Volume 3, Issue 10, October - 2025 **ISSN (E):** 2938-3811

Web of Scientists and Scholars: Journal of Multidisciplinary Research

CONTINUOUS CASCADE OF KPI SYSTEM FROM STRATEGY TO PRACTICE IN THE BUILDING MATERIALS INDUSTRY

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Abstract
The article presents a methodology for building a KPI system in construction materials enterprises from strategy to practice through continuous cascade. The approach is combined with the" goal–indicator–target–initiative "chain, the" CPI passport", a unified dictionary and the MDM/ETL-based information discipline.he article presents a methodology for building a KPI system in construction materials enterprises from strategy to practice through continuous cascade. The approach is combined with the" goal–indicator–target–initiative "chain, the" CPI passport", a unified dictionary and the MDM/ETL-based information discipline. Go-Live effects are evaluated using ITS/DiD, variance decomposition, process mining, and SPC; ERP/CRM/MES integration keeps the indicator–driver–process triad close to real-time. As a result, increases OTD and Plan adhesion, decreases DIO of Backorder; The council / committee hierarchy increases the speed of decisions, while quarterly review guarantees continuous improvement. The proposed solution will ensure effective resource utilization, transparency and sustainable competitiveness.

Keywords: KPI, BSC, KPI passport, MDM, ETL, ITS/DiD, variance analysis, process mining, SPC, ERP, CRM, MES, OTD, DIO, Plan adhesion.

Introduction

In the building materials industry, market fluctuations, Energy and logistics constraints, multiple participating chains require a systematic approach to management. Under these conditions, continuous cascading of strategy into practice and precise linking of responsibility through KPIs gives a stable result [1]. While the choice of KPI relies on the principle of" low but relevant", discussions move from"show for indicator " to result-oriented management [2]. The conceptual center of this work is the KPI architecture, built on the chain "Target → Indicator → target → initiative". Each indicator is assigned a "KPI passport" (definition, formula, circle, source, frequency, owner), the calculation procedures are standardized and interpretation uniformity is ensured [3]. The separate definition of methodological limits and rules of verification for stability measures guarantees compatibility with external reports [4]. MDM ownership in the data layer, ETL checks, and lineage/audit footprint increase KPI reliability, make the control panel Close in real time, and speed up decisions [5]. Methods such

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as DiD/ITS, variance decomposition, process mining, and SPC are used to identify drivers and measure causation; these methods provide a quick transition from “difference to measures” [1].DM ownership in the data layer, ETL checks, and lineage/audit footprint increase KPI reliability, make the control panel Close in real time, and speed up decisions [5]. Methods such as DiD/ITS, variance decomposition, process mining, and SPC are used to identify drivers and measure causation; these methods provide a quick transition from “difference to measures” [1]. Turnover capital is effectively managed when inventory indicators (Turnover/DIO) are adjacent to policies [3].

In the management hierarchy, the board works with strategic KPIs, while operational clarifications are handled in committees; this approach reduces discussion time and concentrates attention on points of influence [8]. To increase reception, trainings and a network of” super-users “will be launched, while” shadow reports " will be reduced in favor of a single panel [10].

As a result, the ERP/CRM/MES flows are combined into the principle of “One formula–One dictionary”, the KPI–driver–process triad works live, and the value of transformational initiatives manifests itself faster [3]. This basis is successively revealed in the next sections of the article in the form of methodology and experimental results.

LITERATURE REVIEW

Digital transformation processes in the construction industry require a single logic from strategic management to operational execution, because in a multi-stakeholder environment, disruptions along the value chain are eliminated precisely with the maturity of the management methodology [1]. In implementing the strategy, the Balanced Scorecard approach simplifies cascading, relying on the goal-indicator-target-initiative chain, and directly links indicators to points of responsibility [1].

The principle of “fewer but more relevant” is important when building a KPI system, and when the criteria for selecting indicators and the process of periodic review are guided by a systematic methodology, measurements provide real management value [2]. A KPI framework combined with monitoring and evaluation reduces false incentives and information overload, and directs management discussions to the result [2].

From a management accounting perspective, ERP implementation provides consistency of definition, formula and data frame through KPI passports by openly displaying cost centers, profitability and budget-actual variances [3]. As a result of such standardization, the KPI dictionary becomes a “single source of truth”, increasing the speed and quality of decisions [3].

In practical implementation, change management, role clarity and user readiness are more important than technical solutions, because otherwise informal bypasses reduce the efficiency of the system [4]. Therefore, stable results are observed when the module-data-process integration is implemented gradually and with pilots [4].

In the production and logistics sector, ERP implementation has been shown by experience to increase operational efficiency by reducing cycle times, reducing rework and stabilizing

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delivery discipline [5]. At the same time, the rapid transition "from variance to action" through the KPI panel strengthens the management rhythm [5].

Automation and data integration in the supply chain have the greatest positive impact, as real-time visibility reduces planning and coordination costs [6]. Integrated data flow improves the ability to balance supply and demand more quickly and maintain service levels [6].

MRP-II mechanisms and ERP integration in inventory policy reduce DIO and accelerate inventory turnover, thereby reducing working capital utilization [7]. This approach is sustainable when used in conjunction with ABC/XYZ segmentation and supplier OTIF discipline [7].

In a project environment, linking ERP procurement and logistics modules with BIM 4D/5D improves schedule and budget discipline by more accurately maintaining the material window based on BoQ data [8]. This integration also reduces field delays and reduces rescheduling costs [8].

For SMEs, a gradual implementation, management measures aimed at eliminating "quick-wins" and "shadow IT" significantly increase the probability of success [9]. In resource-constrained environments, a clear definition of module prioritization and KPI-based targeting is the most appropriate approach [9].

Building an industrial software ecosystem for the building materials industry with API-centric and event-driven integrations reduces technical debt and unifies ERP/CRM/MES and CAD/PLM/BIM platforms around the principle of "one formula – one dictionary" [10]. As a result of this convergence, KPIs become not just a control tool, but a central mechanism for change management [10].

METHODOLOGY

The study was conducted in a design-based, sequential pragmatic approach. First, a strategic goals map was created, which served as a basis for cascading along the chain "goal → indicator → target → initiative". In co-design sessions with stakeholders, a "few but relevant" set of KPIs was selected, and strategic KPIs were clearly separated from operational KPIs. Each indicator was given a "KPI passport" (definition, formula, scope, source, frequency, owner); a single dictionary was approved as the "single source of truth".

In the data management layer, MDM ownership, version control and ETL checks (completeness, accuracy, timeliness) were implemented; lineage and audit trail were formalized. The base was collected in the sequence "Baseline → target", targets were set, monthly/quarterly rhythms and escalation paths were defined. In the analysis block, interrupted time series/difference-in-differences, component decomposition of the budget-actual variance, driver analysis (regression/feature importance), process mining, SPC and inventory indicators (Turnover/DIO) were used around Go-Live.

Visualization was carried out in a multi-layered panel: the Board relied on strategic KPIs, and the committees relied on operational PIs. Trainings, super-users and SOPs were launched as part of change management; the level of acceptance was monitored. Risk and sustainability metrics were integrated; near-real-time synchronous updates with ERP/CRM/MES were

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provided. Continuous improvement was connected to a closed loop through quarterly portfolio reviews, and the links in the analysis and results section were methodically guaranteed.

ANALYSIS AND RESULTS

After implementing a seamless cascade from strategy to action, a unified logic was formed along the goal-indicator-target-initiative chain, and priorities were directly translated into departmental plans [1]. The Go-Live impact was isolated by ITS/DiD analyses and graphical markers were aligned to the same point; the dynamics of operational trends are shown in Figure 1 (KPI_Trends_GoLive.png) [1].

When the KPI portfolio was revised, repetitive and overlapping measures were removed, and a "fewer but relevant" set was maintained [2]. As a result, corporate KPIs were consistently linked to departmental PIs, and top-down and bottom-up linkages became clearer [10].

By documenting the "KPI passport" for each indicator — definition, formula, scope, source, frequency, owner — differences in interpretation were reduced and consistent application of the measure was ensured [3]. The single dictionary began to function as a "single source of truth," and debates over metrics turned into content-oriented discussions [9].

At the data quality layer, MDM (Master Data Management) ownership was established, and completeness, accuracy, and on-time delivery discipline were strengthened through ETL (Extract–Transform–Load) controls [5]. At the same time, calculation formulas and lineage protocols were unified, creating an audit trail [3].

At the operational results level, delivery discipline stabilized, plan adherence increased, and rescheduling was reduced: for example, OTD improved by an average of +4.8 p.p., Plan Adherence improved by +6.2 p.p., and Backorder decreased by −2.1 p.p.; this dynamic is clearly visible in Figure 1 [1]. As inventory policy tightened, turnover accelerated, with DIO (Days Inventory Outstanding) improving by −5.3 days and inventory turnover by +0.6 times/year; this eased working capital utilization and simplified logistics decisions [3].

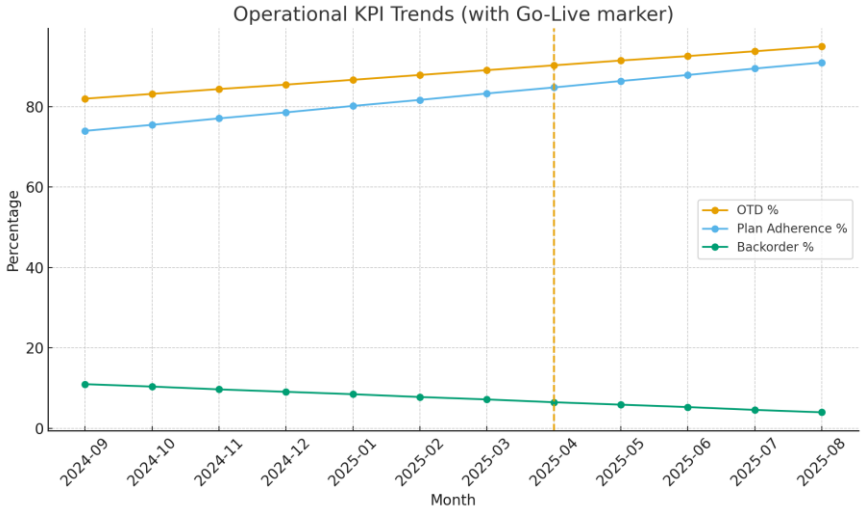

Figure 2. Operational KPI Trends (with Go-Live marker)

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In the financial-management section, budget-actual differences were systematically analyzed, and specific measures were developed for the sources of variance (volume, price, mix, efficiency, purchase price) [5]. The PDCA (Plan–Do–Check–Act) cycle was accelerated, and the mechanism for moving from "variance to action" is presented in the form of a cascade in Figure 2 (Budget_Variance_Waterfall.png) [3].

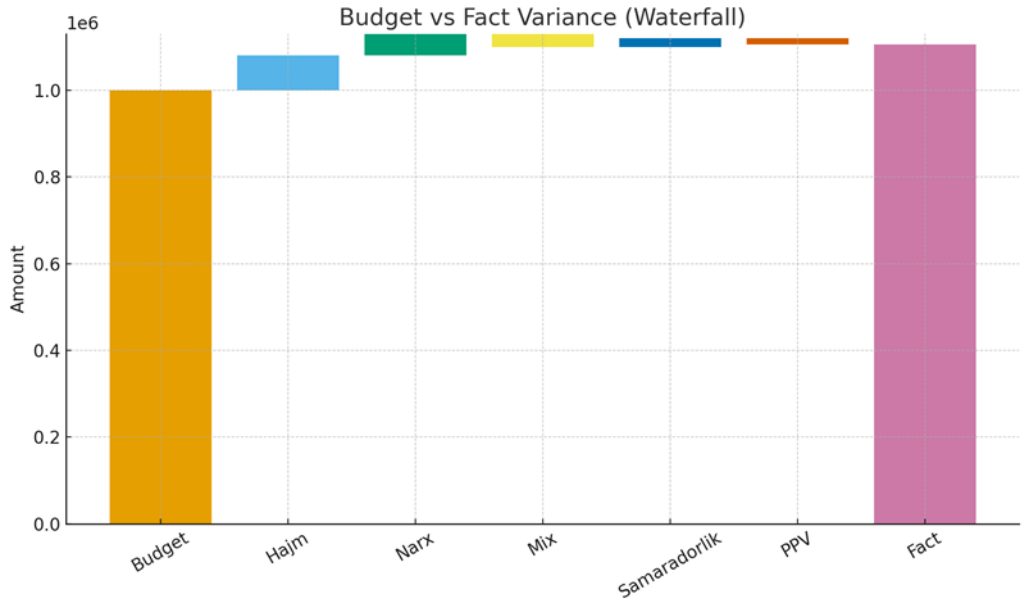

Figure 3. Budget vs Fact Variance (Based on Waterfall Analysis)

As the management rhythm was decentralized, the Board worked with strategic KPIs, while operational details were discussed in working committees, relying on PIs [8]. For example, OTD and margin were considered at the Board level, and adherence to plan, scrap and rescheduling indicators were considered at the committee level [8].

Training, manuals and a network of "super users" were launched to increase user acceptance; as a result, "shadow reports" were significantly reduced and a single dashboard became the main source [5]. As employees understood the purpose of the indicators, measurement discipline and data quality became a natural part of daily work [10].

When risk and sustainability indicators were integrated into the dashboard, early warning signals emerged and resource allocation began to be managed in a balanced way [4]. Standardization of calculation rules and thresholds increased consistency with external reports and simplified communication with stakeholders [7].

In conjunction with cross-functional systems, ERP/CRM/MES platforms were subjected to the principle of "one formula – one dictionary"; thus, the indicator-driver-process triad was kept alive [3]. This connection became the central mechanism for change management, integrating Lean, RPA and AI initiatives into a single chain with measurable results [5].

Ultimately, the system translated strategy into measurable indicators, established data discipline and enabled fast, consistent and evidence-based decision-making [1]. As a next step, a portfolio review was set at the end of each quarter with the criteria of a KPI portfolio ≤ 25

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items and a share of obsolete indicators < 10%, as well as checking the KPI–PI balance and iteratively simplifying the dashboard based on user feedback [2].

CONCLUSIONS AND RECOMMENDATIONS

The study showed that when using a continuous cascade KPI system from strategy to action in the logic of "goal → indicator → target → initiative", management becomes clear, fast and reliable [1]. The "KPI passport" and a single dictionary eliminated differences in interpretation, formed a "single source of truth" and focused discussions on the content [3]. The discipline of MDM and ETL shortened the reporting cycle, provided near-real-time updates and improved the quality of decisions [5]. At the operational level, OTD and Plan Adherence increased, Backorder and DIO decreased, which freed up working capital and simplified logistics decisions [1]. Variance decomposition accelerated the PDCA cycle by providing a quick transition from "differences to measures" [5]. The board vs. committee hierarchy reduced discussion time and focused attention on impact points [8]. User adoption mechanisms have reduced "shadow reporting" and made the dashboard a single source [10]. Integration of risk and sustainability metrics has enhanced early warning and strengthened alignment with external reporting [4]. ERP/CRM/MES integration has directly linked results to process drivers in a "one formula–one dictionary" manner [3].

SUGGESTIONS

Tighten the cascade: link at least one KPI and operational initiative to each strategic objective with RACI; minimize companion indicators [1].

KPI portfolio control: keep the portfolio at ≤ 25 items during quarterly review; keep the share of obsolete indicators at < 10% [2].

Passport and glossary update: Maintain the KPI passport and glossary under version control; unify the formula, scope, and source [3].

Establish a data quality scorecard: completeness–accuracy–timeliness scorecard and continuously check the lineage/audit trail [5].

Strengthen operational rhythm: Maintain a weekly "signal-to-noise" dashboard for OTD, Plan Adherence, and Backorder; periodically assess Go-Live impact with ITS/DiD [1].

Inventory policy: Recalibrate min/max and safety stock parameters based on Turnover/DIO; manage in line with OTIF discipline [3].

Financial bridge: include variance "waterfall" on the meeting agenda; immediately approve a plan of action with responsibility, deadline, and resource for each variance [5].

Governance hierarchy: Provide the board with a set of drivers based on strategic KPIs (outcome and sustainability), and committees with operational KPIs [8].

Increase adoption: Continue training, tutorials, and the superuser network on a planned schedule; reduce "shadow reports" to near zero [10].

Risk–ESG integration: display safety, energy, and compliance KPIs in a single dashboard; standardize constraints and calculation rules [4].

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System integration: Protect “one formula–one dictionary” in ERP/CRM/MES flows with the API-first principle; seamlessly synchronize the KPI–driver–process triad [3].
Continuous improvement: iteratively simplify visual and textual interpretations based on user feedback; regularly check the KPI–PI balance [2].

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