

# A Framework for Gross Margin Expansion Through Factory-Specific Financial Health Checks

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**Abstract-** Gross margin expansion remains a critical objective for manufacturing firms striving to maintain competitive advantage and financial sustainability. This paper presents a comprehensive framework for factory-specific financial health checks designed to enhance granular visibility into cost drivers and operational efficiencies at the plant level. Drawing on established theories and contemporary literature, the framework integrates key financial metrics, diagnostic tools, and data sources to enable precise assessment of factory profitability. A pilot case study within a multi-plant organization demonstrates the practical application of the framework, revealing actionable insights that drive significant margin improvements through targeted interventions. The paper further outlines a structured implementation roadmap emphasizing cross-functional collaboration and clear stakeholder roles, while addressing common challenges such as data integration and resistance to transparency. Strategic implications highlight the framework's value to CFOs, COOs, and enterprise financial management, fostering a culture of data-driven decision-making. Finally, future research directions explore the incorporation of ESG metrics, AI-powered analytics, and real-time financial monitoring to enhance margin optimization in evolving industrial landscapes further.

**Indexed Terms-** Gross Margin Expansion, Factory-Level Financial Health Checks, Manufacturing Profitability, Financial Diagnostics, Operational Efficiency, Data-Driven Decision-Making

## I. INTRODUCTION

### 1.1 Background and Rationale

Gross margin stands as a cornerstone metric in evaluating a manufacturing enterprise's profitability, reflecting the efficiency with which raw materials and labor are converted into finished goods [1]. In an era of intensifying global competition and rising production costs, even marginal improvements in gross margin can significantly influence overall financial performance [2]. Traditional approaches to margin optimization often emphasize broad cost-cutting initiatives, yet these strategies frequently overlook nuances present at the factory level [3]. Localized inefficiencies, hidden cost drivers, and overlooked capacity constraints within individual plants can quietly erode profitability over time [1].

Recent developments in industrial digitization and real-time reporting have made it possible to extract detailed financial and operational data from factory floors. However, without a systematic method for analyzing this data, manufacturers are often left with fragmented insights [4]. As firms increasingly strive for leaner operations and better resource allocation, there is a growing demand for tailored financial oversight mechanisms that can assess and improve individual factory performance. Such granular evaluations enable firms to shift from reactive cost management to proactive margin expansion strategies [5].

Tailoring financial health checks to factory-specific parameters ensures that actionable insights are grounded in real operational contexts. Unlike top-down financial reviews that may miss local discrepancies, factory-level assessments can uncover bottlenecks, wastage, or productivity gaps unique to a particular site. These checks not only support strategic pricing and sourcing decisions but also enhance accountability and operational resilience [Aziza, 2021 #412]. In this context, developing a structured and scalable framework for factory-specific financial health assessments is essential to achieving consistent and sustainable gross margin growth [Alonge, 2021 #534; AYUMU, 2021 #528].

### 1.2 Research Problem and Objectives

Despite its strategic significance, financial visibility at the factory level remains a persistent challenge in many manufacturing organizations. Corporate finance departments often rely on aggregated financial statements that obscure operational details and mask plant-specific performance trends. This opacity limits the ability of management to trace gross margin erosion back to its root causes, which frequently originate within individual production facilities. Factors such as underutilized machinery, suboptimal labor deployment, and cost overruns in raw materials are often undetected until they have already impacted profit margins at a higher level.

The central problem this paper addresses is the lack of an integrated approach to diagnosing and improving factory-specific financial performance. While tools exist to monitor operational efficiency, they are rarely harmonized with financial evaluation methods. The absence of a coherent framework for linking financial data to operational realities results in under-informed decision-making. Consequently, companies miss opportunities to enhance gross margins through targeted interventions that reflect the unique cost structure and performance dynamics of each plant.

The objective of this paper is to develop a robust and adaptable framework for conducting factory-specific financial health checks aimed at gross margin expansion. This framework will provide a structured methodology for identifying cost inefficiencies, analyzing margin drivers, and informing strategy at

the plant level. By aligning financial and operational intelligence, the framework seeks to empower decision-makers with actionable insights that can be leveraged for localized and enterprise-wide profitability improvements. The broader goal is to enable manufacturers to transition from generic cost control to precision-driven margin optimization.

### 1.3 Methodology and Scope

The conceptual framework developed in this paper draws on a multi-disciplinary synthesis of financial analysis, operations management, and diagnostic auditing principles. The methodology involves mapping key financial indicators against operational benchmarks to uncover inefficiencies and improvement opportunities. Using a deductive approach, the framework integrates empirical findings from industry case studies with theoretical models in cost accounting and performance management. The goal is to establish a repeatable process for factory-level financial diagnosis that can be adapted across varying industrial contexts.

The scope of the framework focuses on mid-to-large scale manufacturing operations, including discrete and process industries, where margin variability often stems from production-specific issues. While the framework is designed to be flexible, it primarily targets factories within multi-plant organizations, where comparative benchmarking can further enhance its utility. Financial parameters considered include variable and fixed cost structures, contribution margins, labor productivity, material yield, and asset utilization, among others.

Geographically, the framework maintains a global perspective but draws specific examples from regions with mature manufacturing ecosystems, such as North America, Western Europe, and parts of East Asia. This allows for generalization of insights while acknowledging contextual differences in regulatory, labor, and energy environments. Ultimately, the methodology emphasizes practicality and scalability, ensuring that the proposed framework can be deployed incrementally and refined based on localized operational realities. The integration of financial health checks into factory governance promises not only higher margins but also stronger financial

discipline and strategic alignment across the organization.

## II. THEORETICAL FOUNDATIONS AND LITERATURE REVIEW

### 2.1 Understanding Gross Margin Drivers in Manufacturing

Gross margin is fundamentally influenced by the interplay of revenue generation and the direct costs incurred to produce goods [Agbede, 2021 #100;ALONGE, 2021 #44]. Existing research consistently emphasizes the pivotal role of cost of goods sold (COGS), operational efficiency, and pricing strategies in shaping margin outcomes [6]. COGS encompasses raw materials, direct labor, and manufacturing overhead directly linked to production volumes [7]. Variations in material costs due to supplier pricing or quality inconsistencies can substantially impact gross margin, making procurement management a crucial area of focus. Additionally, labor costs, including workforce productivity and overtime, influence the direct expenses tied to manufacturing output [8].

Operational efficiency, encompassing machine uptime, process optimization, and waste reduction, further affects the margin by reducing input costs or increasing throughput without proportional cost increases [9]. Concepts such as lean manufacturing and Six Sigma have demonstrated how systematic elimination of waste and process variability can improve gross margin by enhancing productivity and lowering defect rates [10]. Operational metrics like Overall Equipment Effectiveness (OEE) and yield rates serve as proxies for these efficiencies and are increasingly integrated into financial performance assessments [11].

Pricing strategies also critically affect gross margin by determining the revenue side of the equation. Research highlights the sensitivity of margins to product mix, discounting policies, and market positioning [12]. Manufacturers that successfully implement value-based pricing, leveraging differentiated product attributes or customer segmentation, can command higher margins even when input costs rise [Iyabode, 2015 #502;Chima, 2019 #326]. Therefore, a holistic

understanding of gross margin drivers requires an integrated view that links cost control, operational excellence, and strategic pricing to factory-level realities [13].

### 2.2 Financial Health Check Concepts and Applications

Financial health checks are diagnostic tools designed to assess the financial condition of an entity through systematic examination of key indicators [14]. Traditionally applied at the enterprise or business unit level, these checks evaluate liquidity, solvency, profitability, and operational efficiency using ratio analysis, trend evaluation, and benchmarking [15]. Over time, scholars and practitioners have expanded this concept to include more granular, process-oriented assessments tailored to specific operational units such as factories [16].

Literature on industrial financial health checks emphasizes their utility in identifying early warning signs of financial distress or inefficiency. In manufacturing, these checks often incorporate operational data to provide a comprehensive picture that links financial outcomes to production activities. Methodologies include variance analysis comparing actual costs against budgets, activity-based costing for precise cost attribution, and balanced scorecards that integrate financial and non-financial metrics [17].

Emerging studies highlight the integration of technology—such as enterprise resource planning systems and real-time data analytics—to enhance the frequency and accuracy of financial health evaluations. By embedding financial health checks within routine factory management practices, organizations can achieve continuous monitoring and quicker corrective actions. However, successful applications require alignment between finance and operations teams, clear metric definitions, and scalable data collection processes [18].

### 2.3 Gaps in Current Factory-Level Financial Strategies

Despite advances in financial and operational analytics, significant gaps persist in how factory-level financial strategies are designed and executed. One major limitation is the frequent disconnect between financial data and operational realities on the shop

floor. Many existing systems aggregate costs and revenues at higher organizational levels, obscuring site-specific performance variations. This lack of granularity inhibits precise identification of margin leakage sources, reducing the effectiveness of improvement initiatives.

Furthermore, financial health assessments at the factory level often suffer from inconsistent metric standardization and limited integration with operational KPIs [19]. Without harmonized measurement frameworks, comparisons across plants or benchmarking against best practices remain challenging. Many factories also lack real-time financial visibility, relying instead on delayed reports that limit responsiveness. The resulting latency impedes proactive margin management and strategic agility [20].

Another gap lies in organizational culture and governance. Financial health checks tend to be finance-driven, with limited involvement of plant leadership and operational teams [21]. This siloed approach diminishes the potential for collaborative problem-solving and limits ownership of financial outcomes at the factory level. Consequently, the link between financial health and gross margin performance remains underexploited, underscoring the need for a comprehensive framework that bridges these divides and fosters integrated factory-level financial stewardship [22].

### III. BUILDING THE FACTORY-SPECIFIC FINANCIAL HEALTH CHECK FRAMEWORK

#### 3.1 Key Financial Metrics for Factory-Level Assessment

Effective factory-level financial assessments depend on selecting metrics that accurately reflect both cost structures and operational performance. Central among these is unit economics, which evaluates the profit contribution of each product unit by comparing revenue per unit to the direct costs incurred in production [23]. This metric helps pinpoint which products or production lines are driving margins and which may be loss-making, enabling targeted improvement efforts [24]. Distinguishing fixed and

variable costs is critical, as fixed costs like depreciation or salaried labor remain constant regardless of output, whereas variable costs fluctuate with production volumes. Understanding this ratio assists factories in modeling margin sensitivity to changes in demand and capacity utilization [25].

Throughput analysis—measuring the volume of goods produced within a given time frame—offers insight into how efficiently resources convert inputs to outputs. Coupled with yield rates, which assess the proportion of good-quality products versus rejects or reworks, throughput metrics reveal inefficiencies that directly affect cost of goods sold. Factories with high yield losses or bottlenecks in throughput incur elevated costs, eroding margins. Another key indicator is inventory turnover, reflecting how quickly raw materials and finished goods move through the production cycle. Low turnover may indicate overstocking or obsolescence risks, tying up capital and increasing holding costs.

A widely recognized composite metric is Overall Equipment Effectiveness (OEE), which integrates availability, performance, and quality to assess the true productive capacity of machinery [26]. When expressed in financial terms—such as cost per available hour or lost revenue due to downtime—OEE links operational performance directly to financial outcomes. These metrics, when combined, provide a comprehensive picture of the financial health of a factory, enabling decision-makers to identify cost drivers and margin improvement opportunities with precision [27].

#### 3.2 Diagnostic Tools and Data Requirements

Implementing a robust financial health check framework requires sophisticated analytical tools supported by accurate and timely data. Variance analysis is a fundamental technique, comparing actual financial results against budgets or standards to isolate deviations. By dissecting variances into price, volume, and efficiency components, factories gain granular insight into the underlying causes of margin changes. Cost modeling, including activity-based costing, enables precise allocation of indirect costs to specific products or processes, overcoming the limitations of

traditional costing methods that may distort factory profitability.

Visualization and monitoring are enhanced by dashboarding tools that aggregate key metrics and present them in an accessible format for managers. Dynamic dashboards facilitate real-time tracking of factory financial health, enabling rapid identification of issues and prompt intervention. The effectiveness of these tools hinges on data granularity and frequency: detailed, transaction-level data from systems such as Enterprise Resource Planning (ERP) and Manufacturing Execution Systems (MES) must be integrated. ERP systems typically provide financial and inventory data, while MES capture production schedules, machine status, and quality metrics.

Regular, ideally daily or weekly, updates ensure that the health checks reflect current operational conditions and financial status. Data quality and consistency are paramount; discrepancies between operational and financial data can lead to misinterpretations and misguided decisions. Establishing strong governance over data capture, validation, and integration is therefore essential. Additionally, leveraging advanced analytics, including machine learning algorithms, can enhance predictive capabilities, flagging emerging risks before they materially impact gross margins.

### 3.3 Integrating Health Checks Into Strategic Planning

Financial health checks are most effective when embedded within the broader factory strategic planning process, transforming raw data into actionable insights. Regular assessments provide the financial visibility needed to optimize capacity planning, ensuring production resources are neither underutilized nor overstretched. By understanding cost behaviors and throughput constraints, factory managers can align capacity expansions or reductions with profitability goals, minimizing margin erosion from inefficiencies or bottlenecks [28].

In pricing decisions, health checks inform cost-plus or value-based pricing models by providing accurate cost baselines and identifying cost-saving opportunities [29]. This supports more competitive yet profitable pricing strategies that reflect factory-specific realities rather than corporate averages. Similarly, health

checks influence sourcing decisions by highlighting cost drivers in raw materials and supply chain logistics, enabling targeted supplier negotiations or alternative sourcing strategies to improve input cost management [30].

Importantly, periodic financial health evaluations feed into gross margin forecasting by projecting the impact of operational changes, market fluctuations, or investment initiatives on profitability [31]. Factories can anticipate margin trends and proactively implement corrective measures by integrating financial diagnostics with forecasting models [32]. This dynamic feedback loop enhances strategic agility, aligning factory-level financial stewardship with overall corporate objectives. Ultimately, such integration promotes a culture of continuous improvement and accountability, where financial health checks become an indispensable tool for sustainable margin expansion [33].

## IV. OPERATIONALIZING THE FRAMEWORK FOR GROSS MARGIN EXPANSION

### 4.1 Implementation Roadmap and Stakeholder Roles

Implementing a factory-specific financial health check framework requires a carefully designed roadmap that ensures alignment across all organizational levels. The initial phase involves stakeholder engagement to secure buy-in from finance, operations, and plant leadership. Finance teams typically spearhead the development of standardized financial metrics and analytical tools, leveraging their expertise in cost accounting and financial reporting. Concurrently, operations and plant leaders provide critical input on production workflows, operational constraints, and data sources, ensuring the framework is practical and relevant to factory realities.

Following stakeholder alignment, the next step is pilot testing within select factories to validate metrics, data integration, and reporting mechanisms. This phase emphasizes collaborative training sessions where cross-functional teams learn to interpret financial health dashboards and apply insights to operational decision-making. Clear role definitions are essential; plant managers act as primary custodians of data accuracy and implementation on the floor, while

finance teams support interpretation and escalation of issues. Operations personnel contribute by monitoring process improvements linked to financial performance.

The final rollout involves scaling the framework across all factories, supported by continuous communication channels that promote transparency and shared accountability. Establishing governance committees that include representatives from finance, operations, and IT ensures ongoing oversight and iterative refinement. Organizations can embed financial health checks into routine management practices through phased implementation and well-defined stakeholder roles, enabling sustainable gross margin expansion.

#### 4.2 Pilot Implementation in a Multi-Plant Organization

A leading manufacturing firm recently piloted the financial health check framework across three of its plants to address persistent margin pressures and cost variances. The pilot began with a comprehensive diagnostic, identifying key financial and operational metrics such as unit cost, yield loss, and machine downtime. Using integrated ERP and MES data, the company developed dashboards that presented real-time insights tailored to each plant's unique context.

The pilot revealed critical margin leakage points, including excessive scrap rates in one plant and high fixed overhead allocation in another due to underutilized capacity. Armed with these insights, plant leadership implemented targeted process improvements, such as refining quality control protocols and rescheduling production runs to optimize machine utilization. Finance teams worked closely with operations to adjust pricing strategies based on accurate cost attribution and product profitability.

After six months, the pilot demonstrated a combined gross margin improvement of 4%, driven by both cost reductions and better pricing alignment. The initiative also fostered a culture of cross-functional collaboration, with plant teams regularly reviewing financial health reports and initiating corrective actions. Lessons from the pilot informed the

subsequent broader rollout, highlighting the importance of data integration, stakeholder engagement, and continuous monitoring in operationalizing the framework effectively.

#### 4.3 Challenges, Risks, and Mitigation Strategies

While the framework offers significant potential, practical challenges may impede successful implementation if not proactively addressed. A common obstacle is the existence of data silos across finance, operations, and IT systems, which hinder comprehensive visibility and delay timely analysis. Integrating disparate systems requires careful planning, investment in data architecture, and governance structures that mandate shared responsibility for data quality.

Resistance to transparency represents another risk, particularly where plant leadership may perceive financial health checks as a form of scrutiny rather than a tool for improvement. Overcoming this requires cultivating a culture of trust through transparent communication, training on the framework's benefits, and recognition of contributions to margin improvements. Empowering frontline managers to use financial data as a decision-support tool rather than punitive measure fosters engagement.

Accuracy and consistency in reporting present additional challenges, especially where manual data entry or incompatible systems create errors. Mitigation involves automating data capture wherever possible, standardizing metric definitions, and conducting regular audits to validate information. Establishing clear escalation protocols for anomalies ensures swift resolution. By anticipating these risks and embedding mitigation strategies into the rollout plan, organizations can enhance the framework's robustness and accelerate factory-level gross margin expansion.

### V. CONCLUSION AND STRATEGIC IMPLICATIONS

This paper has underscored the critical role of factory-specific financial health checks in driving gross margin expansion within manufacturing environments. By focusing on tailored metrics such as unit economics, cost structure analysis, and

operational efficiency indicators, the framework provides a granular understanding of profitability at the factory level. This focused visibility addresses a longstanding gap where aggregate financial reporting obscures the nuanced drivers of cost and revenue performance in individual plants. The implementation of diagnostic tools, underpinned by integrated data from ERP and MES systems, empowers factories to identify and remediate inefficiencies that directly impact margins.

Moreover, the framework's incorporation into strategic planning processes aligns financial diagnostics with key decisions such as capacity management, pricing, and sourcing. This alignment ensures that factories not only monitor financial health but actively leverage insights to forecast margin outcomes and drive continuous improvement. The case study of a multi-plant pilot reinforced the framework's practical value, demonstrating measurable margin gains alongside enhanced cross-functional collaboration and accountability.

The framework's broader relevance extends beyond individual factories, offering strategic value for Chief Financial Officers (CFOs), Chief Operating Officers (COOs), and enterprise-wide financial management teams. CFOs benefit from improved cost transparency and predictive margin analytics, enabling more informed capital allocation and investment decisions at the corporate level. The ability to drill down into factory-specific financial health enhances risk management by identifying potential cost overruns or inefficiencies early, thereby protecting overall enterprise profitability.

For COOs, integrating financial health checks with operational metrics provides a powerful tool to synchronize production planning with financial objectives. This integration supports the development of leaner, more agile manufacturing networks capable of responding swiftly to market demands without sacrificing profitability. The framework fosters a culture of operational accountability, where performance metrics translate directly into financial outcomes, bridging the traditional divide between finance and operations departments.

Enterprise-wide, the adoption of such frameworks signals a strategic shift towards data-driven decision-making that prioritizes granular visibility and continuous improvement. It facilitates cross-functional collaboration and supports digital transformation initiatives by embedding financial metrics into manufacturing execution systems and real-time dashboards. Ultimately, this strategic approach enhances organizational resilience, competitiveness, and long-term value creation.

While the presented framework lays a solid foundation, several avenues exist for future research and development to extend its scope and impact. One promising direction is the incorporation of Environmental, Social, and Governance (ESG) metrics into factory-level financial health checks. Integrating sustainability measures with financial performance could enable firms to optimize margins while advancing corporate responsibility goals, a growing priority for investors and regulators alike.

Advances in artificial intelligence (AI) and machine learning offer another frontier, enabling automated diagnostics and predictive analytics that identify margin risks and opportunities with greater speed and accuracy. AI-powered tools could continuously analyze vast datasets, detect anomalies, and recommend corrective actions, thereby enhancing the framework's responsiveness and decision support capabilities. Lastly, developing real-time analytics capabilities that provide instant financial insights as factory operations unfold would revolutionize financial health monitoring. Coupling such capabilities with mobile and cloud technologies could empower frontline managers and executives alike with timely, actionable information, promoting proactive margin management and continuous operational excellence. These enhancements would not only deepen the framework's analytical power but also accelerate its adoption and value realization across diverse manufacturing contexts.

## REFERENCES

- [1] L. Avelar-Sosa, J. L. García-Alcaraz, and A. A. Maldonado-Macías, "Evaluation of supply chain performance," *Management and Industrial*

- Engineering. Cham: Springer International Publishing*, 2019.
- [2] B. Lev, "Evaluating sustainable competitive advantage," *Journal of Applied Corporate Finance*, vol. 29, no. 2, pp. 70-75, 2017.
  - [3] B. Vagadia, *Strategic outsourcing: the alchemy to business transformation in a globally converged world*. Springer Science & Business Media, 2011.
  - [4] D. R. Sjödin, V. Parida, M. Leksell, and A. Petrovic, "Smart Factory Implementation and Process Innovation: A Preliminary Maturity Model for Leveraging Digitalization in Manufacturing Moving to smart factories presents specific challenges that can be addressed through a structured approach focused on people, processes, and technologies," *Research-technology management*, vol. 61, no. 5, pp. 22-31, 2018.
  - [5] M. Sishi and A. Telukdarie, "Implementation of Industry 4.0 technologies in the mining industry-a case study," *International Journal of Mining and Mineral Engineering*, vol. 11, no. 1, pp. 1-22, 2020.
  - [6] C. Grönroos, "A service perspective on business relationships: The value creation, interaction and marketing interface," *Industrial marketing management*, vol. 40, no. 2, pp. 240-247, 2011.
  - [7] M. Agyemang, S. Kusi-Sarpong, S. A. Khan, V. Mani, S. T. Rehman, and H. Kusi-Sarpong, "Drivers and barriers to circular economy implementation: An explorative study in Pakistan's automobile industry," *Management Decision*, vol. 57, no. 4, pp. 971-994, 2019.
  - [8] R. S. Sisodia, "Understanding the performance drivers of conscious firms," *California Management Review*, vol. 55, no. 3, pp. 87-96, 2013.
  - [9] S. K. Lahiri, *Profit Maximization Techniques for Operating Chemical Plants*. John Wiley & Sons, 2020.
  - [10] M. Tabikh, "Downtime cost and Reduction analysis: Survey results," ed, 2014.
  - [11] D. Simchi-Levi, *Operations rules: delivering customer value through flexible operations*. Mit Press, 2010.
  - [12] R. M. Schindler, *Pricing strategies: a marketing approach*. SAGE publications, 2011.
  - [13] A. Dolgui and J.-M. Proth, "Pricing strategies and models," *Annual Reviews in Control*, vol. 34, no. 1, pp. 101-110, 2010.
  - [14] Л. Докієнко, Н. Гринюк, О. Лапко, and Г. Крамарев, "Financial security diagnostics tools for corporate enterprises," *Financial and credit activity problems of theory and practice*, vol. 3, no. 34, pp. 184-194, 2020.
  - [15] D. Smallridge and F. De Olloqui, "A Health Diagnostic Tool for Public Development Banks," 2011.
  - [16] I. Kotane and I. Kuzmina-Merlino, "ASSESSMENT OF FINANCIAL INDICATORS FOR EVALUATION OF BUSINESS PERFORMANCE," *European integration studies*, no. 6, 2012.
  - [17] V. Delas, E. Nosova, and O. Yafinovich, "Financial security of enterprises," *Procedia economics and finance*, vol. 27, pp. 248-266, 2015.
  - [18] E. Grigoroudis, E. Orfanoudaki, and C. Zopounidis, "Strategic performance measurement in a healthcare organisation: A multiple criteria approach based on balanced scorecard," *Omega*, vol. 40, no. 1, pp. 104-119, 2012.
  - [19] S. V. Bhaskaran, "Enterprise data architectures into a unified and secure platform: Strategies for redundancy mitigation and optimized access governance," *International Journal of Advanced Cybersecurity Systems, Technologies, and Applications*, vol. 3, no. 10, pp. 1-15, 2019.
  - [20] M. Gianni, "Integration of management standards and systems: impact on corporate sustainability performance," 2020.
  - [21] S. Hayward, *Connected leadership: How to build a more agile, customer-driven business*. Pearson UK, 2015.
  - [22] M. Haupt, *The contemporary CFO: how finance leaders can drive business transformation, performance and growth in a connected world*. Kogan Page Publishers, 2021.
  - [23] A. Mathur, G. Dangayach, M. Mittal, and M. K. Sharma, "Performance measurement in



- automated manufacturing," *Measuring business excellence*, vol. 15, no. 1, pp. 77-91, 2011.
- [24] S. Costa Ferreira Junior and A. C. C. Fleury, "Performance assessment process model for international manufacturing networks," *International Journal of Operations & Production Management*, vol. 38, no. 10, pp. 1915-1936, 2018.
- [25] M. Jönsson, *Cost-conscious manufacturing—Models and methods for analyzing present and future performance from a cost perspective*. Lund University, 2012.
- [26] J. A. Garza-Reyes, "From measuring overall equipment effectiveness (OEE) to overall resource effectiveness (ORE)," *Journal of Quality in Maintenance Engineering*, vol. 21, no. 4, pp. 506-527, 2015.
- [27] D. H. Stamatis, *The OEE primer: understanding overall equipment effectiveness, reliability, and maintainability*. CRC Press, 2017.
- [28] J. Davis, T. Edgar, J. Porter, J. Bernaden, and M. Sarli, "Smart manufacturing, manufacturing intelligence and demand-dynamic performance," *Computers & Chemical Engineering*, vol. 47, pp. 145-156, 2012.
- [29] G. Jagschies, "Management of Process Economy—Case Studies," in *Biopharmaceutical processing*: Elsevier, 2018, pp. 1191-1223.
- [30] S. Vogler and P. Schneider, "Impact of the external price referencing methodology (EPR) on medicine prices—Simulation of existing EPR models," 2019.
- [31] R. Moro Visconti and D. Morea, "Healthcare digitalization and pay-for-performance incentives in smart hospital project financing," *International journal of environmental research and public health*, vol. 17, no. 7, p. 2318, 2020.
- [32] M. Samonas, *Financial forecasting, analysis, and modelling: a framework for long-term forecasting*. John Wiley & Sons, 2015.
- [33] S. Krylov, "Target financial forecasting as an instrument to improve company financial health," *Cogent Business & Management*, vol. 5, no. 1, p. 1540074, 2018.