Scholar Publishing Group
Socio-Economic Statistics Research
https://doi.org/10.38007/SESR.2026.070110
ISSN 2790-2722 Vol. 7, Issue 1: 87-94

Research on Integrated Analysis Method of Sales and Operations Data for Management Decision Support

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Keywords: S&OP process optimization, data integration analysis, demand forecasting, supply chain collaboration, VUCA environment

Abstract: In the VUCA environment of global economy and deep integration of supply chain, enterprises need to achieve differentiated competition through S&OP process optimization. Research has found that traditional S&OP implementation faces multiple challenges: departmental communication barriers lead to insufficient information sharing, and cross departmental collaboration efficiency is low; The dynamic balance between supply and demand is difficult to achieve and is susceptible to the impact of the "bullwhip effect"; The synergy effect of the supply chain is limited, and there is insufficient collaboration between enterprises, customers, and suppliers in demand forecasting, production planning, and other aspects; The connection between the strategic and executive levels is broken, making it difficult to translate goals into executable plans. This study constructs a management decision support framework through integrated analysis of sales and operational data, and verifies its effectiveness in an empirical study of a certain enterprise. Optimization strategies include: using a combination of qualitative and quantitative methods for demand forecasting to reduce departmental workload and improve accuracy; Requirement management follows the principle of "order priority", promotes cross departmental joint forecasting, classifies products into ABC-XYZ categories, and formulates corresponding strategies; Customer classification is based on Pareto principle to identify key customers and implement agile S&OP strategy to shorten the cycle; Adopt more agile demand forecasting and supply planning responses for key projects; Establish complaint channels and assessment mechanisms for data management to stimulate the drive for improving data quality; Establish cross departmental teams for process management, optimize the RACI matrix to clarify responsibilities, build a unified performance evaluation system to improve overall performance, and establish an online and offline training system to enhance employee skills. The research contribution lies in enriching the theory of S&OP optimization at the theoretical level and expanding the application boundaries of data integration analysis; At the practical level, by breaking down departmental barriers, optimizing resource integration, and enhancing supply chain collaboration, inventory costs can be reduced, market response speed can be improved, and decision-making support capabilities can be strengthened. The optimization work basically does not increase additional costs and has certain feasibility, but there are limitations - the lack of overall industry comparative research may result in results that are not applicable to other enterprises. In the future, the scope of research will be expanded to different types of companies to enhance universality and applicability.

1 Introduction

In the context of global economy and deep integration of supply chains, enterprises are facing macro environmental challenges dominated by VUCA (instability, uncertainty, complexity, ambiguity) characteristics. The intensification of competition among enterprises requires them to achieve differentiated competition through comprehensive optimization and deep integration of internal resources. In this context, sales and operations planning (S&OP), as a core management tool for balancing supply and demand and optimizing operational efficiency, has become a key path for enterprises to enhance competitiveness through standardized, systematic, and rationalized process construction. Existing literature research indicates that traditional S&OP implementation faces multiple challenges: communication barriers between departments lead to insufficient information sharing, and cross departmental collaboration efficiency is low; The dynamic balance between supply and demand is difficult to achieve and is susceptible to the impact of the "bullwhip effect" and the "anti bullwhip effect"; The synergy effect of the supply chain is limited, and the collaboration between enterprises, customers, and suppliers in demand forecasting, production planning, logistics, and other aspects is insufficient; The connection between the strategic and executive levels is broken, and strategic goals are difficult to translate into executable plans and measurable indicators. These issues have resulted in the underutilization of S&OP's potential in decision support. The motivation for this study stems from addressing the aforementioned challenges: by integrating sales and operational data analysis methods, strengthening cross departmental collaboration and supply chain coordination within enterprises, achieving dynamic balance between supply and demand, and enhancing the operability and measurability of strategic execution. The objective of the paper is clear: to construct a data integration analysis framework for management decision support and verify its effectiveness in S&OP process optimization; Through the case study of Company D, explore the application value of data integration methods in demand forecasting, supply planning, inventory control, and other scenarios. Research contributions include both theoretical and practical aspects: enriching the theory of S&OP process optimization at the theoretical level and expanding the application boundaries of data integration analysis methods in management decision-making; At the practical level, by breaking down departmental barriers, optimizing resource integration, and enhancing supply chain collaboration, we provide enterprises with accurate demand forecasting and supply planning support, achieving reduced inventory costs, improved market response speed, and strengthened decision-making support capabilities.

2 Correlation theory

2.1 Overview of S&OP Concept and Core Theory

The Sales and Operations Plan (S&OP)[1] is proposed by management consulting experts to address the problem of a disconnect between enterprise demand and supply, as well as low efficiency in cross departmental collaboration. Its core is to integrate sales, product, demand, supply, finance, and other departments to achieve dynamic balance in the supply and demand chain. It is defined as the process of integrating the entire department plan of the enterprise, coordinating short-term operational activities and long-term strategies through a periodic meeting mechanism to ensure that supply matches market demand. The relevant theories cover demand forecasting [2] (including qualitative methods such as Delphi method and salesperson combination method, quantitative methods such as moving average method, exponential smoothing, and regression analysis), supply-demand balance (achieving dynamic equilibrium through market mechanisms to regulate supply and demand), resource optimization allocation (reasonably allocating internal resources within the time and space range to maximize utilization), and collaboration theory[3] (subsystem collaboration

produces a "whole greater than the sum of parts" effect, improving overall efficiency through collaboration between departments and employees).

2.2 S&OP Theory and Literature Review

As a cross departmental collaboration tool, S&OP's development can be divided into three stages: the origin stage focuses on supply-demand balance and data analysis, the development stage extends to multi departmental collaboration to improve operational levels, and the modern stage emphasizes meeting mechanisms and information sharing to achieve strategic implementation. Foreign research has pointed out that S&OP builds strategic and operational bridges through departmental collaboration, performance settings can stimulate employee motivation, corporate culture and collaboration mechanisms are key to implementation, and practical cases have shown that it can optimize inventory, improve service levels, and promote sustainable development of the supply chain. As the core of S&OP, demand forecasting includes both qualitative (Delphi method, salesperson combination method) and quantitative (moving average, exponential smoothing, regression analysis) methods, emphasizing the combination of data-driven and judgmental approaches. Domestic research has supplemented the five step process framework, the "shoe foot matching" supply-demand balance model, and the inventory health management concept, while expanding the application of tools such as agile supply chain, Pareto principle[4], ABC-XYZ matrix, etc. The RACI matrix and performance evaluation theory [5] (MBO, KPI, SMART principle) have been used to clarify the allocation of responsibilities and target management, and the training system is seen as the key to improving employee professional competence. Existing research acknowledges the role of S&OP in strategic alignment and supply chain collaboration, but there is still room for exploration in areas such as agility quantification evaluation and overall performance standardization, providing theoretical support and improvement directions for enterprise process optimization.

3 Research method

3.1Enterprise Overview and S&OP Process Status

A certain enterprise was established in the 1940s as a long-standing electronics enterprise. After more than 80 years of development, through resource integration and mergers and acquisitions, it has grown from a "small workshop" to an industry leader with global business coverage. It has over 20000 employees, 9 factories, and 8 product groups, serving more than 300 customers worldwide. The enterprise adheres to the values of integrity, responsibility, team spirit, and innovation, and regards innovation and sustainable development as its core principles. In recent years, with the rise of artificial intelligence technology, enterprises have seized market opportunities and achieved a 44% increase in sales in fiscal year 2025 compared to fiscal year 2024, reaching 4 billion yuan. The business has shown a continuous growth trend, but at the same time, it also faces challenges in improving delivery efficiency and customer satisfaction. The enterprise adopts a traditional functional organizational structure, covering departments such as human resources, technology, products, sales, finance, and operations, each performing their own duties. The S&OP process includes five stages: product review, demand review, supply review, financial review, and management review. It is carried out in the form of meetings and the cycle covers month end data organization, product forecasting, demand forecasting, supply planning, and management meetings, forming a complete closed loop. As a core process, demand forecasting involves stages such as product forecasting, sales forecasting, and key customer demand review, ultimately forming a global demand consensus (GDC) and inputting it into the system to provide support for supply

planning..

3.2 S&OP Process Issues and Case Analysis

Through in-depth internal interviews and case analysis, reveal multiple issues in the S&OP process of enterprises. The interview covered 31 employees, including departments such as product, sales, demand, supply, and finance. Background information showed that the interviewees ranged from senior to grassroots employees with diverse work experience. In terms of understanding and execution of the S&OP process, most people recognize its value in balancing supply and demand, optimizing resource allocation, but problems such as low accuracy of demand forecasting, poor timeliness and accuracy of data, difficulties in cross departmental collaboration, and unclear responsibilities are prominent. In the data related process, although data is shared between SAP and IBP systems, data delays and frequent errors affect the efficiency of departmental communication. Cross departmental collaboration has long communication cycles and unclear responsibilities due to global distribution and cross time zone issues. In terms of performance evaluation, departmental indicators are scattered and there is a lack of unified S&OP overall performance standards, resulting in each department acting independently. Case 1 "Missed 30 million sales revenue" shows that the product department and sales department were deadlocked for six months due to pricing strategy differences, resulting in a passive and significant downward adjustment of demand forecast data, ultimately missing business opportunities, exposing problems such as lack of common goal guidance in the process, poor communication, lack of rigor and dynamic adjustment mechanism in demand forecasting, and low decision-making efficiency. Case 2 "Complaints from different departments" reflects the pressure faced by the sales department in high-frequency demand forecasting, the disconnect between the sales and supply departments, data issues affecting demand forecasting work, insufficient emphasis on forecasting accuracy by leaders, and misplaced goal setting among departments.

3.3 Analysis of Key Indicators in the S&OP Process

Through data analysis, in-depth interviews, and case studies, classify the key factors that affect S&OP performance and form a fishbone diagram (as shown in Figure 1)

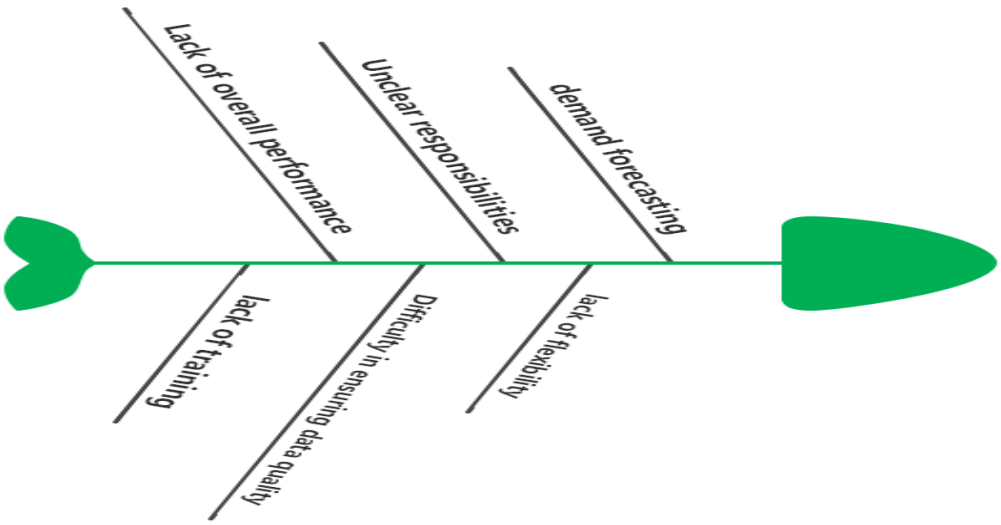

Fig1 The chart problem attribution

The results show that demand forecasting, as a process precursor, has significant deviations, mainly due to the single forecasting method (relying on sales personnel input and demand personnel adjustment), resulting in a large workload for participants and a lack of quantitative forecasting data basis; The S&OP process lacks flexibility and focuses on numerous products and customers, making it difficult to cope with changes in internal and external market environments; The vague definition of departmental responsibilities affects overall work efficiency; The incomplete data management system leads to frequent data delays and errors, and the quality cannot be guaranteed; S&OP lacks unified assessment indicators, making it difficult to motivate departments to work towards the same goal; Lack of process related knowledge and skill training, unable to systematically enhance the professional skills of participants. These issues collectively constitute the core obstacles to optimizing the S&OP process, and targeted research and optimization strategies need to be proposed to improve performance.

4 Results and discussion

4.1 Existing Problems and Attribution Analysis of S&OP Process

Through internal in-depth interviews and case analysis, the company found multiple problems with the S&OP process: low accuracy of demand forecasting, excessive reliance on a single department and qualitative methods, lack of joint forecasting and quantitative tool application among multiple departments, resulting in large prediction deviations; The data management system is weak, and although SAP and IBP systems have been deployed, data delays and errors occur frequently, affecting the efficiency of inter departmental communication; There are structural barriers to cross departmental collaboration, and the global distribution leads to high communication costs, conflicting departmental goals (such as the product department pursuing high profit margins and the sales department's low price strategy divergence), vague delineation of rights and responsibilities, and a lack of unified coordination mechanisms; The performance evaluation system is scattered and lacks overall goal orientation, with departments acting independently and neglecting the overall strategy of the enterprise; Lack of process agility, difficulty in responding to market changes, and lagging response to key customers and projects; In addition, there is a lack of systematic training for personnel involved in the process, which limits their ability to improve their professional skills. The attribution of the problem shows that the core issues are the single demand forecasting method, rigid process, unclear responsibilities, poor data quality, scattered assessment indicators, and lack of training. Targeted optimization is needed to improve S&OP efficiency.

4.2 Model experiment

The optimization of enterprise S&OP strategy should follow seven core principles: balancing supply and demand to ensure efficient utilization of resources, avoiding cost waste or customer loss; Agility quickly responds to market changes by shortening process cycles, especially for key customers and projects; Cross departmental collaboration and information sharing break down barriers, integrate resources from departments such as sales, production, demand, products, supply, and finance, drive decision-making with data, and extract effective information from massive amounts of data; Vertical alignment of strategy and execution decomposes enterprise goals into measurable indicators (such as accuracy of demand forecasting and inventory turnover), achieving strategic implementation; Continuous improvement relies on the PDCA cycle[6]to dynamically optimize processes; Cost control focuses on economy and effectiveness, exploring optimization solutions under near zero cost conditions. The optimization of demand forecasting adopts an order priority strategy, which enhances the accuracy of forecasting by constructing a table of differences

between orders and demand forecasting (covering regions, customers, products, scope of differences, and action measures); Multi departmental joint forecasting integrates resources from sales, demand, product, supply, and finance departments, and conducts in-depth discussions on historical data, order status, and future trends at each stage; The combination of qualitative and quantitative methods introduces tools such as moving average[7]and weighted average[8]. For example, the 5-cycle moving average mitigates short-term fluctuations and provides insights into medium-term trends. The weighted average method improves prediction fit through subjective weighting (such as a weight of 0.35 for the most recent period). Requirement management implements ABC-XYZ product classification, distinguishing products based on the proportion of demand amount (70% for Class A, 20% for Class B, and 10% for Class C) and dispersion degree (X<0.3, Y 0.3-0.6, Z>0.6), corresponding to different prediction strategies (such as using simple models for high-value and low dispersion products in Class AX, and prioritizing orders for high-value and high dispersion products in Class AZ), and combining the "seven point technology, three point management" concept to strengthen data analysis, tool usage, and modeling capabilities. At the same time, high-level attention and cross departmental meeting reports (such as the accuracy and deviation of the demand department's 5-10 page PPT report) are used to improve prediction performance, forming a demand planning system that emphasizes both technology and management.

4.3 Effect analysis

To improve the efficiency of sales and operational plans, the company has taken multidimensional optimization measures: establishing a cross departmental 10 person execution supervision team, consisting of 2 experienced personnel from the product, sales, demand, supply, and finance departments, responsible for process execution supervision, stage meeting hosting, and experience summary. The responsibility allocation adopts the RACI matrix to clarify the boundaries - during the product review stage, the product department is responsible for "execution+ultimate responsibility", and the sales and supply departments provide consultation; The product, sales, and demand departments are jointly responsible for the requirement review stage; During the supply review phase, the supply department takes the lead and the product department provides support; The finance/supply-demand balance review stage is executed by four departments, with the finance department ultimately responsible; During the management review stage, each department executes and the management makes the final decision.The introduction of complaint channels and reward and punishment mechanisms in data management is evaluated monthly based on indicators such as data delay frequency, deviation frequency, and problem handling timeout duration. The initial score is 100 points, and the deduction rules for each problem are clear (such as deducting 1 point for a single delay and adding 1 point every 4 hours of timeout). The annual performance is the average of each month. The performance evaluation adopts a star rating system, based on the five major indicators of STR, FA (PN), FA (GPL), FB (PN), and ITR, setting sporadic to five-star standards (as shown in Table 1 for the S&OP total performance star rating standard)

Table 1 S&OP Overall Performance Star Standards

Rating	STR Target	FA(PN) Target	ITR Target	Performance Achievement Rate
Three Stars	92%	68%	7.0	100%
Five Stars	94%	71%	8.0	120%

Corresponding to an achievement rate of 50% -120%, the total performance is the average star rating of each indicator. Three dimensional mode of training system construction: Internal case teaching is conducted every six months for 1-2 hours, focusing on real process difficulties; External

expert training lasts 1-2 days per year to strengthen the integration of theory and practice; Online compulsory courses cover basic theory, case analysis, and other content, with chapter questions and final exams, and a score of 80 or above is required.

5 Conclusion

The optimization work is committed to improving the sales and operation planning process of a well-established electronic enterprise. Through data analysis, internal interviews, case analysis, and other methods, combined with the current situation and relevant theories of enterprise sales and operation planning (S&OP), actionable optimization strategies are extracted. The demand forecasting adopts a combination of qualitative and quantitative methods [9] to reduce departmental workload and improve forecasting accuracy; Requirement management follows the principle of "order priority", promotes cross departmental joint forecasting, strengthens personnel's dual skills in technology and management, classifies products into ABC-XYZ categories [10], and develops corresponding forecasting methods. Customer classification is based on the Pareto principle, identifying key customers and implementing agile S&OP strategies to shorten the time cycle by half; Adopt more agile response in demand forecasting and supply planning for artificial intelligence projects. Innovate data management by establishing complaint channels and deduction assessment mechanisms to stimulate performance improvement in data management centers. Establish a cross departmental team of 10 people in the process management dimension to coordinate execution and supervision, optimize the RACI matrix to clarify responsibilities, build a unified star performance evaluation system to improve overall performance, and establish a combination of online and offline training systems to enhance employee skills and process awareness. This optimization work is based on existing theories and the actual situation of the enterprise, with little additional cost, and has certain feasibility, but there are limitations - the lack of overall industry comparative research may result in results that are not applicable to other enterprises. In the future, the scope of research will be expanded to different types of companies to enhance universality and applicability.

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