, hvad du leder efter. SOP'er handler om kvalitet, kemikaliehåndtering, afvigelser og reklamationer. Det er vigtigt, men ikke nødvendigvis centralt for din analyse, hvis du primært arbejder med data og planlægning.

Jeg vil primært fokusere på udløb og færdigvarer – giver det mening?

AK: Ja, det giver god mening. Så er det bedre at fokusere på de data, der er direkte relevante for din analyse.

Hvordan greb du problemet med korte salgshistorikker an?

AK: Det er en klassisk udfordring. Nogle varer får nye varenumre, selvom det reelt er det samme produkt, fx ved designændringer. Det betyder, at historikken bliver splittet.

Hvordan håndterer jeg det i analysen?

AK: Du bliver nødt til manuelt at identificere sammenhænge mellem varenumre. Det kan du gøre via varebeskrivelser eller tekstfelter, hvor det fx fremgår, at en vare erstatter en anden. Ellers risikerer du at miste historik.

Jeg har filtreret data ned til ca. 300 varer baseret på nogle kriterier. Er det en god tilgang?

AK: Ja, det lyder fornuftigt. Når datasættet er mindre, giver det mening at gå mere i dybden manuelt.

Jeg har fjernet varer under 30 måneders holdbarhed, D9-kunder, returposter og outliers – giver det mening?

AK: Ja, det er en god og systematisk tilgang. Det vigtigste er, at du er konsekvent i dine filtreringer.

Hvad er den største risiko i min metode?

AK: Den største risiko er, at du overser historik, fordi den ligger på forskellige varenumre. Det kan betyde, at du undervurderer stabiliteten i efterspørgslen.

Hvordan arbejder I med produktionsteknik i praksis?

AK: Det handler blandt andet om at lukke produktionsordrer og sikre, at alt forbrug er korrekt registreret. Derudover arbejder vi med effektivisering og løbende forbedringer i produktionen.

Hvordan håndterer I ændringer i leverancer fra leverandører?

AK: Hvis en komponent bliver forsinket, skriver indkøb en bemærkning på produktionsordren. Den bliver så fanget i en liste, hvor vi justerer både produktionsordrer og salgsordrer og informerer kunden om nye leveringstider.

Hvordan ser du forskellen på dataarbejde og implementering?

AK: Dataarbejde er grundlaget – det handler om at skabe struktur og forstå mønstre. Men implementeringen er ofte det mest interessante, fordi det er her, man skaber reel værdi i organisationen.

A.9 Operations Related Interview

Interview with Head of Planning, PT & Logistics

Allan Kousted, Head of Planning, PT & Logistics – DermaPharm A/S, Fårup
Date: Conducted on April 10th, 2026

Hvordan bruger I KPI'er til at måle performance i produktionsplanlægning og produktion?

AK: Vi bruger flere forskellige målinger, men en af de vigtigste KPI'er er, om produktionen møder produktionsplanen. Når planlægningen laver en plan og frigiver produktionsordrerne, fastlægger vi den seneste dato, hvor en given produktionsordre skal være færdig. Det er den due date, jeg måler op imod. På den måde ser jeg på, om produktionsordrerne bliver afsluttet på dagen eller før deres due date.

Hvad viser denne KPI i praksis?

AK: Den viser det, jeg kalder delivery performance ud af produktionen. Man kan se, at den starter ret dårligt i 2023 og derefter gradvist bliver bedre. I gennemsnit ligger vi nok omkring 60–70%. Det betyder, at cirka 60–70% af alle produktionsordrer bliver afsluttet på dagen eller før deres due date.

Hvordan kan produktionens performance kun være 60–70%, når leveringsgraden til kunderne ligger over 90%?

AK: Forskellen ligger i den tid, vi har på lageret til at plukke og klargøre ordrer. Vi har som regel to dage til rådighed til pluk. Det betyder, at lageret ofte kan kompensere for forsinkelser i produktionen. Selv hvis taberiet er forsinket, kan vi nogle gange hente noget af forsinkelsen ind ved at arbejde hurtigere på lageret og stadig levere til kunden til tiden. Derudover er nogle varer make-to-stock varer, og de tæller også med, når vi ser på den samlede delivery performance. Så forskellen mellem 60–70% og over 90% skyldes en kombination af make-to-stock varer og det pres, vi lægger på lageret for at reagere hurtigere.

Hvorfor siger du, at den historiske KPI ikke er fuldt sammenlignelig?

AK: Det er fordi vi tidligere, især i 2023 og 2024, frigav produktionsordrerne tidligere, end vi gør i dag. Det betyder, at due dates blev sat længere tid i forvejen. I tidligere perioder kunne en produktionsordre blive frigivet med en due date en uge før, den faktisk skulle starte. I løbet af den uge kunne der ske mange ting i produktionen: omplanlægning, maskinnedbrud, sygdom eller andre forstyrrelser. Men KPI'en måler stadig op imod den oprindelige due date, og derfor bliver det en meget hård måling.

Så KPI'en tager ikke højde for forstyrrelser i produktionen?

AK: Nej, ikke rigtigt. Den tager ikke højde for maskinnedbrud, sygdom eller andre praktiske forhold, som kan forsinke én ordre og derefter påvirke alle de efterfølgende ordrer. Hvis jeg har ti ordrer planlagt i rækkefølge på den samme tappelinje, og den første bliver forsinket, så bliver de næste ni også forsinket. Det giver et meget dårligt billede af produktionens performance, selvom årsagen ikke nødvendigvis er dårlig udførelse, men snarere manglende fleksibilitet eller buffer.

Er der indlagt nogen buffer i produktionskapaciteten?

AK: Kun en meget lille smule. Jeg prøver at tage højde for sygdom, men kun på et meget generelt niveau på tværs af hele produktionen. Problemet er, at medarbejderne ikke alle har de samme kompetencer. Hvis en bestemt linje er under pres, og medarbejderne på den linje har specialiseret viden, så bliver sygdom på netop den linje et langt større problem. Det kan jeg ikke rigtig tage højde for i detaljeret planlægning. Jeg kan kun reducere den planlagte kapacitet generelt, for eksempel ved at planlægge med 95% i stedet for 100%, for at tage højde for noget sygdom. Så det er en meget overordnet planlægningsantagelse.

Hvorfor er KPI'en blevet bedre over tid?

AK: En del af forbedringen kommer af, at vi frigiver produktionsordrer tættere på det tidspunkt, hvor de faktisk skal gennemføres. Det reducerer risikoen for, at due daten bliver urealistisk på grund af forsinkelser eller nedbrud, som opstår før produktionen overhovedet starter. Så jo tættere vi kommer på den faktiske udførelse, desto mere realistisk bliver due daten. Derudover er produktionen selvfølgelig også blevet bedre til at levere til tiden.

Måler I også produktionseffektivitet på en anden måde?

AK: Ja. En anden vigtig KPI er det, vi kalder effektivitets-overblik for taberiet. Det er noget, vi gennemgår hver mandag morgen på produktionsmødet. Her vurderer vi den forgangne uges produktion og, hvordan den er gået.

Hvordan beregnes effektiviteten i det overblik?

AK: Vi ser på hver tappelinje, produktionsordrenummeret og den færdigvare, der er produceret. Derefter sammenholder vi den producerede mængde med det antal arbejdstimer, der er registreret på den pågældende produktionsordre. Hver medarbejder stempler ind på en produktionsordre, når de begynder at arbejde på den. Så hvis for eksempel tre personer har arbejdet en hel dag på én ordre, summerer jeg deres timer og sammenholder det med den producerede mængde. Det giver mig et produktivitetstal, for eksempel antal producerede enheder pr. time.

Hvordan vurderer du, om en ordre har klaret sig godt eller dårligt?

AK: Jeg sammenligner den aktuelle ordre med tidligere produktion af den samme vare på den samme linje. Jeg ser på, hvor mange tidligere ordrer vi har haft, hvad det gennemsnitlige output pr. time har været, og hvad den gennemsnitlige produktionsordrestørrelse historisk har været. Derefter sammenholder jeg den aktuelle ordre med det historiske gennemsnit.

Hvordan fungerer farveindikatorerne?

AK: Farveindikatorerne er baseret på standardafvigelse fra det historiske gennemsnit. Hvis det aktuelle resultat er bedre end én standardafvigelse over gennemsnittet, bliver det grønt. Hvis det ligger inden for én standardafvigelse over eller under gennemsnittet, bliver det gult. Hvis det ligger mere end én standardafvigelse under gennemsnittet, bliver det rødt. Det er sådan, jeg bruger farverne som en indikator for, om produktionen er gået bedre eller dårligere end forventet.

Indgår der også kommentarer om, hvad der gik galt?

AK: Ja. Medarbejderne kan skrive kommentarer direkte på produktionsordren, hvis de oplever nedbrud eller andre problemer, som påvirker produktionen. De kommentarer henter jeg frem i overblikket som process error comments. Det gør det lettere at forstå, hvorfor en bestemt produktionsordre er blevet rød.

Hvad bruger I de røde indikatorer til?

AK: Dem gennemgår vi på produktionsmødet og taler om, hvad der er sket. Pointen er ikke kun at identificere, at performance har været dårlig, men også at forstå hvorfor. Det hjælper os med at afgøre, om problemet skyldtes lille ordrestørrelse, driftsproblemer, et nedbrud, manglende materialer eller noget andet.

Er der andre KPI'er i produktionen?

AK: Ja. En anden vigtig KPI er spild. Hvis vi for eksempel skal producere 5.000 styk, vil der typisk gå en vis mængde tabt, mens linjen bliver kørt ind og justeret. Det kan være, at der går 200 enheder, før etiketterne sidder lige, eller flaskerne bliver fyldt korrekt. Så selvom produktionsordren lyder på 5.000 enheder, kan det være, at kun 4.800 ender som brugbart output. Resten bliver kasseret.

Hvor ofte omplanlægger I produktionen?

AK: I praksis hver dag. Hver morgen taler produktionschefen med natholdet for at forstå, hvordan natten er gået. Derefter går han hen til den person, der sidder med finplanlægningen, og forklarer, hvilke produktionsordrer der er gået godt, og hvilke der er blevet forsinkede. Det samme sker igen om eftermiddagen ud fra, hvordan dagholdet er kommet igennem produktionen.

Hvilke ændringer fører typisk til omplanlægning?

AK: Både forsinkelser og tidligere færdiggørelse. Hvis produktionen bliver færdig med en ordre hurtigere end forventet, kan det være relevant at fremrykke en anden ordre. Hvis en ordre er forsinket, kan det være nødvendigt at skubbe andre ordrer tilbage. Produktionschefen kommunikerer det manuelt til finplanlægningen.

Hvorfor skal produktionschefen involvere planlægningen, før en ordre flyttes?

AK: Fordi vi skal sikre os, at resten af systemet er klar. Blandingen skal måske være klar til taberiet. Hvis den ikke allerede er forberedt, så skal blandingsordren måske også fremrykkes. Derudover kan alle komponenter som flasker, tuber, kapsler, etiketter og andre materialer stadig stå på lageret og ikke være kørt ind i produktionen endnu. Derfor skal planlægningen opdatere produktionsordren i NAV, så alle de understøttende processer kan reagere.

Så omplanlægningsprocessen er manuel?

AK: Ja, i høj grad manuel. Produktionschefen kommer og fortæller, hvad der er gået godt, og hvad der er gået skidt, og så justerer vi ud fra det. Nogle gange ringer han også direkte, hvis der sker noget akut, for eksempel et linjenedbrud, som ikke kan løses før næste dag.

Hvad sker der, hvis en tappelinje bryder ned midt på dagen?

AK: Så kan medarbejderne på den linje ikke bare stå stille. I det tilfælde kan produktionschefen flytte dem til en anden tappelinje og ringe til planlægningen for at få fremrykket en anden produktionsordre med det samme. Det kan dog kun lade sig gøre, hvis blandingen er klar og godkendt, og hvis lageret hurtigt kan få de nødvendige materialer frem. Det hele handler om at undgå at spilde arbejdskapacitet.

Vil du sige, at produktionen har næsten fuld kapacitetsudnyttelse?

AK: Det afhænger helt af, hvordan man definerer kapacitetsudnyttelse. Hvis man definerer det som, at alle 18 tappelinjer kører konstant, så nej, det har vi ikke. Men hvis man definerer det som, om de 30–35 medarbejdere i taberiet er beskæftiget hele tiden, så ja, især i højsæsonen.

Hvordan påvirker sæsonudsving kapaciteten?

AK: I højsæsonen, særligt i januar, februar, marts og frem til påske, bruger vi det, der kaldes varierende ugentlig arbejdstid. Det er en del af overenskomsten og giver os mulighed for at bede operatørerne om at arbejde ekstra timer hver dag i de 13–14 uger. Det giver os ekstra kapacitet, når efterspørgslen på solprodukter er høj.

Hvad sker der så med de ekstra timer senere?

AK: Medarbejderne bliver kompenseret for dem, og de får også fri senere. For eksempel kan de få de tre dage op til påske fri, eller tage fri på udvalgte dage i efteråret, hvor efterspørgslen er lavere. På den måde bruger vi fleksibiliteten til at tilpasse produktionskapaciteten til den sæsonmæssige efterspørgsel.

Ville det give mening at producere mere i efteråret i stedet for at være så afhængig af kapacitet i højsæsonen?

AK: Det er netop det interessante spørgsmål. Hvis flere varer blev produceret i efteråret, så ville vi måske ikke have behov for den samme grad af varierende ugentlig arbejdstid. Det kunne også forbedre kundetilfredsheden, fordi nogle kunder i dag oplever lange leveringstider om foråret, når kapaciteten er fuldt udnyttet. Hvis flere solprodukter blev produceret i god tid, kunne vi generelt tilbyde kortere leveringstider i stedet for kun uden for højsæsonen.

Ville det også rejse spørgsmål om lager og kapitalbinding?

AK: Ja, helt sikkert. Det er det, der gør det spændende. At producere mere i forvejen kan forbedre leveringstiderne og reducere presset i højsæsonen, men det betyder også mere lager og mere kapital bundet i varer. Så det reelle spørgsmål er, hvad der samlet set giver mest mening, når man balancerer serviceniveau, omkostninger og risiko.

Har I oplevet problemer med varenumre i dataene?

AK: Ja. Nogle gange er ét varenummer blevet erstattet af et andet, men når man søger på det nye varenummer, kan det ikke findes. I nogle tilfælde ser det ud til, at det samme produkt har eksisteret under flere varenumre på grund af ændringer som plombering, udfasning eller andre justeringer. Det gør det svært at spore korrekt, hvis man kun bruger varenummeret.

Hvad er så den bedste måde at identificere produkterne på?

AK: I den situation er det ofte mest sikkert at bruge produktnavnet i stedet for kun at stole på varenummeret. Det er ikke optimalt, men i nogle tilfælde er det den eneste måde at lave analysen korrekt på. Hvis du sender mig konkrete eksempler, kan jeg også prøve at slå dem op.

Hvor meget lager har I typisk?

AK: Meget lidt samlet set. Vores lageromsætningshastighed ligger omkring 5,7. Det betyder, at varer generelt ikke står ret længe på lager. For færdigvarer, som vi fører på lager, er hovedreglen, at vi ikke bør have mere end tre måneders lager.

Hvorfor er der en grænse på tre måneders lager?

AK: Det er fordi kunder som Coop ønsker fleksibilitet. De kan vælge at fjerne et produkt fra sortimentet, hvis salget er for lavt. I den situation går det ikke, hvis vi kommer tilbage og siger, at vi har et helt års lager stående. Derfor bør vi som hovedregel ikke overstige tre måneders lager på færdigvareniveau, og jeg mener, at et lignende princip også gælder for komponenter.

Betyder det så, at der ikke er nogen kassationsrisiko?

AK: Ikke nødvendigvis. Hvis efterspørgslen pludselig falder hurtigere end forventet, så kan et lager, der var tænkt til tre måneder, pludselig række til seks måneder. På det tidspunkt bliver holdbarhedskravene et problem. En kunde som Coop kan for eksempel kræve, at produkterne stadig har 720 dages holdbarhed tilbage, når de modtager dem. Hvis efterspørgslen falder for hurtigt, kan vi ende i en situation, hvor varerne ikke længere opfylder det krav.

Hvad sker der i den slags situationer?

AK: Så bliver det en diskussion om, hvem der skal bære omkostningen. Var det vores fejl, at vi producerede for tidligt, eller faldt efterspørgslen bare meget hurtigere, end kunden oprindeligt forventede? Den slags situationer bliver som regel håndteret gennem dialog, og udfaldet afhænger meget af den konkrete sag.

Så er den slags aftaler standardiserede, eller varierer de?

AK: De varierer. Det bliver som regel en vurdering fra sag til sag afhængigt af den konkrete situation og af, hvad der har forårsaget misforholdet mellem forecast, produktion og reel efterspørgsel.

A.10 Capacity Related Interview

Interview with Head of Planning, PT & Logistics

Allan Kousted, Head of Planning, PT & Logistics – DermaPharm A/S, Fårup
Date: Conducted on May 18th, 2026

Jeg kiggede lidt på kapacitetsudligning, og hvordan man kunne gøre det mere smidigt, særligt i forhold til overarbejde i forårsmånederne sammenlignet med efteråret.

AK: Det er faktisk lidt svært at svare helt konkret på, men jeg kan sandsynligvis godt finde noget data på det. Vi har jo en fast stab af medarbejdere i tapperiet, og det er typisk dér, vi kigger på kapacitetsudnyttelse. Medarbejderne i blanderiet er meget specialiserede, og selvom de også arbejder over i højsæsonen, kan vi som regel få tingene til at hænge sammen der.

AK: Grunden til det er, at vi i højsæsonen producerer store mængder af de samme produkter. For eksempel tager det næsten lige så lang tid at producere en ti-tons tank som en to-tons tank, men outputtet er naturligvis langt større. Derfor er blanderiet faktisk ikke den primære flaskehals i højsæsonen.

Så flaskehalsen opstår længere henne i processen?

AK: Ja, præcis. Presset opstår i tapperiet. I højsæsonen producerer vi store mængder af identiske varer, eksempelvis solcreme SPF 30, men senere på året begynder mindre kunder at placere mere fragmenterede ordrer. I stedet for ti-tons batches bestiller de én eller to tons ad gangen, og det skaber langt flere omstillinger og mere kompleksitet i produktionen.

Hvordan øger I så kapaciteten i de perioder?

AK: Vi bruger primært tre mekanismer. For det første anvender vi vikarer strategisk. Det er dog ikke alle roller, der realistisk kan erstattes af vikarer uden at effektiviteten falder. Ved hver tappelinje er der typisk to eller tre faste medarbejdere, og det er kun de mere simple opgaver, der kan overtages af midlertidig arbejdskraft.

AK: For det andet bruger vi det, vi kalder varierende ugentlig arbejdstid. Medarbejderne arbejder ekstra timer i højsæsonen, og timerne bliver gemt i en slags timebank. De optjente timer afspadseres senere i perioder med lavere aktivitet, eksempelvis op til påske eller mellem jul og nytår.

AK: Den tredje mekanisme er egentlig bare at forlænge lead times. Når vi rammer vores kapacitetsgrænse, udjævner vi efterspørgslen ved at skubbe leveringstidspunkterne længere ud i fremtiden.

Så problemstillingen handler ikke nødvendigvis om, hvorvidt virksomheden skal gå fuldt fra Make-to-Order til Make-to-Stock?

AK: Nej, præcis. Udfordringen handler snarere om at identificere, hvilke produkter der egner sig til tidligere produktion, og hvilke der fortsat bør være Make-to-Order. Nogle produkter og kunder er stabile nok til, at vi med rimelig sikkerhed kan producere dele af volumen tidligere, mens andre er for usikre.

AK: Derfor giver en differentieret hybridtilgang mere mening end en komplet overgang til Make-to-Stock. Nogle produkter kan potentielt produceres tidligere i perioder med ledig kapacitet, mens andre fortsat bør være fuldt efterspørgselsstyrede.

Så beslutningen afhænger blandt andet af efterspørgselsstabilitet, forecast-sikkerhed og kundeadfærd?

AK: Ja, lige præcis. Nogle kunder accepterer længere lead times, mens andre ikke gør. I nogle tilfælde er kunderne også villige til at splitte produktionen op, eksempelvis ved at producere halvdelen tidligere på året og lade resten forblive fleksibelt tættere på sæsonen.

AK: Det afgørende spørgsmål er derfor, hvilke produkter der er stabile nok til at retfærdiggøre tidligere produktion uden at skabe for stor lagerrelateret risiko.

Litteraturen anbefaler ofte, at lager placeres før det led med størst værdiforøgelse. Gælder den logik også her?

AK: Ikke nødvendigvis. Teoretisk ville det give mening at holde lager i bulkform før tapning. Men vores reelle flaskehals ligger i tapperiet og ikke i blanderiet. Derfor løser det ikke vores centrale problem blot at lagerføre bulkblandinger. Udfordringen handler i højere grad om kapacitet på tappelinjerne og tilgængelige medarbejdertimer.