

Evaluating the Impact of Power BI-Enabled Dashboards on Supply Chain

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***Abstract-** Global supply chains are becoming more volatile, and the traditional reporting systems are not always able to provide timely and actionable information. BI systems have become essential in solving these issues, and Microsoft Power BI has become one of the most popular tools. The paper provides a conceptual analysis of Power BI-enabled dashboards in supply chain management and creates the Visibility-Efficiency-Resilience (VER) framework. The framework proposes three interdependent domains: visibility, which includes real-time transparency of supply chain activities; efficiency, which includes cost reduction, forecasting, inventory management, etc; and resilience, which involves the capacity to predict disruptions and act promptly. Using available literature, this paper explores how dashboards can be used to enhance the performance of the supply chain and also highlights the challenges that include dependency on vendors, data governance, information overload, and unequal access between large companies and SMEs. Finally, this paper offers a foundation for future empirical studies and offers practitioners a guide on how to make the most of dashboards through integration governance and cultural preparedness.*

Keywords: Power BI, supply chain management, business intelligence, dashboards, digital transformation

I. INTRODUCTION

The current supply chain environment is marked by volatility, complexity and global interdependence. With the expansion of production chains in various geographies as a result of globalisation, the connections become longer and more vulnerable, and they are easily broken. Meanwhile, the demands of the customers towards quicker delivery, personalised products, and the quality of service delivery also grow. In turn, the occurrence of disruptions, including the COVID-19 pandemic, geopolitical instability, and climate-related shocks, often reveals the vulnerability of these systems, which supports the necessity to use sophisticated tools that enable resilience and flexibility (Ivanov and Dolgui, 2020; Queiroz et al., 2020).

However, traditional reporting systems have failed to satisfy these needs. Most organisations have their

data scattered in procurement, logistics, inventory, and customer service, and thus, it becomes difficult to integrate and analyse in real time. Reports are, in most cases, fixed, backward and slow. Consequently, managers often operate on obsolete data, which is one of the causes of inefficiencies, including the bullwhip effect, when minor changes in demand cause disruptions in the upstream supply chain, resulting in excess inventory or shortages (Christopher, 2016; Lee et al., 1997).

To address these challenges, the Business Intelligence (BI) tools have become a strategic need. BI can enable quicker and better decision-making systems by merging information provided by various sources and displaying it in interactive dashboards. Furthermore, researchers remark that BI can improve demand prediction, reinforce teamwork, and provide supply chain responsiveness (Trkman et al., 2010; Wamba et al., 2015). Microsoft Power BI, specifically, has become an extremely popular tool as it is comparatively cheap, easy to use, and can be integrated with the rest of the Microsoft collection of applications. In particular, its dashboards enable firms to monitor the performance of suppliers, the fulfilment of orders, and the inventory in real time, thus making it possible to monitor operations as well as conduct strategic control (Gartner, 2023; Kumar and Mishra, 2021).

However, academic literature has not done justice to assessing the precise use of Power BI dashboards in supply chain management, but only examines BI in general, with little attention given to the role of Power BI in bringing about supply chain visibility, efficiency, and resilience. To fill this gap, this paper introduces the Visibility-Efficiency-Resilience (VER) framework, a conceptual framework of the impact of Power BI dashboards, via these three objectives:

- To explore the benefits of using Power BI dashboards to improve visibility in the supply chain functions.

- To assess their role in efficiency in forecasting, inventory management and cost control.
- To examine how they help to improve resilience through risk identification and swift reaction.

By addressing these questions, this paper aims to add a conceptual framework explaining the importance of Power BI dashboards in supply chain management, as well as highlighting the challenges and future research directions.

II. BACKGROUND AND LITERATURE REVIEW

2.1 Power BI in Context

Microsoft Power BI has become a force within this broader BI environment. It is always among the market leaders due to its affordability, Microsoft Office integration ease, and excellent visualisation capabilities (Gartner, 2023). Power BI also has a user-friendly interface, unlike many conventional BI systems that require advanced coding or a lot of customisation before allowing managers to design dashboards.

Several case studies confirm the significance of Power BI in supply chains; according to a report by HCL Technologies (2023), one of the multinational furniture retailers mentioned that the accuracy of their forecasts and up to 12% reduction in inventory costs improved after the introduction of Power BI dashboards. In the same vein, any FMCG company that implemented Power BI and Azure reduced by 40 per cent and 25 per cent manual reporting and shortages in inventory, respectively, according to EBIS Group (2024).

2.2 Supply Chain Business Intelligence

Business intelligence (BI) has become widely accepted in organisations in response to these reporting limitations. BI is a set of processes, technologies, and tools that convert raw data into valuable information to make decisions (Kumar and Mishra, 2021). In the supply chain setting, BI is useful in descriptive analytics (what happened), diagnostic analytics (why it happened) and, more recently, predictive and prescriptive analytics (what might happen and what should be done).

The empirical studies also indicate that the use of BI enhances the performance of the supply chain in various areas. Trkman et al. (2010) argue that BI is more agile because it can help firms to respond to changes in the market in a more efficient way, as they can identify the changes sooner. In the same vein, Chae (2015) also emphasises the role of BI dashboards in enhancing demand forecasting, streamlining inventory management, and building a stronger relationship with suppliers. Dashboards minimise the time used to detect bottlenecks and can be used to make decisions faster by consolidating data into interactive formats.

However, there are challenges to the adoption of BI, as adaptation to the existing systems is a major challenge, especially in companies that have more than one enterprise resource planning (ERP) system. Moreover, accuracy, consistency, and security of data, also known as data governance, a recurring issues (Kiron et al., 2014). Most importantly, the adoption of BI is not entirely a technical issue: organisational culture and user skills are the ultimate determinants of whether the insights are put into action. According to Shanks et al. (2010), companies implementing BI without developing a data-oriented culture will end up not using their systems fully.

2.3 Supply Chain Reporting Problems

Supply chain management has always been data-intensive. However, the volume and velocity of information have increased many times over during the last 20 years. The organisations are now monitoring the supplier lead times, inventory, transportation schedule, customer demand trends and flow of money over the geographically dispersed networks. However, in spite of this requirement, conventional reporting systems are often lagging. Reports tend to be static, siloed, and retrospective and thus are not suitable in fast-changing environments (Christopher, 2016).

Furthermore, one recurring issue is that reporting systems are often linked to specific functions--procurement, logistics, or sales, and not to the chain. This causes end-to-end visibility to be lacking for the decision-makers, and the cross-functional coordination is compromised. Lack of consolidated data promptly is especially problematic when there are disruptions, where the lack of timely information flow can lead to increasing the effect of shocks. As an example, the COVID-19 pandemic demonstrated

such weaknesses in a very graphic way, as many companies could not adapt to the sudden shortages of supply or the explosion of demand due to the inability of their reporting procedures to provide real-time information (Ivanov & Dolgui, 2020).

Besides that, the fact that the bullwhip effect has not disappeared is also a key issue. The poor information sharing at the customer level tends to increase upstream because of small demand fluctuations. As a result, the managers who lack trustworthy information on time might overreact to the local changes, which cause inefficiencies in inventory and production (Lee, Padmanabhan, and Whang, 1997).

2.4 Research Gap and Theoretical Foundation

The wider body of BI literature has associated the adoption of analytics with supply chain visibility (Chae, 2015), efficiency (Trkman et al., 2010), and resilience (Ivanov and Dolgui, 2020). But even with these insights, these dimensions have hardly been integrated into a coherent conceptual framework of Power BI in particular.

Furthermore, the most important questions are not explored thoroughly. An example is, does the dependence on Power BI increase the dependence of firms on the Microsoft ecosystem, which is a vendor lock-in issue? Are dashboards more advantageous to big multinationals than to SMEs, and thus increase digital divides in supply chain networks? And to what level do dashboards facilitate strategic and not just operational decision-making?

Hence, this paper proposes the Visibility-Efficiency-Resilience (VER) framework, which defines three areas in which Power BI dashboards influence the supply chain results. The framework is based on the existing supply chain theory and places Power BI as a clear and more powerful BI platform.

III. THEORETICAL FRAMEWORK: THE VER MODEL

The adoption of Business Intelligence in supply chains is usually considered in the context of enhanced visibility, efficiency, and resiliency. Based on these dimensions, the present paper constructs the Visibility-Efficiency-Resilience (VER) framework to conceptualise the distinctive contributions of Power BI dashboards. Notably, these domains are not independent, but instead interdependent: efficiency

cannot exist without visibility, and resilience cannot exist without visibility or efficiency.

3.1 Visibility

Visibility is the ability to track activities, flows and disruptions throughout the supply chain in real time. Traditionally, periodic reporting or delayed reporting has been used by companies, which restricts transparency. In comparison, the Power BI dashboards combine the information on various functions- procurement, logistics and sales- into cohesive displays that constantly update. As a result, managers are able to monitor order statuses, supplier performance or transportation delays as they happen and take proactive action.

Researchers have always emphasised that visibility is a precondition to supply chain agility and collaboration (Barratt & Oke, 2007; Caridi et al., 2010). Additionally, it has been demonstrated in case that dashboards enable the realisation of this visibility not only to analysts but also to managers who do not have technical expertise, expanding the range of informed decision-making (HCL Technologies, 2023). Therefore, the visibility in the VER model is not just informational but actionable and hence the way the organisations manage both internally and externally.

3.2 Efficiency

Efficiency is a measure of how to maximise resources, reduce costs and enhance performance. Increased visibility enables easier identification of inefficiencies, and the dashboards can identify them using custom key performance indicators (KPIs). An example is Power BI dashboards, which will allow firms to track near real-time the accuracy of their forecasts, inventory turnover and variability of lead time. Consequently, the corrections, like order quantity adjustments or rerouting, can be done promptly.

Different studies show that the use of BI enhances the process of forecasting, inventory control, and coordination of supplier relationships (Chae, 2015; Trkman et al., 2010). In practice, case studies of Power BI report reductions in overstock, improved production planning, and improved supply-demand coordination (EBIS Group, 2024; DataToBiz, 2023). Thus, efficiency in the VER framework is perceived as both operational, i.e. waste reduction and delays,

and strategic, i.e. enabling firms to allocate resources more efficiently.

3.3 Resilience

Resilience is the ability to foresee, absorb and bounce back when disruptions occur. Although efficiency is considered, over-lean supply chains are prone to shocks. Dashboards may make them more resilient through early warning systems, situation analysis, and quick coordination during crisis situations. For example, real-time tracking can be used to alert of the supplier delays before they propagate down the supply chain, and predictive analytics can simulate the impact of other sourcing policies.

The importance of visibility and collaboration is highlighted in the literature on supply chain resilience as the means to deal with disruptions (Pettit, Croxton, and Fiksel, 2010; Ivanov and Dolgui, 2020). Based on this, Power BI dashboards enhance resilience not by removing threats, but by exposing them and addressing them. In this respect, the VER framework places dashboards as mechanisms that strike a balance between the cost savings that are driven by efficiency and the flexibility that is needed to absorb shocks.

The three areas of the VER model are mutually supporting; visibility offers real-time insights, which allow improving efficiency, and both visibility and efficiency help to build resilience by empowering businesses to respond promptly to disruption. Dashboards, therefore, cannot be considered using a single dimension but based on their capacity to generate synergies among all three. The integration of both theories and practices is that this integrated perspective brings forth the redefinition of supply chain management in its entirety through the use of Power BI dashboards.

3.4 Power BI Dashboards: Strengths and Weaknesses

The use of Power BI dashboards offers a lot of potential in enhancing supply chain management. On the one hand, they will enable visibility through the unifying effect of fragmented data in real-time insights, which will enable responding to a disruption in time and improve cross-functional coordination (Caridi et al., 2010; HCL Technologies, 2023). In addition to that, dashboards increase effectiveness, as they allow making forecasts more accurate, reducing manual reports, and optimising inventory (Chae, 2015; EBIS Group, 2024). Moreover, they play a

role in resiliency as they enable early warning mechanisms and scenario analysis that enable managers to predict and reduce risks before they intensify (Pettit et al., 2010; Ivanov and Dolgui, 2020). These advantages are consistent with the three areas of the VER framework, and they show the way dashboards influence the performance of the supply chain on a holistic basis.

Conversely, there are a number of limitations that limit the effects of Power BI. To start with, long-term risks can be generated by vendor dependency and possible lock-in. Companies that integrate Power BI with their systems might turn into being too dependent on the Microsoft ecosystem, which limits their ability to switch to other platforms (Kiron et al., 2014). Second, there are still issues of data governance. Dashboards are as good as the data that drives them, and accuracy, consistency, and integration issues are common, especially when the enterprise systems are more than one (Shanks et al., 2010).

Third, the decisive role is played by organisational readiness and culture. Although dashboards give insights, they might not provide the training or confidence of the employees to interpret and act on the insights. BI investments are underused without the help of leadership and the culture of data-driven usage (Wamba et al., 2015). Fourth, SMEs are often hindered by barriers to adoption, such as cost, technical skills, and infrastructure barriers. Therefore, the advantages of Power BI are sometimes limited to large companies, which creates digital divides in supply chain networks (Queiroz et al., 2020).

Moreover, dashboards cannot withstand unintended consequences. The result of poorly designed interfaces or too many KPIs can be information overload instead of clarity, which hampers the process of decision-making instead of enhancing it (Eppler and Mengis, 2004). Hence, dashboards are useful in enhancing visibility; however, they may clog managers with too much information unless they are designed prudently. Finally, Power BI dashboards could raise supply chain visibility, efficiency, and resilience tremendously. However, their effect is contingent upon the ability to overcome issues associated with the dependency on vendors, data governance, organisational preparedness, and fair adoption between firms. This section highlights the

need to integrate dashboards, not merely as technical systems, but as socio-technical systems which demand supportive practices, culture and governance to achieve their potential.

IV. IMPLICATIONS FOR PRACTICE AND THEORY

The VER framework has significant implications for practice and theory. In practice, dashboards are to be considered as intelligence facilitators and not solutions in themselves. Hence, managers should then invest in data governance, integration infrastructure and training to make sure the insights are accurate and actionable. Otherwise, the poorly designed dashboards can produce information overload instead of clarity. Conversely, well-designed dashboards may help align organisational goals, improve cross-functional coordination, and accelerate the process of decision-making. While large companies are now in a more advantageous position, the strategies of shared platforms or industry partnerships have the potential to make SMEs beneficiaries of digital supply chain ecosystems, minimising the threat of being left out of them.

Theoretically, the VER framework is part of the current discussions on the visibility, efficiency and resilience. It emphasises the underlying reality that visibility does not actually mean just operational, but is the cornerstone of efficiency and stability. In addition, it connects the research on BI adoption with resilience theory, indicating the capabilities of dashboards to increase agility and barriers to disruptions. However, it is worth noting that its frames dashboards as socio-technical infrastructures, rather than neutral tools, bring to the fore the mechanisms of competition between technology and culture, processes, and decision-making.

Finally, the framework gives directions towards future research. The applicability might be verified through a comparative study of industries as well as geographies, but the particular work regarding SMEs would shed light on the impediments of implementation.

V. CONCLUSION AND FUTURE RESEARCH

The paper has discussed how Power BI dashboards can be used in managing supply chains through the

development of the Visibility-Efficiency-Resilience (VER) framework. This model shows how dashboards can contribute to transparency, streamline operations, and resilience, which makes the model more important than descriptive reporting systems.

These benefits are, however, conditional. The realisation of value involves the incorporation of reliable, well-governed, and organisationally prepared data. Without them, dashboards will become unutilized or even misleading. The problems of vendor lock-in, digital divides between large companies and SMEs, as well as the threat of information overload, further emphasise the importance of a careful implementation.

Therefore, future studies should hence involve empirical testing of the VER framework in other industries and regions, as well as comparative testing of Power BI with other BI tools. SMEs' research is especially significant, as they have structural obstacles. Similarly, researchers can also examine the use of dashboards in long-term sustainability initiatives and strategic decision-making, thereby expanding the BI literature to incorporate an element of operational problems.

Finally, Power BI dashboards are not just technical reporting assistance. Their worth is how organisations design, integrate and take action on them. This paper clearly defines the VER framework, which is why it not only offers a theoretical basis of scholarly research but also offers practical advice to managers who want to make their supply chains more visible, efficient, and resilient.

REFERENCES

- [1] Barratt, M., & Oke, A. (2007). Antecedents of supply chain visibility in retail supply chains: A resource-based theory perspective. *Journal of Operations Management*, 25(6), 1217–1233. <https://doi.org/10.1016/j.jom.2007.01.003>
- [2] Caridi, M., Crippa, L., Perego, A., Sianesi, A., & Tumino, A. (2010). Measuring visibility to improve supply chain performance: A quantitative approach. *Benchmarking: An International Journal*, 17(4), 593–615. <https://doi.org/10.1108/14635771011060565>
- [3] Chae, B. (2015). Insights from big data analytics for supply chain management: An empirical

- investigation of firms' performance. *International Journal of Production Economics*, 165, 38–49. <https://doi.org/10.1016/j.ijpe.2014.12.031>
- [4] Christopher, M. (2016). *Logistics & supply chain management* (5th ed.). Pearson Education.
- [5] DataToBiz. (2023). *Power BI in the automotive industry: Case study*. DataToBiz.
- [6] EBIS Group. (2024). *Power BI in fast-moving consumer goods: Industry insights*. EBIS Group.
- [7] Eppler, M. J., & Mengis, J. (2004). The concept of information overload: A review of literature from organization science, accounting, marketing, MIS, and related disciplines. *The Information Society*, 20(5), 325–344. <https://doi.org/10.1080/01972240490507974>
- [8] Gartner. (2023). *Magic Quadrant for Analytics and Business Intelligence Platforms*. Gartner Inc.
- [9] HCL Technologies. (2023). *Global retailer supply chain transformation with Power BI*. HCL Tech Insights.
- [10] Ivanov, D., & Dolgui, A. (2020). Viability of intertwined supply networks: Extending the supply chain resilience angles towards survivability. *International Journal of Production Research*, 58(10), 2904–2915. <https://doi.org/10.1080/00207543.2020.1750727>
- [11] Kiron, D., Prentice, P. K., & Ferguson, R. B. (2014). The analytics mandate. *MIT Sloan Management Review*, 55(4), 1–25.
- [12] Kumar, P., & Mishra, R. B. (2021). Business intelligence and analytics in supply chains: Review and future directions. *Journal of Enterprise Information Management*, 34(2), 518–539. <https://doi.org/10.1108/JEIM-07-2019-0195>
- [13] Lee, H. L., Padmanabhan, V., & Whang, S. (1997). The bullwhip effect in supply chains. *MIT Sloan Management Review*, 38(3), 93–102.
- [14] Pettit, T. J., Croxton, K. L., & Fiksel, J. (2010). Ensuring supply chain resilience: Development of a conceptual framework. *Journal of Business Logistics*, 31(1), 1–21. <https://doi.org/10.1002/j.2158-1592.2010.tb00125.x>
- [15] Queiroz, M. M., Ivanov, D., Dolgui, A., & Wamba, S. F. (2022). Impacts of epidemic outbreaks on supply chains: Mapping a research agenda amid the COVID-19 pandemic through a structured literature review. *Annals of Operations Research*, 319, 1159–1196. <https://doi.org/10.1007/s10479-020-03685-7>
- [16] Shanks, G., Sharma, R., Seddon, P. B., Reynolds, P., & Carlsson, S. (2010). A framework for explaining the business value of information systems. *Communications of the Association for Information Systems*, 26(1), 1–29.
- [17] Trkman, P., McCormack, K., de Oliveira, M. P. V., & Ladeira, M. B. (2010). The impact of business analytics on supply chain performance. *Decision Support Systems*, 49(3), 318–327. <https://doi.org/10.1016/j.dss.2010.03.007>
- [18] Wamba, S. F., Gunasekaran, A., Papadopoulos, T., & Ngai, E. W. (2017). Big data analytics and firm performance: Effects of dynamic capabilities. *Journal of Business Research*, 70, 356–365. <https://doi.org/10.1016/j.jbusres.2016.08.009>