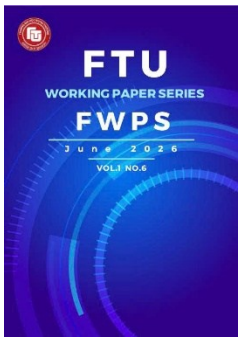

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VAI TRÒ CỦA CHIA SẺ THÔNG TIN TRONG VIỆC GIẢM THIỂU HIỆU ỨNG BULLWHIP TRONG CHUỖI CUNG ỨNG: BẰNG CHỨNG TỪ PROCTER & GAMBLE VÀ WALMART

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Tóm tắt

Nghiên cứu này xem xét vai trò của chia sẻ thông tin trong việc giảm thiểu hiệu ứng Bullwhip trong chuỗi cung ứng, đồng thời đưa ra các khuyến nghị quản trị cho doanh nghiệp Việt Nam. Sử dụng phương pháp nghiên cứu tình huống định tính, bài nghiên cứu phân tích kinh nghiệm của Procter & Gamble và Walmart nhằm đánh giá cách các thực tiễn chia sẻ thông tin ảnh hưởng đến khả năng quan sát nhu cầu, dự báo và phối hợp trong chuỗi cung ứng. Kết quả cho thấy việc phụ thuộc vào tín hiệu đặt hàng thường làm sai lệch thông tin về nhu cầu và khuếch đại biến động ở các cấp độ thượng nguồn. Ngược lại, các cơ chế như chia sẻ dữ liệu điểm bán (POS) và các hình thức hợp tác như Vendor Managed Inventory (VMI) giúp điều chỉnh quyết định sản xuất và bổ sung hàng hóa phù hợp hơn với nhu cầu thực tế của người tiêu dùng. Tuy nhiên, việc áp dụng tại Việt Nam có thể gặp hạn chế do năng lực số và nguồn lực tài chính

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còn hạn chế của các doanh nghiệp vừa và nhỏ (SMEs). Nghiên cứu kết luận rằng quá trình chuyển đổi số theo lộ trình, việc sử dụng các nền tảng điện toán đám mây, tăng cường hợp tác trong chuỗi cung ứng và các chính sách hỗ trợ phù hợp có thể cải thiện tính minh bạch thông tin và giảm thiểu hiệu ứng Bullwhip.

Từ khóa: quản trị chuỗi cung ứng, hiệu ứng Bullwhip, chia sẻ thông tin, khả năng quan sát nhu cầu, doanh nghiệp Việt Nam

THE ROLE OF INFORMATION SHARING IN MITIGATING THE SUPPLY CHAIN BULLWHIP EFFECT: EVIDENCE FROM PROCTER & GAMBLE AND WALMART

Abstract

This study examines the role of information sharing in mitigating the Bullwhip Effect in supply chains and aims to derive managerial recommendations for Vietnamese enterprises. Using a qualitative case-study approach, the research analyzes the experiences of Procter & Gamble and Walmart to evaluate how information-sharing practices influence demand visibility, forecasting, and coordination. The findings show that reliance on order-based signals often distorts demand information and amplifies variability upstream. In contrast, mechanisms such as point-of-sale (POS) data sharing and collaborative practices, including Vendor Managed Inventory (VMI), help align production and replenishment decisions with actual consumer demand. However, adoption in Vietnam may be constrained by limited digital capabilities and financial resources among SMEs. The study concludes that gradual digital transformation, cloud-based platforms, stronger supply chain collaboration, and supportive policies can improve information transparency and reduce bullwhip effects.

Keywords: supply chain management, Bullwhip effect, information sharing, demand visibility, Vietnam enterprises

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1. Introduction

1.1. Background and Research Context

In recent decades, global supply chains have become increasingly complex and interconnected, requiring close coordination among multiple firms operating across different stages and geographical locations. While such integration improves efficiency and competitiveness, it also exposes firms to higher levels of demand uncertainty. In practice, upstream firms often rely on orders from downstream partners

rather than actual consumer demand, which can distort information as it moves across the supply chain (Lee et al., 1997). As a result, even small fluctuations in end-customer demand may be amplified upstream, leading to significant variability in orders, inventory, and production.

This phenomenon, widely known as the bullwhip effect, has important implications for supply chain performance. Distorted demand signals can lead to excess inventory, stockouts, unstable production planning, and increased logistics costs (Sodhi and Tang, 2012). The bullwhip effect has been observed across various industries, including consumer goods, electronics, and automotive sectors, and has become particularly evident during periods of disruption such as the COVID-19 pandemic (Holweg and Bicheno, 2002; Nguyen et al., 2021). Consequently, reducing demand distortion and improving coordination have become central concerns in supply chain management.

1.2. The Role of Information Sharing

Among the various strategies proposed to mitigate the bullwhip effect, information sharing has been widely recognized as one of the most effective approaches. Information sharing refers to the exchange of operational and planning data among supply chain partners, including demand information, inventory levels, and production schedules (Lee and Whang, 2000). By improving demand visibility, information sharing allows firms to rely less on order-based signals and more on actual consumer demand, thereby reducing uncertainty and improving forecasting accuracy (Chen et al., 2000).

Advances in information technologies such as Enterprise Resource Planning (ERP), Electronic Data Interchange (EDI), and cloud-based platforms have enabled real-time data exchange across organizations (Gunasekaran et al., 2017). These technologies have been widely applied in practice, for example through the sharing of point-of-sale (POS) data between retailers and suppliers or the implementation of collaborative mechanisms such as vendor-managed inventory. However, despite these advancements, the effectiveness of information sharing remains uneven across firms and industries. In many cases, organizations continue to experience demand distortion due to limitations in data quality, technological capability, and inter-firm coordination (Nguyen et al., 2021).

1.3. Research Objectives and Questions

The main objective of this study is to examine the role of information sharing in mitigating the bullwhip effect in supply chains. Specifically, the study aims to analyze how information-sharing mechanisms influence demand visibility, forecasting accuracy, and coordination among supply chain

partners through the cases of Procter & Gamble and Walmart. Based on these findings, the study seeks to derive practical managerial implications for Vietnamese enterprises.

To achieve these objectives, the study addresses the following research questions:

- What are the main causes of the bullwhip effect in supply chains?
- How does information sharing reduce demand distortion and amplification?
- What lessons from the cases of Procter & Gamble and Walmart can be applied to Vietnamese enterprises?

2. Theoretical framework

2.1. The Concept of the Bullwhip Effect

The bullwhip effect refers to the phenomenon in which demand variability amplifies as it moves upstream in a supply chain, from retailers to wholesalers and manufacturers. The concept was first introduced by Forrester (1961) through industrial dynamics, which modeled supply chains as feedback systems affected by delays and information distortion. It was later formalized by Lee, Padmanabhan and Whang (1997), who demonstrated that even small fluctuations in consumer demand can generate significantly larger variations in upstream orders.

At its core, the bullwhip effect results from the misalignment between actual market demand and the demand signals perceived by upstream firms. As information flows through multiple supply chain stages, it is often distorted due to forecasting practices, inventory policies, and behavioral responses. Each participant reacts to incoming orders as if they represent real demand changes, leading to cumulative amplification of variability. As a result, the bullwhip effect should be understood as a systemic problem of information distortion and decentralized decision-making rather than simply a demand fluctuation issue.

2.2. Main Causes of the Bullwhip Effect

The bullwhip effect arises from a combination of operational, behavioral, and informational factors within the supply chain. Lee et al. (1997) identified four primary causes: demand forecast updating, order batching, price fluctuations, and rationing games, with the latter often tied to information opacity. These causes interact to distort demand signals, leading to amplified variability.

The bullwhip effect arises from a combination of operational and informational factors that distort demand signals across supply chain stages. Lee, Padmanabhan and Whang (1997) identified four primary causes: demand forecast updating, order batching, price fluctuations, and rationing and shortage gaming, which are closely related to information opacity.

Demand forecast updating is a major driver of demand amplification. Firms typically base forecasts on orders received from immediate downstream partners rather than actual consumer demand. This practice leads to a chain of distorted signals, as each stage interprets order fluctuations as genuine demand changes. Cachon and Lariviere (1999) demonstrated that such reliance creates information asymmetry and leads to significant deviations between upstream forecasts and real demand. Furthermore, Chen et al. (2000) showed that common forecasting methods, such as moving averages and exponential smoothing, amplify demand variability when applied to order data, particularly in the presence of lead times.

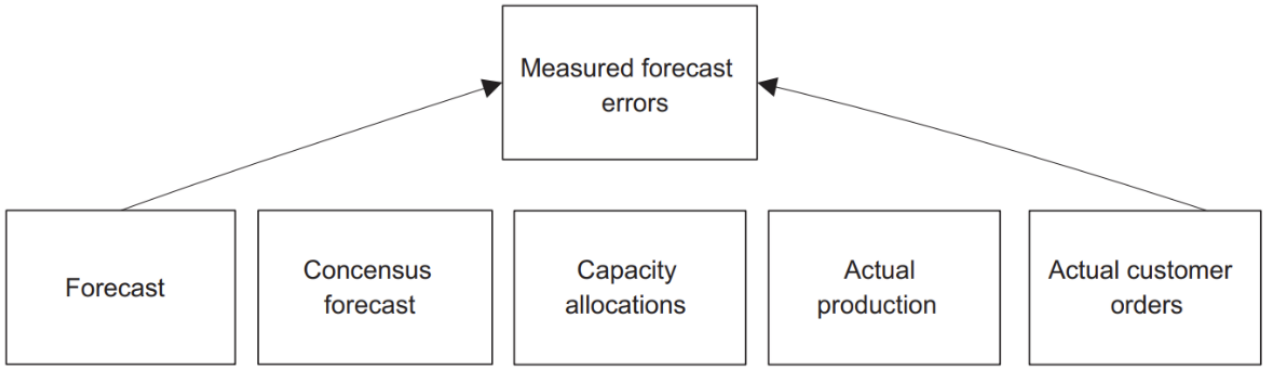

Figure 1. Forecast-driven planning and the separation between forecasts and actual customer orders

Source: Kerkkänen et al., 2009

Order batching also contributes significantly to the bullwhip effect. Firms often consolidate orders into larger and less frequent batches to reduce ordering and transportation costs. However, this behavior creates artificial demand spikes that do not reflect actual consumption patterns. Lee, Padmanabhan and Whang (1997) highlighted that batching introduces periodic fluctuations, while Potter and Disney (2006) demonstrated that larger batch sizes are directly associated with higher levels of demand amplification.

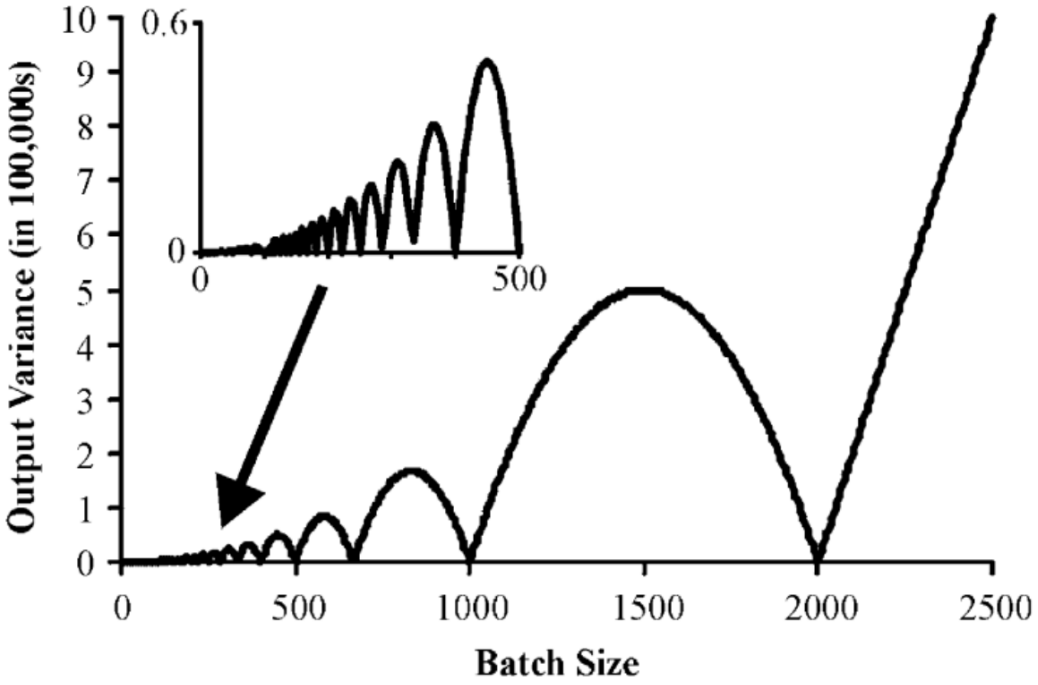

Figure 2. Impact of batch size on bullwhip for steady demand

Source: Potter and Disney (2006)

Price fluctuations and promotional activities further distort demand signals by influencing purchasing behavior. Temporary discounts encourage forward buying, where downstream firms purchase larger quantities in anticipation of future price increases. This results in demand surges followed by sharp declines, making it difficult for upstream firms to identify the true demand pattern. Sodhi and Tang (2011) found that such practices significantly increase order variability, particularly in consumer goods industries.

Finally, lack of information transparency and delayed information flows exacerbate the bullwhip effect. When supply chain members do not have access to real-time demand data, they must rely on delayed or incomplete information, which increases uncertainty and leads to overreaction. Forrester (1961) originally emphasized the role of delays in feedback systems, while Dejonckheere et al. (2004) showed that improved information visibility can substantially reduce demand amplification.

Source: Infante, 2025.

Figure 3. Separation between material flows and upstream information flows in supply chains

Source: Infante, 2025

2.3. Impacts on Supply Chain Performance

The bullwhip effect has significant negative implications for supply chain performance. One of the most immediate consequences is excess inventory, as firms overestimate demand and accumulate stock beyond actual consumption levels. This leads to increased inventory holding costs, including storage, handling, and insurance (Chen et al., 2000).

At the same time, distorted demand signals may result in stockouts when firms underestimate demand or fail to respond effectively to real consumption patterns. This imbalance reduces product availability and negatively affects customer service levels (Lee, Padmanabhan and Whang, 1997).

Production systems are also affected by instability. Manufacturers frequently adjust production schedules in response to fluctuating orders, resulting in inefficient capacity utilization and increased operational costs. These fluctuations create cycles of overproduction and underproduction, further reducing efficiency.

In addition, logistics costs tend to increase due to the need for expedited transportation, additional warehousing, and flexible labor arrangements. Overall, the bullwhip effect reduces supply chain responsiveness, increases costs, and weakens operational performance.

2.4. Role of Information Sharing in Mitigating Demand Distortion

Information sharing has been widely recognized as one of the most effective mechanisms for mitigating the bullwhip effect. Since demand amplification is primarily driven by distorted information, improving the visibility and accuracy of demand data can significantly reduce variability across the supply chain.

By sharing downstream demand information, particularly point-of-sale (POS) data, upstream firms can observe actual consumer demand rather than relying on orders from immediate partners. This improves forecasting accuracy and reduces the need for repeated adjustments based on distorted signals (Lee, Padmanabhan and Whang, 1997; Chen et al., 2000). Cachon and Fisher (2000) further demonstrated that information sharing can significantly improve supply chain performance by reducing inventory levels and increasing responsiveness.

In addition, real-time information sharing enhances the speed of decision-making. Firms can respond more quickly to changes in demand, reducing delays in information transmission and limiting overreaction. Information sharing also supports collaborative practices such as vendor-managed inventory (VMI) and collaborative planning, forecasting and replenishment (CPFR), which improve coordination and reduce uncertainty (Lee et al., 2004).

However, information sharing alone is not sufficient to eliminate the bullwhip effect. Its effectiveness depends on how information is integrated into decision-making processes and whether supply chain partners are able to coordinate their actions effectively.

2.5. Determining Factors of the Effectiveness of Information Sharing

The effectiveness of information sharing depends on several key factors related to technology, information quality, organizational conditions, and supply chain structure.

From a technological perspective, the availability and integration of systems such as Enterprise Resource Planning (ERP), point-of-sale systems, and cloud-based platforms are essential for enabling real-time data exchange. However, simply adopting these technologies does not guarantee improved performance if systems are not properly integrated or utilized (Gunasekaran et al., 2017).

The quality of shared information is another critical factor. For information sharing to be effective, data must be accurate, timely, and complete. Poor data quality can lead to incorrect forecasts and decisions, potentially worsening demand distortion rather than reducing it (Chen et al., 2000).

Organizational factors, particularly trust and incentive alignment among supply chain partners, also play a crucial role. Firms may be reluctant to share sensitive information if they fear opportunistic behavior or competitive disadvantage. Fawcett et al. (2007) emphasized that both the willingness to share information and the ability to use it effectively are essential for improving supply chain performance.

Finally, structural characteristics of the supply chain, such as lead times and network complexity, influence the effectiveness of information sharing. Longer lead times increase uncertainty and amplify demand variability, while more complex supply chains create additional coordination challenges. Zhao et al. (2002) found that the benefits of information sharing are significantly affected by these structural conditions, highlighting that information sharing must be embedded within broader coordination mechanisms to be effective.

3. Empirical analysis of information sharing practices

3.1. Procter & Gamble (P&G)

3.1.1. Supply chain overview

Procter & Gamble (P&G) operates one of the largest supply chains in the FMCG sector, distributing products across more than 180 countries through numerous production sites, distribution centers, and retail channels. This global scale exposes the company to significant demand variability, making forecasting and inventory coordination challenging. One of the most well-known examples is how P&G addressed the Bullwhip Effect in the supply chain of its Pampers diapers.

3.1.2. Bullwhip-induced demand distortion and its effects

In the Pampers case at Procter & Gamble, retail sales were relatively stable, but order variability increased significantly upstream. Distributor orders fluctuated more than retail demand, and P&G's orders to suppliers showed even larger swings, demonstrating how distorted information flows can amplify demand even for stable products.

A key cause was demand forecast updating based on order history rather than actual consumer demand. Each supply chain stage independently adjusted forecasts using local order data, and longer lead times encouraged higher safety stock, further magnifying variability. Order batching also intensified the problem, as firms placed periodic large orders instead of continuous replenishment, creating irregular demand for suppliers.

As a result, P&G experienced unstable forecasts, large inventory swings, disrupted production schedules, and reduced operational efficiency, highlighting how distorted demand information can generate the bullwhip effect even when actual consumer demand is stable.

3.1.3. An evaluation of information sharing mechanisms in mitigating the bullwhip effect

To address this issue, P&G gained direct access to Walmart's point-of-sale (POS) data, allowing the company to observe actual consumer purchases in near real time instead of relying solely on distributor orders. This access fundamentally corrected distorted demand signals by separating true market demand from artificial fluctuations caused by ordering behavior. With real demand visibility, P&G could identify that baby diaper consumption was relatively stable, even when upstream orders appeared highly volatile.

Building on this transparency, P&G and Walmart implemented collaborative forecasting and replenishment practices, enabling both parties to jointly interpret demand data and align replenishment decisions. Rather than independently updating forecasts based on local incentives, shared forecasts reduced bias and prevented exaggerated reactions to short-term demand changes. This collaboration helped stabilize order quantities and limited the amplification of variability across supply chain tiers. In addition, joint planning initiatives improved coordination between retail, distribution, and manufacturing levels. By aligning demand forecasts with production and replenishment plans, P&G reduced conflicting decisions that previously contributed to demand amplification. This alignment ensured that production schedules were based on actual consumption trends rather than distorted order histories.

As a result of these information-sharing mechanisms, P&G experienced measurable improvements in forecast accuracy, as forecasts based on POS data showed significantly lower variance compared to order-based forecasts. This improvement translated into a clear reduction in order volatility at the manufacturer level, smoothing material orders and stabilizing interactions with upstream suppliers. Ultimately, enhanced information sharing improved production planning stability and operational

predictability. With more reliable demand signals, P&G was able to reduce unnecessary inventory buffers, stabilize production schedules, and improve overall supply chain efficiency. The Pampers case thus demonstrates that effective information sharing, when integrated into forecasting and planning processes, plays a critical role in mitigating the bullwhip effect and restoring supply chain stability.

3.2. Walmart

3.2.1. Supply chain overview

Walmart, the world's largest retailer, operates a highly integrated supply chain linking thousands of stores, distribution centers, and suppliers. Acting as an information hub, Walmart collects point-of-sale (POS) data at the store level and shares it with upstream partners to improve demand visibility and reduce the Bullwhip Effect (Simchi-Levi et al., 2021). However, the COVID-19 pandemic showed that even such advanced systems remain vulnerable to demand distortions when extreme uncertainty and unstable lead times disrupt normal supply chain decisions.

3.2.2. Sources of demand distortion and bullwhip effects

The Bullwhip Effect in Walmart's supply chain became evident during the early stages of the COVID-19 pandemic, when global disruptions such as factory shutdowns, labor shortages, port congestion, and longer transportation lead times created severe supply uncertainty (Choi, Rogers & Vakil, 2020).

To avoid stockouts, Walmart shifted from a Just-in-Time (JIT) approach to a Just-in-Case (JIC) strategy, building larger safety stocks and inventory buffers. While this helped mitigate short-term shortages, it also distorted ordering behavior, as replenishment orders increasingly reflected precautionary policies rather than actual consumer demand.

Forecasting errors further intensified the problem. Pandemic lockdowns drove unusually high demand for home-related products during 2020–2021, leading retailers to expect this trend to continue. However, as economies reopened in 2022, consumer spending shifted toward services and travel, causing forecasts to diverge from real demand. At the same time, suppliers often interpreted Walmart's larger orders - driven by precautionary buffers - as signals of sustained demand growth, amplifying volatility upstream in line with classic bullwhip dynamics (Lee, Padmanabhan & Whang, 1997).

Finally, uneven regional demand recovery created mismatches between inventory allocation and local market needs, leading to both shortages and excess stock, which further reinforced demand amplification within the supply chain.

3.2.3. An evaluation of information sharing mechanisms adopted by Walmart to mitigate the bullwhip effect

As the pandemic progressed and the limitations of buffer-based, Just-in-Case responses became increasingly apparent, Walmart shifted from a primarily defensive inventory strategy toward a more information-driven coordination approach. The COVID-19 crisis thus acted not only as a source of disruption, but also as a catalyst for intensifying and re-prioritizing information-sharing mechanisms aimed explicitly at mitigating demand amplification.

Although many of these mechanisms had existed prior to the pandemic, their role and strategic importance changed markedly during the mid-to-late stages of the crisis. Rather than serving mainly efficiency objectives, information sharing became central to stabilizing demand signals and preventing short-term shocks from propagating upstream.

a. Application of information sharing mechanisms during the COVID-19 pandemic

During 2020-2021, Walmart faced uneven demand surges across essential product categories while supply disruptions reduced reliability and extended lead times. Under these conditions, traditional order-based coordination became increasingly ineffective.

To address this challenge, Walmart intensified real-time sharing of POS data with suppliers. By encouraging suppliers to rely on actual consumer purchase data rather than replenishment orders inflated by safety buffers, Walmart enabled upstream partners to distinguish between persistent demand shifts and temporary panic buying. This reduced overreaction in production decisions and dampened demand amplification (Lee, Padmanabhan & Whang, 1997).

Retail Link played a central role in facilitating this transition by providing high-frequency updates on store-level sales trends, inventory positions, and distribution center constraints. Shortening information delays allowed suppliers to respond more proportionately to localized demand changes.

Walmart also expanded RFID and inventory visibility technologies to improve accuracy across distribution centers and retail stores. Accurate inventory data prevented phantom shortages that could otherwise trigger unnecessary replenishment orders.

Vendor Managed Inventory (VMI) arrangements were expanded for selected high-volume categories. By reallocating replenishment decisions to suppliers with access to real-time sales and inventory data, Walmart reduced order batching and behavioral bias in retailer-driven ordering processes, thereby smoothing replenishment flows (Disney & Towill, 2003).

b. Post-pandemic retention and institutionalization of mechanisms

As disruptions eased during 2022, Walmart did not simply reverse the emergency measures adopted during the pandemic or return to pre-COVID coordination practices. Instead, it institutionalized several information-sharing mechanisms that proved effective in stabilizing demand signals.

Continuous POS data sharing became embedded in routine forecasting and production planning processes, allowing suppliers to rely less on historical averages distorted by pandemic conditions. Retail Link also evolved into a more strategic collaboration platform with expanded analytical capabilities supporting demand sensing and scenario analysis.

Investment in RFID and inventory visibility technologies continued, reflecting recognition that accurate inventory data improves both operational efficiency and resilience. At the same time, VMI and collaborative planning, forecasting and replenishment (CPFR) arrangements were formalized with strategic suppliers to align expectations regarding demand, promotions, and capacity planning.

The post-pandemic institutionalization of these mechanisms reflects a strategic learning process. Walmart's experience during COVID-19 demonstrated that inventory buffers alone are insufficient to manage systemic uncertainty. In contrast, deeply embedded, real-time information sharing combined with coordinated decision-making structures provides a more robust and sustainable foundation for mitigating the bullwhip effect in both stable and disrupted environments.

c. Outcomes and implications for bullwhip effect mitigation

Post-pandemic inventory performance provides evidence of the effectiveness of these mechanisms. Walmart's inventory turnover declined from approximately 8.6 times in 2019 to around 8.1 times in 2022,

while Days Sales of Inventory (DSI) increased from roughly 42 days to 45 days, reflecting precautionary inventory accumulation during the crisis (Walmart Inc., 2019; Walmart Inc., 2022).

By fiscal year 2023, however, inventory efficiency improved significantly. Inventory turnover rose to approximately 8.9 times, exceeding pre-pandemic levels, while DSI declined to around 41 days, indicating faster inventory circulation and reduced reliance on safety stock (Walmart Inc., 2023).

From a bullwhip perspective, these improvements suggest that information sharing reduced demand amplification by shifting replenishment decisions from order-based signals to real-time consumption data. As suppliers increasingly relied on POS information, production decisions became more closely aligned with actual market demand, reducing order batching and forecast overreaction (Lee, Padmanabhan & Whang, 1997).

The simultaneous increase in inventory turnover and decline in DSI indicates that Walmart was able to unwind excess inventory without generating renewed upstream instability. This suggests that information sharing not only improved internal inventory efficiency but also stabilized order variability for suppliers, supporting smoother production schedules and better capacity utilization.

3.3. Cross-company comparative analysis

3.3.1. Common patterns in information sharing practices for bullwhip mitigation

Both P&G and Walmart show that the bullwhip effect mainly results from distorted demand signals rather than unstable consumer demand. Orders often reflect forecasting biases, safety stock adjustments, and batching, which amplify variability upstream.

To mitigate this, both firms shifted from order-based signals to point-of-sale (POS) data, allowing forecasts and planning to rely on actual consumer demand. The effectiveness of information sharing occurred when POS data was integrated into operational decisions such as P&G's production planning and Walmart's replenishment, vendor-managed inventory, and collaborative planning. Overall, information sharing reduced the bullwhip effect by creating a common and reliable demand signal across the supply chain.

3.3.2. Key differences in information sharing approaches and underlying reasons

Despite similar principles, their approaches differed due to supply chain roles. For P&G, a manufacturer, information sharing mainly improved forecast accuracy and production planning, helping

separate real demand from volatile distributor orders. For Walmart, a retailer with direct access to consumer data, information sharing functioned as a coordination and control mechanism through systems like Retail Link and vendor-managed inventory.

Thus, the effectiveness of information sharing depends on information ownership and decision authority: centralized systems (like Walmart's) enable stronger coordination, while decentralized relationships (like P&G's) rely more on collaboration and trust.

3.3.3. Cross-case insights on the evaluated role of information sharing in bullwhip mitigation

The comparison indicates that information sharing mitigates the bullwhip effect by aligning decision-making across supply chain partners. However, its effectiveness depends on integration with collaborative forecasting, coordinated replenishment, and joint planning processes that align incentives across firms.

The cases also demonstrate that the value of information sharing increases under conditions of high uncertainty, such as during the COVID-19 pandemic. Real-time demand visibility allowed both companies to respond proportionately to sudden demand shifts and prevented temporary shocks from evolving into persistent disruptions.

Overall, the analysis suggests that the bullwhip effect reflects a coordination failure rather than purely a forecasting problem. When embedded within collaborative governance structures, information sharing enables supply chains to operate as integrated, demand-responsive systems capable of maintaining stability even during major disruptions.

4. Evaluation of information sharing implementation in the Vietnam supply chain context

The case studies of Procter & Gamble and Walmart demonstrate that the bullwhip effect is primarily driven by distorted demand signals rather than actual demand volatility. In both cases, access to real-time demand data and the integration of information sharing into decision-making processes significantly improved supply chain coordination and reduced variability (Lee, Padmanabhan and Whang, 1997). However, the transferability of these practices to Vietnam depends on the structural and institutional characteristics of its enterprise sector. This section examines the current supply chain context in Vietnam

and explains why bullwhip risks continue to persist despite increasing awareness of digital transformation.

4.1. Current Supply Chain Context in Vietnam

Vietnam has increasingly integrated into global value chains, particularly in manufacturing and export-oriented sectors, supported by trade expansion and foreign investment (World Bank, 2023). However, the domestic enterprise landscape remains dominated by small and medium-sized enterprises (SMEs), which account for the vast majority of firms and play a central role in the economy (General Statistics Office, 2023).

This structural feature has important implications for supply chain organization. SME-dominated systems tend to be more fragmented, with weaker coordination mechanisms and limited standardization across firms. Unlike large multinational corporations, SMEs often lack the financial resources and technological capabilities required to implement advanced information-sharing systems.

In addition, digital maturity across Vietnamese firms is highly uneven. While some firms, particularly those integrated into global supply chains, have adopted modern digital tools, many domestic enterprises continue to rely on basic systems or manual processes. This uneven adoption creates information gaps flow across supply chain tiers, limiting visibility and coordination (World Bank Group, 2023).

4.2. Challenges in the Implementation of Information-sharing Solutions

Although digital technologies are increasingly available, their implementation in Vietnam often fails to deliver expected outcomes due to several underlying issues.

A key problem is the “technology-first” approach. Firms frequently invest in software systems without redesigning their processes or aligning organizational structures. As a result, digital tools are layered onto inefficient workflows, limiting their effectiveness (McKinsey & Company, 2021).

Data quality is another major constraint. Even when systems are in place, data is often incomplete, inconsistent, or manually entered. According to Kache and Seuring (2017), the effectiveness of digital supply chain systems depends heavily on data accuracy and integration. Poor data quality reduces forecasting reliability and undermines the value of information sharing.

Human capital limitations further weaken implementation outcomes. Many firms lack employees with sufficient analytical and technological capabilities to interpret data and support decision-making. This limits the ability to translate digital investments into operational improvements (OECD, 2021).

Trust and collaboration also remain critical barriers. Information sharing requires firms to exchange sensitive data, but concerns about opportunistic behavior and data misuse often discourage participation. As emphasized by Barratt (2004), effective collaboration depends on trust and aligned incentives, which are often underdeveloped in fragmented supply chains.

Finally, financial pressures lead to short-term decision-making. Many SMEs prioritize immediate cost control over long-term capability development, resulting in incomplete or abandoned digital transformation initiatives. Consequently, existing solutions fail to address the root causes of the bullwhip effect.

5. Reccommendations

The analysis of Vietnam's supply chain context highlights that the persistence of the bullwhip effect is not solely due to a lack of technology, but rather the misalignment between digital tools, organizational capabilities, and coordination mechanisms. Therefore, effective solutions must go beyond technology adoption and focus on building integrated capabilities that improve demand visibility and coordination across supply chain actors. The following recommendations propose a structured and context-sensitive approach for Vietnamese enterprises.

5.1. Gradual Digitalization for SMEs

A key priority for Vietnamese enterprises, particularly SMEs, is to adopt a gradual and capability-driven approach to digitalization. Rather than implementing complex enterprise systems at the outset, firms should begin with basic digital tools that directly improve demand visibility, such as cloud-based sales tracking and inventory management systems.

The rationale for this approach lies in the resource constraints faced by SMEs. Large-scale systems such as ERP require not only significant financial investment but also organizational readiness and process integration. Without these conditions, early adoption may lead to underutilization and implementation failure (McKinsey & Company, 2021).

Cloud-based solutions provide a more accessible alternative by reducing upfront investment costs and allowing firms to scale their systems incrementally (World Bank, 2019). More importantly, early-stage digitalization helps firms build data discipline, ensuring that sales, inventory, and operational data are consistently recorded and structured. This forms the foundation for more advanced forecasting and coordination mechanisms in later stages.

From a bullwhip perspective, even basic improvements in data visibility can reduce reliance on distorted order signals, thereby lowering demand variability.

5.2. Pilot Data-sharing Partnerships

Given the low level of trust and coordination in many Vietnamese supply chains, a full-scale implementation of information-sharing systems may not be feasible in the short term. Instead, firms should adopt a pilot-based approach by establishing data-sharing partnerships with a small number of strategic partners.

These pilot initiatives can focus on specific products or supply chain segments and involve sharing key data such as demand forecasts, inventory levels, or sales information. By limiting the scope, firms can reduce implementation complexity while generating tangible evidence of the benefits of collaboration.

The effectiveness of this approach is supported by collaboration theory, which emphasizes that trust and coordination mechanisms evolve gradually through repeated interactions (Barratt, 2004). Pilot projects create a controlled environment in which firms can test governance structures, define data-sharing protocols, and align incentives.

Furthermore, such partnerships help address one of the core causes of the bullwhip effect, information distortion, by enabling upstream firms to access more accurate demand signals. Over time, successful pilots can be scaled to include additional partners and products, gradually transforming the supply chain into a more coordinated system (Simatupang and Sridharan, 2005).

5.3. Building Forecasting and Analytical Capabilities

Improving forecasting capability is essential for reducing dependence on order-based signals. As identified in Section 4, many Vietnamese firms rely on manual or experience-based forecasting, which contributes directly to demand distortion.

To address this issue, firms need to invest in developing analytical capabilities, including training employees in demand forecasting methods and basic data analysis techniques. Even relatively simple approaches, such as structured time-series forecasting, can significantly improve accuracy compared to purely judgment-based methods.

The importance of this capability is highlighted by Chen et al. (2000), who show that forecasting methods directly influence the magnitude of the bullwhip effect. When forecasts are based on distorted inputs, variability is amplified across the supply chain.

In addition, advances in data analytics provide opportunities to enhance decision-making. While sophisticated big data systems may not be immediately feasible for SMEs, incremental adoption of analytical tools can improve demand sensing and reduce forecast errors over time (Choi, Wallace and Wang, 2018).

Ultimately, strengthening forecasting capability ensures that information sharing translates into better decisions, rather than simply increasing the volume of data exchanged.

5.4. Development of Sector-level Shared Platforms

One of the structural challenges in Vietnam is the fragmentation of supply chains, particularly among SMEs. Individual firms often lack the resources to invest in advanced information systems, which limits the overall level of coordination.

Sector-level shared platforms provide a potential solution by enabling multiple firms to access standardized digital tools for information exchange, forecasting, and logistics coordination. These platforms can be developed by industry associations, logistics providers, or public-private partnerships.

The advantage of this approach is that it reduces the cost of adoption for individual firms while improving interoperability across the supply chain. Standardized data formats and shared systems facilitate more efficient information flows, which are essential for reducing demand distortion.

According to OECD (2021), collective digital solutions can play a significant role in supporting SME digital transformation, particularly in environments where individual investment capacity is limited. By creating shared infrastructure, these platforms can help overcome fragmentation and enable more coordinated supply chain operations.

5.5. Government Support for Digital Transformation

Government intervention is critical in addressing the structural barriers that limit digital adoption and supply chain coordination in Vietnam.

First, financial support mechanisms such as tax incentives, grants, and subsidized digital programs can reduce the cost burden associated with technology adoption. This is particularly important for SMEs, which often face liquidity constraints and limited access to financing.

Second, investment in digital infrastructure is necessary to support real-time information exchange. Reliable internet connectivity, cloud ecosystems, and digital platforms are essential enablers of information sharing (Asian Development Bank, 2021).

Third, capacity-building initiatives play a crucial role in improving the effectiveness of digital transformation. Training programs targeting both managerial and technical skills can help firms better utilize digital tools and integrate them into decision-making processes (OECD, 2021).

Without such support, digital transformation efforts may remain fragmented and fail to address the underlying causes of supply chain inefficiencies.

5.6. Prioritization by Firm Size

Given the heterogeneity of firms in Vietnam, a one-size-fits-all approach is unlikely to be effective. Instead, strategies should be tailored based on firm size and capability.

For SMEs, the priority should be establishing basic digital infrastructure, improving data quality, and developing internal capabilities. Attempting to implement advanced coordination mechanisms prematurely may lead to inefficiencies and wasted investment.

In contrast, larger firms, particularly those integrated into global supply chains, are better positioned to implement advanced systems and lead coordination efforts. These firms can act as central nodes in the supply chain, facilitating information sharing and aligning incentives among partners.

From a systemic perspective, the involvement of larger firms is critical for scaling information-sharing practices across the supply chain. Their ability to invest in technology and enforce standards can help overcome coordination failures and reduce the overall magnitude of the bullwhip effect (World Bank, 2023).

6. Conclusion

This study examined the role of information sharing in mitigating the bullwhip effect through a qualitative analysis of the cases of Procter & Gamble and Walmart. The findings confirm that the bullwhip effect is primarily driven by distorted demand signals rather than inherent demand volatility. In particular, the reliance on order-based information, combined with forecasting practices, safety stock adjustments, and coordination failures, leads to amplified variability across supply chain tiers (Lee, Padmanabhan and Whang, 1997; Chen et al., 2000).

The case evidence demonstrates that information sharing, especially through access to point-of-sale (POS) data and the integration of collaborative mechanisms such as Vendor Managed Inventory (VMI), plays a critical role in reducing demand distortion. By improving demand visibility and aligning decision-making across firms, information sharing enables more accurate forecasting, smoother replenishment, and greater production stability. However, the analysis also highlights that information sharing is effective only when embedded within broader coordination systems, including aligned incentives, data governance, and collaborative planning structures.

In the context of Vietnam, the persistence of the bullwhip effect reflects not only limited technological adoption but also deeper structural and organizational constraints. These include fragmented supply chains, low data quality, weak coordination, and capability gaps among SMEs. As a result, existing digital solutions often underperform because they are implemented without corresponding changes in processes, skills, and inter-firm collaboration.

Therefore, reducing the bullwhip effect in Vietnam requires a phased and capability-driven approach. Rather than directly replicating the practices of large multinational corporations, Vietnamese enterprises should prioritize gradual digitalization, targeted data-sharing partnerships, and the development of forecasting and analytical capabilities. At the system level, stronger collaboration mechanisms and supportive government policies are necessary to address structural barriers and enable more effective information sharing.

In conclusion, the findings suggest that future supply chain competitiveness will depend not only on technological adoption but on the ability of firms to build coordinated, data-driven, and collaborative supply chain systems. Information sharing, when effectively implemented, serves as a critical enabler of this transformation.

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