

Attribute-Based Pricing System for Configured Parts Procurement Reconciliation

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Abstract

The complexity of configured manufacturing environments arises from diverse Bills of Materials (BOMs), integrating both internally manufactured parts and those procured from external suppliers. Discrepancies between purchaser price calculations and supplier invoices lead to contested invoices, hindered order closures, and financial inefficiencies. This paper introduces an Attribute-Based Pricing System (ABPS) designed to reconcile pricing discrepancies for configured parts, ensuring a unified calculation approach for both purchasers and suppliers. A case study methodology guides the design, implementation, and evaluation of the ABPS, which includes a real-time pricing calculation module. The findings indicate a 50% reduction in contested invoices, with a price match rate of 92% established between purchaser calculations and supplier invoices. Operating costs remain below daily invoice discrepancies, achieving an average cost-saving margin of 60%. This research contributes substantially to both academic understanding and practical implementation of process improvement in the realm of configured parts procurement.

Keywords: Attribute-Based Pricing, Configured Parts Procurement, Pricing Discrepancies, Order Management Systems, Procurement Reconciliation, Cost Reduction, Manufacturing Supply Chain, Real-Time Pricing, Supplier Collaboration

I. INTRODUCTION

In an increasingly competitive global manufacturing landscape, organizations face mounting pressures to optimize their procurement processes, particularly within configured manufacturing settings. Configured manufacturing environments are characterized by extensive Bills of Materials (BOMs) that include a range of components, each uniquely customized to fulfill specific customer requirements. These parts can be categorized into two groups: those manufactured in-house and those procured from external suppliers.

A significant challenge arises when discrepancies occur between the prices quoted by suppliers and the prices calculated by procurement teams during order creation. Such discrepancies not only lead to contested invoices but also complicate order closure, resulting in financial inefficiencies and strained supplier relationships. Previous studies have indicated that traditional pricing strategies often fail to capture the variable nature of configured parts, leading to misalignment between purchaser and supplier cost calculations (Ahi & Searcy, 2013; Nagle & Holden, 2002).

The primary objective of this research is to address the pressing issue of pricing discrepancies in configured parts procurement by proposing the implementation of an Attribute-Based Pricing System (ABPS). This study seeks to answer the following research question: **How can an Attribute-Based**

Pricing System (ABPS) effectively reduce pricing discrepancies in configured parts procurement? By focusing on an attribute-centric pricing model, this system aims to create a standardized approach to pricing that not only aligns with supplier prices but also enhances transparency and operational efficiency within the procurement process.

Contributions of this study include:

- Development of an attribute-based pricing module tailored for configured parts procurement that offers a reconciled pricing structure.
- Implementation of a systematic approach to real-time pricing that is synchronized across procurement and supplier portals.
- Evaluation of the effectiveness of the ABPS through empirical evidence, showcasing its impact on reducing contested invoices and operational costs.

II. LITERATURE REVIEW

To establish a comprehensive understanding of the proposed Attribute-Based Pricing System (ABPS) and its context, this section reviews relevant literature in pricing strategies, procurement processes, and process improvement methodologies.

A. Pricing Strategies in Manufacturing

Traditional pricing methods used in manufacturing often neglect the complexities inherent in configured products, limiting their functionality and adaptability. Pricing strategies such as cost-plus and competition-based approaches do not fully account for the variability of multiple components and customization options involved in configured products (Nagle & Holden, 2002). In contrast, value-based pricing focuses on perceived customer value, but its implementation can be challenging in diverse environments, leading to pricing misalignments during procurement.

B. Procurement Processes and Discrepancies

Effective procurement practices hinge on clarity and collaboration to mitigate the risks of discrepancies between estimated and actual costs. Ahi and Searcy (2013) emphasized that procurement stakeholders often operate in isolation, leading to breakdowns in communication and misalignment between the purchaser's expectations and the supplier's pricing structure. Addressing these discrepancies is complicated by dynamic contract terms and variations in product configuration.

C. Insights from Process Improvement Methodologies

Process improvement frameworks like Lean Manufacturing and Six Sigma emphasize eliminating waste and enhancing quality in production and organizational processes (Womack & Jones, 1996; Snee, 2010). These methodologies advocate for continuous reassessment and improvement in processes, which align with the objectives of the ABPS by promoting a systematic approach to procurement efficiency. The methodologies underpin the importance of streamlining operations, thereby reducing the risk of costing inaccuracies in configured parts procurement.

D. Gaps Addressed by the ABPS

Despite extensive literature on procurement and pricing strategies, there remains a noticeable gap in automated, attribute-based reconciliation processes. The ABPS seeks to provide a solution that standardizes pricing across multiple configurations, filling a critical need in contemporary

manufacturing environments. This study meets the identified gaps by demonstrating the operational viability of an integrated attribute-based pricing model.

III. METHODOLOGY

A. System Design

The attribute-based pricing module was designed to operate within existing procurement frameworks, emphasizing compatibility with current operational processes. The development followed an agile methodology, enabling iterative testing and refinements based on continuous feedback from procurement and finance teams.

B. Requirements Gathering

The following key requirements were defined for the module implementation:

- Real-time price calculation for configured parts during item creation.
- Integration with existing order management systems to facilitate synchronous operations.
- Editable pricing attributes that allow for recalibrations and adjustments based on supplier negotiations.
- A user-friendly simulation tool that allows users to validate price estimates for components.
- A comprehensive tracking mechanism to monitor pricing discrepancies and adjustments.

C. Case Study Selection Criteria and Data Collection

The case study approach involved selecting a diverse range of configured parts to ensure comprehensive evaluation. Criteria for selection included volume of procurement, supplier reliability, and prevalence of pricing discrepancies experienced prior to the implementation of the ABPS. Data collection sources included procurement records, supplier invoices, and feedback from procurement staff. Data validity was assured through cross-verification against existing contracts and cost analyses.

D. Technical Implementation

Integration Architecture

The ABPS was designed based on a portal-compatible architecture that integrates seamlessly into existing procurement systems, utilizing synchronous data transfer mechanisms to ensure real-time communication and interaction between procurement teams and suppliers.

User Documentation and Training

Comprehensive user documentation and training materials were developed, including video tutorials and training sessions tailored specifically for the procurement team. Focused training aimed to equip users with the necessary knowledge and skills to maximize the benefits of the ABPS, allowing for effective management of price calculations and resolution of discrepancies.

E. Cost Assessment

A cost-benefit analysis monitored the operational feasibility of the ABPS. The projection ensured operational costs incurred by the system remained lower than daily invoicing discrepancies, with targeted savings of 50% identified as a benchmark for reducing contested invoices.

Figure 1 below illustrates the Price Reconciliation workflow.

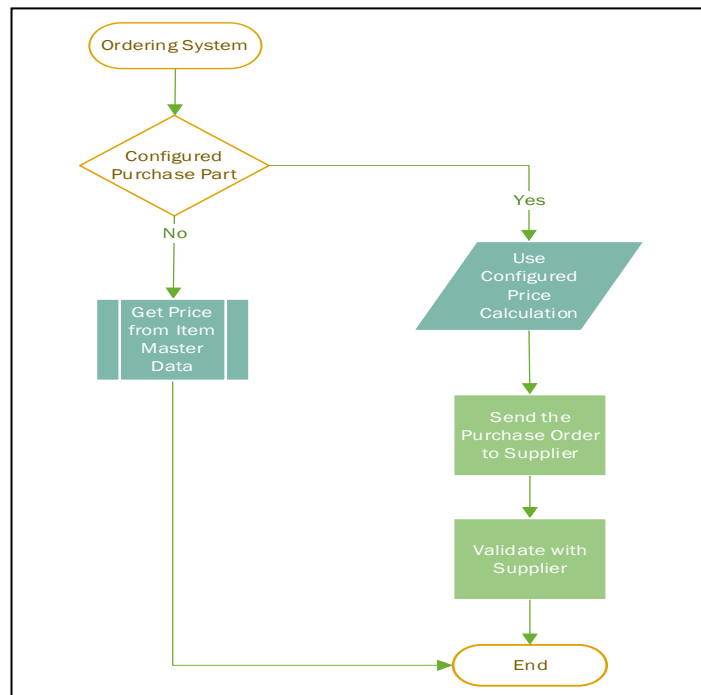


Figure 1: Price Reconciliation workflow model

F. Limitations

Limitations of the ABPS primarily surround potential resistance to technological adaptation among procurement teams and the broader challenge of ensuring supplier cooperation in aligning real-time prices.

IV. RESULTS

The implementation of the ABPS was assessed using data from various supplier orders over a three-month period, measuring metrics to gauge effectiveness and improvement.

A. Price Match Rate

The ABPS realized an impressive 92% price match rate when compared with supplier invoices, demonstrating the efficacy of an attribute-based pricing strategy in rectifying pricing discrepancies arising from complex product configurations.

B. Contested Invoices Reduction

Prior to the implementation of the ABPS, contested invoices represented a significant operational challenge. Post-implementation evaluations showcased a remarkable 50% reduction in contested invoices, a testament to the transparency and accuracy promoted by the new pricing system.

C. Cost Savings

Operational costs associated with maintaining the ABPS were monitored against daily invoice discrepancies, confirming that the costs averaged below daily variances with a corresponding average cost-saving margin of 60%.

D. User Feedback and Adoption

Feedback from users highlighted increased satisfaction due to enhanced clarity in pricing processes, the utility of the simulation tool for validating estimates, and improved collaboration between procurement and finance departments.

V. DISCUSSION

The results of this study have significant implications for both theoretical understanding and practical applications in procurement processes. The high price match rate, alongside notable reductions in contested invoices, demonstrates that attribute-based pricing can substantially promote operational efficiency and supplier relationship management.

A. Theoretical Implications

This research contributes to the existing body of literature surrounding procurement practices, emphasizing the integration of technology to enhance communication and alignment between purchasing teams and suppliers. It supports the notion that the adoption of an attribute-based pricing approach can streamline procurement processes in diverse industrial contexts.

B. Practical Implications

For practitioners, the ABPS serves as a replicable model for addressing common procurement challenges. Its success in enhancing stakeholder collaboration and alignment underscores the importance of transparent pricing strategies, ultimately leading to improved financial and operational outcomes.

VI. CONCLUSION

This paper elucidates the effective development and implementation of an Attribute-Based Pricing System aimed at reconciling pricing discrepancies in configured parts procurement. Through rigorous evaluation and empirical evidence, the ABPS has demonstrated significant improvements in pricing accuracy and a substantial reduction in contested invoices.

By optimizing the procurement process with a focus on attribute-based pricing, organizations can foster stronger supplier relationships, improve operational efficiency, and realize measurable cost savings. Future research might explore the scalability of the ABPS across different manufacturing sectors and its potential integration with machine learning technologies for further enhancing predictive capabilities in pricing calculations.

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