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Assignment 2 Report

**Integrating Business Intelligence with ERP Systems:  
A Case Study of Target Canada's Inventory Management Failure**



Student number	Name	Date
C3422184	Buu Quan Luu	18/05/2025

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## 1. Introduction

In today's data-driven economy, Business Intelligence (BI) has become an indispensable strategic asset for organisations seeking to enhance decision-making and streamline operational efficiency. When effectively integrated with Enterprise Resource Planning (ERP) systems, BI tools enable businesses to transform raw transactional data into timely, actionable insights that support agile responses to market demands and disruptions. BI provides a foundation for more informed, data-supported decisions, particularly in inventory management, where decisions must balance demand forecasting, supplier coordination, and logistics.

However, the real value of BI lies not merely in the availability of data but in the strategic architecture that allows for data to be extracted, cleaned, transformed, analysed, and visualised for decision-makers (Shollo & Galliers, 2016). ERP systems, though robust in their ability to manage operations and consolidate business functions, often fall short in their analytical capabilities when deployed without BI. This gap creates risks: poor inventory visibility, delayed responses, and unreliable forecasts, all of which can undermine business performance.

To solve this gap, organisations must implement a well-defined BI strategy supporting the evolution from data collection to insight (Power, 2007). This begins by identifying operational pain points in legacy or misconfigured ERP systems, such as isolated data silos or inadequate forecasting models and incrementally addressing them through modular BI components. These components include real-time data integration, multidimensional analysis, predictive modelling, and performance measurement. Each component contributes to solving specific operational problems, and together, they enable organisations to achieve a broader goal: resilient, insight-driven inventory management.

This report explores how the integration of BI within ERP systems can resolve real-world inventory challenges, using Target Canada's failed from 2013 to 2015 expansion as a case study. It then outlines a specific proposed BI architecture tailored to overcome such failures, from improving data centralisation, real-time inventory visibility and visibility to deploying adaptive demand forecasting models using historical data. By addressing these issues systematically, the report demonstrates how incremental BI solutions can accumulate to produce an intelligent decision-support system, ultimately leading to smarter, faster, and more reliable managerial decisions.

## 2. Existing issues in ERP system

### 2.1. ERP systems and Business Intelligence

Enterprise Resource Planning (ERP) is a business management integrated system that is used in organizations (Shehab et al., 2004). It consists of multiple mature applications that could be used for sales, procurement, production, distribution, asset, human resources, accounting, finance, customer relationship, and sales management (IBM Technology, 2022, 8:32). To implement the ERP system into the operation of the organizations, it can help to eliminate data silos, enhance the integration of information across various departments, streamline operations, and maintain stock levels efficiently to meet demand without overstocking.

Business Intelligence (BI) is an umbrella term encompassing a range of concepts and methods aimed at enhancing decision-making through fact-based, computerized support (Ghazanfari, 2011) refers to a suite of decision-support technologies that help organizations make better and

faster decisions. It enables executives, managers, and analysts to transform large volumes of raw data into actionable insights.

In traditional industries that rely on legacy or non-integrated inventory systems, inventory management is often conducted manually or through isolated software. This outdated method leads to human error, data inconsistency, delayed updated and inaccurate estimation for creating future demand forecasts (Sada, 2024). Such limitations hinder organizations from responding effectively to supply chain disruptions, ultimately impacting service levels and profitability.

When ERP systems are deployed without the integration of business intelligence (BI) tools, they often struggle to provide actionable insights. Although traditional ERP systems are adept at data collection and transaction processing, they frequently lack the analytical capabilities necessary to identify inventory trends, highlight inefficiencies, and optimize stock movements in real time. Consequently, decision-makers may find themselves with significant volumes of raw data but limited ability to extract meaningful insights that could foster improvements.

The integration of BI tools with ERP systems bridges this gap, allowing organizations to gain operational visibility and foster proactive decision-making. However, successfully deploying an ERP systems and BI tools comes with its own set of challenges. Organizations must understand the key elements that influence successful implementation to avoid potential drawbacks (Brown, 2003). Crucial criteria for selecting the appropriate ERP system include the ease of integration with existing systems, alignment with business processes, the ability to consolidate various platforms and data, and a well-defined approach to risk management and security controls, etc. (Tsai, 2012). By thoughtfully considering these factors, organizations can harness the full potential of ERP systems and drive sustainable growth.

## 2.2. Existing issue: Target Canada failure in inventory management

### 2.2.1. Background of Target

Target Corporation, founded in 1962 in Minnesota as a discount division of the Dayton Company, is one of the largest retail chains in the U.S. Known for stylish, affordable products (Target Brand, 2025a). Rebranded in 2000, Target is recognized for its clean store layouts, popular private-label brands like Good & Gather and Cat & Jack, and designer collaborations (Target Brand, 2025b). Today, Target operates nearly 2,000 stores across all 50 states and employs over 400,000 people (Target Brand, 2025c). The company has also expanded the e-commerce and same-day service offerings to adapt to evolving consumer behaviours, especially during the COVID-19 pandemic.

### 2.2.2. Target's issue in inventory management

Before the grand opening of Target Canada in February 2013, expectations were high. However, the company struggled to move products from its expansive distribution centres to store shelves. Less than two years later, in 2015, Target announced the closure of 133 Canadian stores and projected that it would not achieve profitability until at least 2021 (Target Brand, 2025d). This was largely due to the rapid and ambitious expansion that occurred within just 10 months, which was executed without adequate preparation (Dahlhoff, 2015).

A critical factor contributing to the failure of Target Canada was the implementation of its enterprise resource planning (ERP) system, specifically a modern customized SAP system (Menon, 2019) that essentially serves as retailers' brain, storing huge amounts of data related to every single product in stores. Despite SAP's robust capabilities in inventory forecasting and stock

replenishment, the system's effectiveness was undermined by poor data quality and integration challenges (Castaldo, 2016a). Specifically, Challenges in inventory and supply chain management arose primarily from data management issues, exacerbated by the hurried introduction of large volumes of products and suppliers (Robocoder Corporation, 2024).

The stores were notably understocked, while the distribution centres were overfilled, resulting in a significant bottleneck. Despite having the latest forecasting system in place, its effectiveness was compromised by a lack of historical sales data. The company relied on optimistic projections from U.S. headquarters, treating Canadian stores as if they were established U.S. outlets rather than new entrants needing to build a customer base (Castaldo, 2016b). Additionally, the decision to commit to 124 Zellers locations created pressure to project strong sales, which in turn led to unrealistic expectations (Castaldo, 2016b). A key failure was the mismatch between warehouse software and the SAP ERP system, which is about product dimensions and quantities, led to shipping errors, data discrepancies, and delays in product delivery (Castaldo, 2016c). Furthermore, without real-time BI tools, the company couldn't identify or address issues promptly. Products often appeared as "in stock" in the system but were missing in stores, causing customer dissatisfaction.

The absence of an effective BI tool to support ERP data compromised Target Canada's ability to adapt to market realities, identify emerging issues, and implement corrective actions. This resulted in overstocking, stockouts, pricing inconsistencies, and operational inefficiencies, led to the company's complete withdrawal from Canada.

### 3. BI requirements

#### 3.1. The architecture of business Intelligence for Target's inventory management

The architecture of Business Intelligence includes four interconnected components, including data warehouse environment storing historical data and current data that was organised and summarised to be easily view and manipulate data and information, business analytics environment working with the data warehouse by utilising a variety of tools and techniques, such as reports and queries; mathematical and statistical tools, business performance management measuring performance and user interface generating dashboards and other information broadcasting tools (Turban, 2008a).

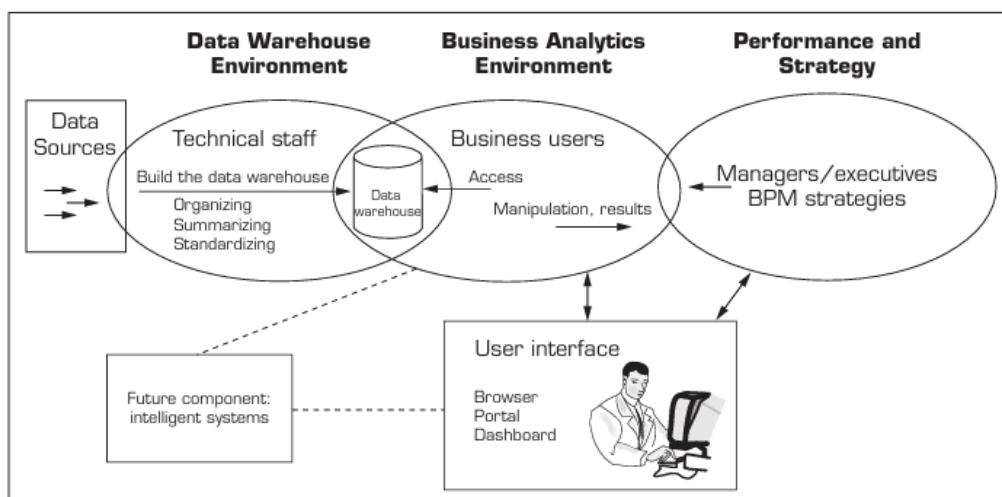


Figure 1: The High-level Architecture of BI (Turban, 2008b)

As mentioned before, Target faced with some issues in their ERP system, including inaccurate and incomplete inventory data, lack of real-time visibility. To address the inventory management failure experienced by Target Canada in 2015, the Business Intelligence framework can be implemented to enhance data accuracy, visibility, and decision – making (Figure 2).

At the core of this framework is the Data Sources layer, known as OLTP systems, take responsible for capture and integrate day-to-day transactions, such as sales, stock levels, delivery logs, etc., through the POS (point-of-sale) system and warehouse management system, which is ERP systems. This system must offer the clean, standardized and real-time data using SKU formats and validated identifiers for products and suppliers.

The next layer is ELT (Extract, Load, Transform), data is first extracted from siloed operational systems. It is then transformed to resolve inconsistencies, convert units, fix missing or duplicated entries, and align product hierarchies, then loaded into centralized repositories. This ensures the accuracy of stock levels, sales data, and delivery logs (Castaldo, 2016a).

BI integrates data from various sources, cleans and standardizes it, and stores it in centralized repositories like data warehouses (Chaudhuri et al., 2011). The data is then centralized within the Enterprise Data Warehouse (EDW), which serves as the single source of truth across departments to support analysis and decision making (Nambiar & Mundra, 2022). Within the EDW of Target Canada, Data Marts are created as subsets of data for specific business areas, such as inventory, sales, or warehouse operations.

For analysis, Online Analytical Processing (OLAP) serves as the analytical backbone of the BI framework by enabling fast, multidimensional querying and intuitive data exploration (Chaudhuri & Dayal, 1997). OLAP is to support high-performance analysis the insights, such as the information of products, locations, time, stock levels, suppliers across the multi-dimensions. By applying techniques for summarization and aggregation, OLAP helps provide insights into inventory trends, supplier performance, and operational efficiencies.

After that, there is processing layer, which include data and text mining, which is to discover patterns of the structured data and extract useful insights from unstructured text data, such as the popular products. In the case of Target, data and text mining assists Target in overcoming its inventory management issues by uncovering hidden patterns within structured data such as historical sales, returns, and restocking records. Through pattern recognition, it identifies frequent purchase combinations, seasonal trends, and regional demand variations that were previously overlooked. These insights allow inventory levels to be adjusted based on specific customer behaviours in different. This leads to more accurate demand forecasting and efficient stock allocation, ultimately reducing overstocking and out-of-stock scenarios.

Finally, it is the user interface, such as dashboards, that translates complex analytical insights into a clear and actionable visual format for decision-makers. Dashboards consolidate key performance indicators (KPIs), inventory levels, sales trends, and real-time alerts of stock status into an interactive interface that is easy to understand.

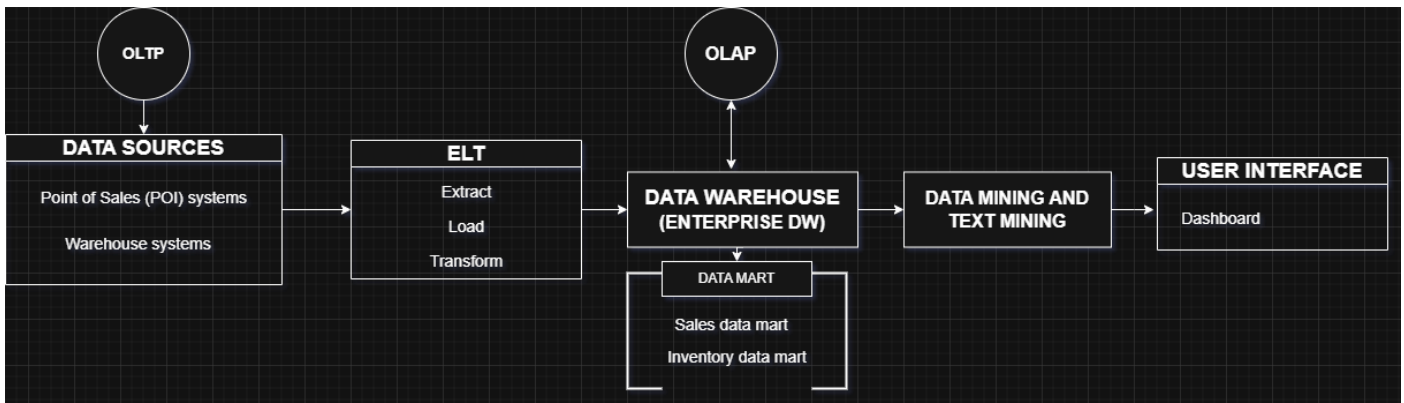


Figure 2: The BI architecture of Target's Inventory management (author's work)

### 3.2. Target Canada's inventory management – Specific BI requirements

The collapse of Target Canada in 2015 underscored significant failures in inventory management, including inadequate demand forecasting, and a lack of real-time visibility. To avert similar disasters in the future, businesses must adopt Business Intelligence solutions; however, the success of these solutions hinges on first establishing the appropriate BI requirements.

#### 3.2.1. Real-Time Data Integration and Centralization

To eliminate fragmented data and delays in operational response, real-time data integration and centralization are essential. This requires the implementation of automated ELT (Extract, Load, Transform) processes that continuously gather data from operational systems such as ERP, POS, and warehouse management systems. The data must be transformed into consistent formats, for example, standardizing SKU codes and units of measure in each product. The data is loaded into Enterprise Data Warehouse (EDW) and then allocated into the Data Mart. Clean and validated data ensures that all departments have access to the same information. Additionally, robust metadata management and data governance are necessary to maintain consistency in product hierarchies (Peace & Agoro, 2024).

#### 3.2.2. Real-Time Inventory Visibility

Improving inventory visibility requires the use of automated real-time stream processing technologies to process and analyse continuous data flows from inventory systems. These technologies enable immediate detection of issues like low stock levels or sudden demand changes.

A centralized dashboard must be developed as a user interface, showing live updates on inventory positions, replenishment needs, and supply chain performance. Integrating IoT sensors further enhances the real-time tracking of product movement providing the accurate stock data within warehouses and across stores. Real-time alerts and notifications can be configured to trigger immediate action when predefined thresholds are breached.

#### 3.2.3. Advanced Demand Analysis

Implementing an AI-driven demand forecasting dashboard necessitates a robust business intelligence infrastructure. The integration of machine learning models is vital for effectively analysing historical sales patterns, seasonal variations, and market trends in different areas. The system should be designed to automatically calculate and adjust reorder points in response to fluctuating lead times. Additionally, incorporating real-time data regarding supplier lead times into the forecasting process will mitigate the risk of inaccuracies caused by delivery delays.



## 4. Proposed BI

This section outlines a comprehensive BI solution designed to address the critical inventory management failures faced by Target Canada in 2015. By leveraging real-time analytics, integrated data platforms, data and text mining, machine learning models, and interactive dashboards, the proposed solution ensures real-time visibility, accurate forecasting, and optimized warehouse. This can help the ERP system to operate and achieve a smooth with a consistent flow of products from warehouse to clients (Intelegain Technologies, 2024).

### 4.1. Real-Time Data Integration and Centralization

The first step is bringing inventory data from ERP, POS, WMS and supplier platforms into a unified data warehouse running on SQL Server. SQL queries and APIs are applied to collect data and Power Query is used to correct and format the raw data into a standard layout that can be used for Business Intelligence purposes.

Using this data management pipeline, we can review both history and the latest data to keep track of trends and make accurate long-term forecasting. To detect anomalies, a data validation framework is used with machine learning methods such as K-Means clustering. They identify cases of unusual stock activity, ensuring incorrect numbers are not fed into the system which is similar to what happened at Target Canada.

### 4.2. Real-Time Inventory Visibility

After integration, we implement Power BI dashboards to give real-time updates into your inventory. The cleaned data is loaded into Power BI, with dashboards refreshing every 5 to 15 minutes to keep information current.

The dashboards are designed specifically for inventory managers and display some key metrics such as stock on hand, stock status alerts, and stock movement trends. Tables display ordered quantities by product. High-demand and slow-moving items are clearly highlighted through the clustered bar graph to guide proactive decisions.

Automated alerts, which is the stock status alerts, powered by DAX formulas, notify users of low stock or overstock risks. These alerts use predictive analytics and anomaly detection to help prevent stockouts and excess inventory.

### 4.3. Advanced Demand Analysis

The reason Target Canada experienced challenges was due to using data from the US company instead of analysing its own specific market. Localised machine learning models like ARIMA and LSTM are powered by Canadian sales history and data analysis by regional trends over time.

The models continuously adjust restocking levels and quantities according to changes in current consumer needs. Safety buffer quantities and replenishment values are constantly adjusted to match changing market patterns. This forecasting method considerably increases the accuracy of predicted demand, leading to fewer stockouts and surpluses. Moreover, we leverage text mining to determine the best-selling category at Target throughout the mentioned timeframe.

## 5. Data Dashboard

The following Power BI dashboards illustrate the primary characteristics to encourage the inventory management system of Target to solve the problem in 2015.

### 5.1. Real-time inventory management

In figure 3, the first dashboard allows users to view real-time data of the inventory and delivery management using filters, including category of products and delivery status. Key performance indicators such as total sales of products, available stock, and stock status are prominently displayed to provide a quick overview of current inventory health. A table of ordered quantities categorised by product type gives detailed insights into demand levels, while a pie chart illustrates the distribution of delivery statuses. Additionally, a clustered bar chart compares the number of ordered items with the available stock across categories, which clearly helps identify discrepancies such as stock shortages or surpluses. This dashboard is essential for ensuring that inventory levels align with customer demand and for maintaining efficient supply chain operations.

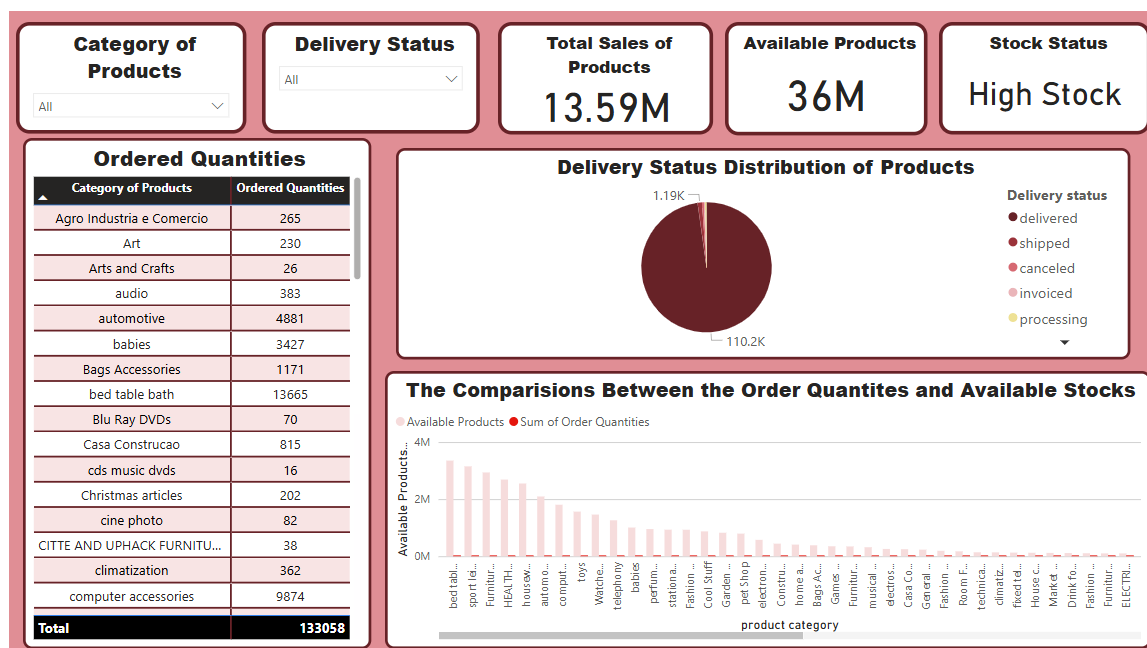


Figure 3: Real-time inventory management [Dashboard 1] (author's work)

In the figure 4, it is a detailed selection of the category of products including different products in Target with different product IDs and delivery status grouped multiple statuses into four main statuses, when filtering it the information in the dashboard will change automatically according to the selected products and selected statuses.



Figure 4: Drop-down slicers of Dashboard 1 (author's work)

The second dashboard is focused on analysing sales trends and identifying popular products (Figure 5). It includes interactive filters for product category, different period, and geographical state, enabling users to analyse trends in specific segments (Figure 6). A line graph visualises monthly purchasing trends, helping identify seasonal demand patterns and changes in consumer behaviour. A corresponding bar chart shows the monthly count of delivered and purchased products, providing insights into order fulfilment efficiency. Another visual ranks the top product categories based on order quantities, aiding in inventory prioritisation. Finally, the dashboard includes a word cloud generated through text mining, which highlights the most frequently purchased or discussed products based on keyword analysis. This visualisation helps identify customer interests and emerging product trends by helping businesses actively respond to the current situation.



## 6. Discussion and Conclusion

### 6.1. Discussion in Data Security and Ethical Considerations

When Business Intelligence (BI) is connected to an Enterprise Resource Planning (ERP) system, managing and protecting confidential information from customers and the business becomes necessary. Trust, law compliance and system integrity can be preserved if data is kept secure and company behaviour is ethical.

#### 6.1.1. Data security

Data security aims to prevent unauthorized access, data breaches, and system failures. One of the key practices is implementing user access control, which ensures that only authorized personnel can access or modify certain types of data. This is typically managed through role-based access, where different users are given specific permissions based on their job responsibilities.

Especially when data is being transferred between the ERP system and BI tools. Data encryption protects data from being intercepted or read by unauthorized parties (RocketMe Up Cybersecurity, 2024). In addition, systems should include monitoring and logging tools to track who accesses data and when. This not only helps with audits but also with detecting and responding to potential threats.

Moreover, to maintain business continuity, organizations must establish a robust data backup and disaster recovery plan. Regular data backups ensure that systems can be restored efficiently following a cyberattack or data corruption (Australian Cyber Security Centre, 2022). If BI and ERP services are hosted in the cloud, it is important to choose providers that comply with internationally recognized security standards such as ISO 27001 or General Data Protection Regulation (GDPR) (The ISO Council, 2025).

#### 6.1.2. Ethical considerations

Ethical data handling ensures that data is used responsibly, and that individuals' rights and privacy are respected. One of the first steps is to ensure the accuracy and honesty of data used in BI dashboards and reports. Manipulating or selectively using data can lead to biased insights and unethical decision-making.

All personal data belongs to customers; organizations must prioritize data privacy. This involves obtaining proper consent, informing users how their data will be used, and limiting access only to those who need it. Ethical data practices also require teams to avoid algorithmic bias. BI tools and analytics models should be regularly reviewed to ensure they do not unfairly disadvantage certain groups, which is important factors for maintaining ethical integrity.

Furthermore, organizations should adopt the principle of data minimization, collecting only the information necessary for decision-making (Association for Computing Machinery, n.d.). All data handling processes must comply with relevant legal frameworks, such as the General Data Protection Regulation (GDPR).

### 6.2. Conclusion

The failure of Target Canada was largely attributed to poor inventory management, insufficient data integration, and the absence of real-time business intelligence capabilities. While ERP systems are essential for transaction processing and storing operational data, their effectiveness is limited without the support of advanced BI tools.

This report proposes a comprehensive Business Intelligence solution tailored to Target Canada's operational shortcomings. The proposed BI architecture addresses the core issues by integrating real-time data from ERP and other sources into a centralized warehouse, offering dynamic dashboards, predictive analytics, and AI-driven forecasting. These tools will ensure real-time visibility, improved demand analysis, and timely decision-making, helping prevent overstocking, stockouts, and customer dissatisfaction. Besides that, it is important to consider the different aspects of data security and ethical considerations to ensure the protection of sensitive business and client's data.

Overall, Target must focus on accurate data integration, real-time inventory visibility, and predictive analytics tailored to local markets. By learning from the failure of Target Canada and adopting a proactive BI-driven approach, businesses can build resilient inventory systems that support long-term growth and customer satisfaction.

## 7. Appendix

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