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1. Introduction

This report is primarily based on the case study 'The Implementation of an ES in a Small Firm: The case of Silk Cooperation,' published in the Twenty-fifth Pacific Asia Conference on Information Systems (Wickramatunga and Lokuge, 2021). Information of their current technology, strategies and customers have been collected from the case study, supplemented with information from the company's official website. Figure 1 displays the company logo:

Figure 1: E-Silk Route Ventures (Pvt) Ltd. Logo (Source: Silk Route Ventures)

1.1. Company Background

E-Silk Route Ventures (Pvt) Ltd., trading as **Silk Cooperation (SC)**, is a Sri Lanka-based, export-oriented company operating in the organic agriculture, food, beverage, and nutraceutical sectors. Founded in 2014 by Sahan Clive Bakmiwewa, the business began with a modest investment of $1000 and has since evolved into a vertically integrated enterprise with a global client base (Silk Route Ventures, no date). The company manages the entire value chain from sourcing and processing to private labelling and last-mile delivery, enabling strict control over product quality, traceability, and compliance with international standards. SC partners with small-scale farmers across the country, acting as a link between sustainable local agriculture and global consumer markets.

1.2. Business Objective

Silk Cooperation's core business objective is twofold: to **deliver high-quality, organic products to international markets**, and to **uplift the livelihoods of Sri Lanka's smallholder farmers** by integrating them into global value chains. The company positions itself not only as a commercial exporter but also as a social enterprise with a mission to ensure equitable participation, fair trade, and sustainable sourcing practices. This dual objective of balancing global competitiveness with

local empowerment requires efficient supply chain coordination, real-time operational visibility, and strategic decision-making based on reliable data (Wolniak, 2024).

1.3. Customers and their requirements

SC's primary customers are **international B2B clients**, including global retailers, distributors, and brands seeking high-quality organic commodities. Many of these clients purchase products under private labelling arrangements or Original Brand Manufacturing (OBM) services. Given the premium positioning of SC's offerings, customers typically expect consistent quality, timely delivery, and traceable sourcing information. To meet customer expectations, SC must ensure traceability, consistency, and responsiveness through timely delivery, transparent sourcing, and verified organic quality by relying on accurate, real-time data across departments (Jean, 2024).

1.4. Current Data Management Strategy and Technologies

According to the case study by Cornell University's researchers, SC uses a Cloud-based enterprise system **(Bitrix24)** that operates on relational database principles, allowing structured data to be stored and managed across its several core business functions (Volik, Kovaleva and Khachaturova, 2021). Bitrix24 serves as a centralised platform for Customer Relationship Management (CRM), Human Resources (HR), Project Management, File Sharing, and Internal Communication. Employees can track attendance, manage tasks through Kanban boards and Gantt charts, and collaborate via internal activity streams. The system also supports webmail integration and document version control (Alić, 2015).

However, Bitrix24 is not the only data environment in use. SC continues to rely on **Google Sheets** for certain operational tasks, especially when staff are unfamiliar with the system's advanced features. Additionally, the company operates a separate, **custom-built Inventory Management System (IMS)**, to accommodate its unique multi-step workflows and product complexities, which is not integrated with Bitrix24 (Long *et al.*, 2024). Data from these three sources must be manually aggregated for analysis, creating inefficiencies in reporting and decision-making.

1.5. Alignment Between Technology and Business Objective

While the adoption of Bitrix24 reflects an effort to digitise operations, SC's current data management setup **does not fully align** with its strategic goals. The company's mission requires end-to-end visibility across sourcing, logistics, sales, and staffing, but still its data remains fragmented. For instance, inventory data housed in the IMS is not automatically reflected in sales dashboards, and project timelines in Bitrix24 are not linked to operational delivery data.

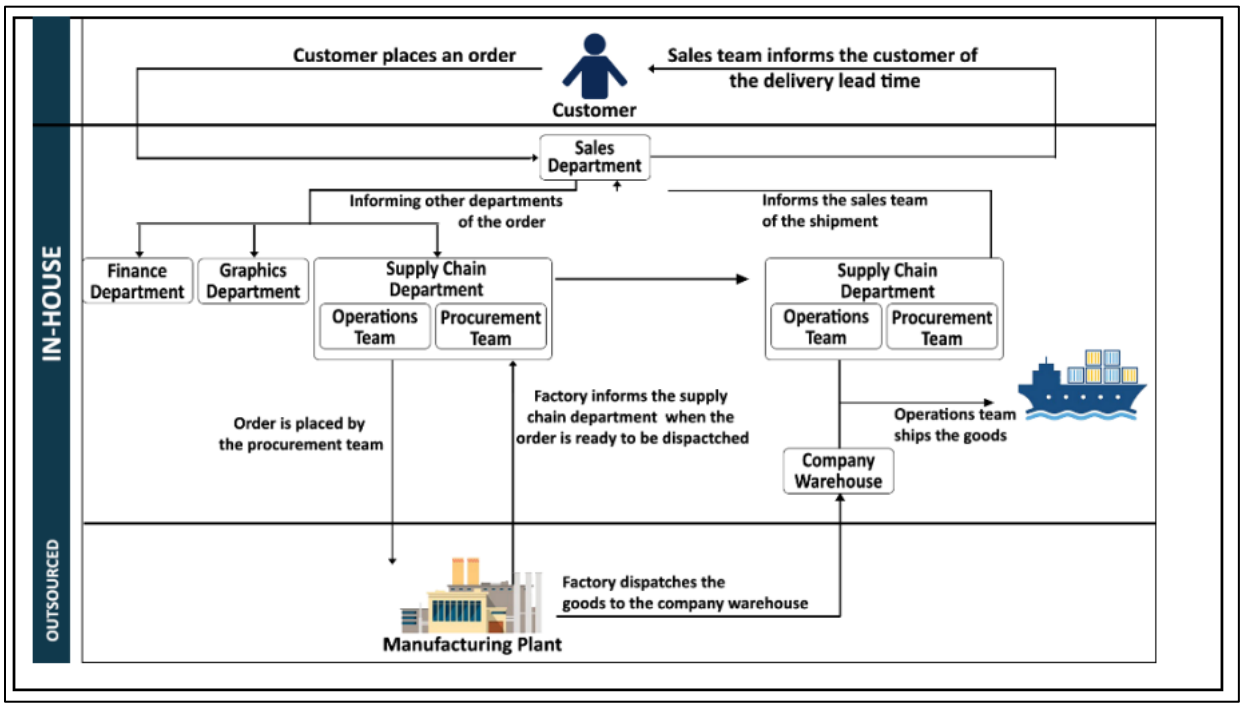

Figure 2: Business Processes of the Company (Source: Wickramatunga and Lokuge, 2021)

Figure 2 illustrates the company's existing business process, highlighting the sequential handoffs between departments and the absence of data synchronisation across internal and external units. From customer requests and design approvals to procurement and delivery, the data is generated at each step and is not automatically shared between teams. The Sales Department, for example, depends on manual updates from the Supply Chain team to inform customers about lead times. This lack of integration causes bottlenecks, duplication, and poor visibility, which hinders real-time performance tracking, swift client response, and measurement of social impact (Ngcobo *et al.*, 2024).

The company also lacks a centralised analytics capability. Managers prepare reports manually, relying on outdated or incomplete data to inform decisions. This is particularly problematic given the company's international exposure and promise of reliability to high-value clients (George *et al.*, 2023). Moreover, SC's **internal technical capacity is limited**. While the company has hired an IT executive to manage Bitrix24, broader data strategy roles like data stewardship, governance, or analytics remain unfilled. As SC scales, this gap could widen, undermining the accuracy and accessibility of decision-critical data (Alexander, 2022).

1.6. Data the Company Needs to Obtain

To fully support its business objectives and its customer requirements, SC must improve its ability to **collect, structure, and analyse key operational data**, including:

Required Data	Reason	Literature Evidence
Real-time inventory data	To ensure consistent supply for global orders and avoid delays and stockout risk	(Mohamed, 2024)
Ordering and Sales data	To track how leads convert into sales and optimise the sales process for better targeting and revenue generation	(Boone *et al.*, 2019)
Delivery timelines and shipment data	To meet delivery lead times promised to customers and proactively address any shipping delays in the outbound supply chain	(Pratama, 2024)
Farmer sourcing volumes and contribution metrics	Measure the impact of the company's operations on small-scale farmers and uphold its social mission of fair sourcing	(Vorley, Lundy and MacGregor, 2009)
Cost per order	Evaluate product profitability and make informed pricing, promotion, and resource allocation decisions	(Kaplan and Cooper, 1998)
Employee Engagement data	To balance workloads across departments and ensure that team efficiency aligns with scaling demands	(Ajewumi, 2024)
Cross-departmental workflow metrics	To identify inefficiencies or bottlenecks in coordination between departments, particularly across in-house and outsourced activities	(Lack, 2013)
Customer feedback	To maintain product quality standards and reinforce client trust	(Stevens *et al.*, 2018)

Table 1: Data required to obtain by the company (Source: Author)

These data features are not only critical for operational decision-making but are also expected by customers as part of the value proposition for premium organic products.

2. Data Management Technology Proposal

2.1. Proposed Technology

To address SC's operational gap, it is proposed that the company adopt a **Business Intelligence (BI) Platform** as an overlay to its existing systems. A BI platform provides a unified environment for data integration, analysis, and visualisation (Zheng, 2017). It enables organisations to extract value from scattered datasets by consolidating them into unified dashboards and performance reports (Kumar and Belwal, 2017). Unlike traditional data tools, BI platforms enable end-users to explore data interactively, monitor key performance indicators (KPIs), and make faster, data-driven decisions (Bussa, 2023).

Given the company's scale and resource profile, **SME-friendly** BI tools such as Microsoft Power BI, Zoho Analytics, or Qlik Sense are suitable options. These tools are cloud-based, relatively affordable, and capable of integrating with Bitrix24 via the platforms' API-based connectors (Mishra, 2020). For example, Power BI allows data import from Excel, Google Sheets, and cloud databases, while Zoho Analytics provides native connectors and pre-built templates designed for small to mid-sized enterprises. Importantly, they do not replace existing systems but enhance their utility by aggregating their outputs into a decision-support interface (Srivastava *et al.*, 2022). For Silk Cooperation, a BI platform will bridge the disconnect between Bitrix24, IMS, and spreadsheets, offering a real-time view of operations across sales, inventory, procurement, and HR.

2.2. Integration of BI Platform

Effective integration requires the BI platform to align with SC's key operational areas, ensuring that each department contributes to and benefits from a unified data ecosystem. To better understand how a BI Platform will be integrated, Figure 3 below outlines a standard BI framework (AltexSoft, no date).

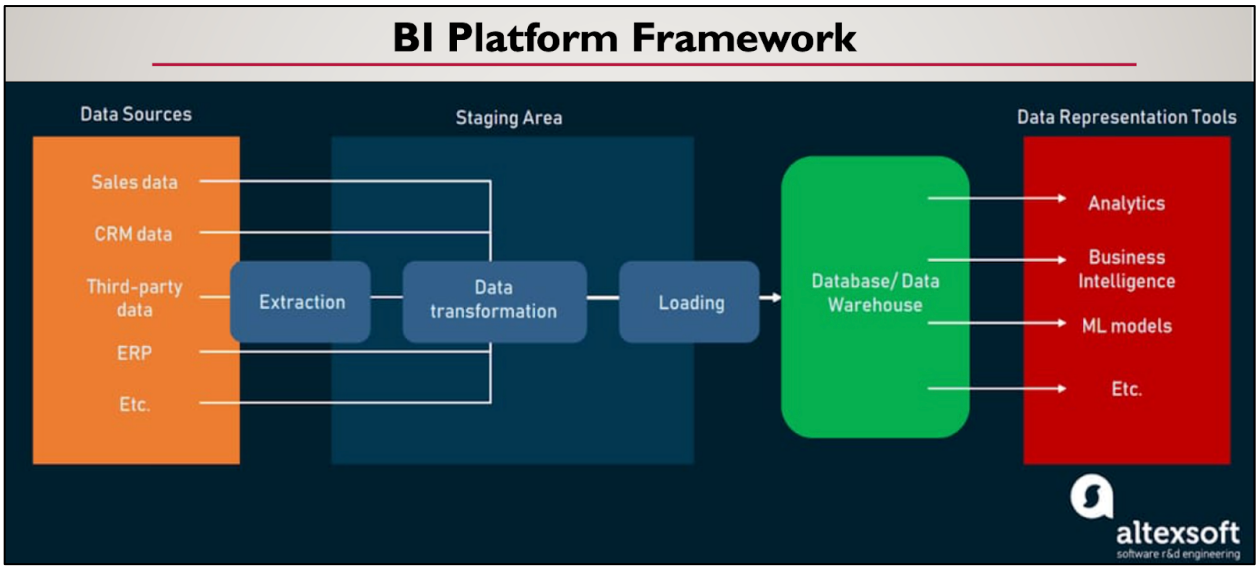

Figure 3: BI Platform Framework (Source: AltexSoft)

The framework typically comprises four core layers: **data sources**, **ETL (Extract, Transform, Load)**, **data storage (data warehouse)**, and **visualisation/reporting tools**. In the context of SC, ETL tools like Power Query or Zoho Dataprep would import data from CRM modules in Bitrix24, the IMS, and spreadsheets into the ETL layer. This layer will then automate the cleaning of inconsistent fields, standardise key identifiers, and prepare unified datasets that can be visualised within the BI dashboards (Jorge, 2024). Without this layer, the accuracy, reliability, and timeliness of BI outputs would be compromised, especially in a workflow where departments still rely on partially manual data entry. ETL will be the critical enabler of the BI system's success within SC's fragmented digital ecosystem. This structured data would then be stored in the data warehouse to support fast, consistent querying and dashboard generation. The final layer provides dashboards, alerts, and insights tailored to different departments, from Sales and Procurement to HR and Finance using tools like Microsoft Power BI or Tableau.

This would be extremely helpful and aligned with SC's existing technology in the view of operations (Negash and Gray, 2008). For instance, the CRM module in Bitrix24 captures customer profiles, sales opportunities, and order histories, which can be **connected** with IMS data on product availability and shipment timelines to evaluate fulfillment efficiency and client satisfaction trends. The Sales Department's data on lead progression and conversion rates can be **analysed** alongside procurement and stock data to optimise supply chain readiness. Supply Chain data, which includes order processing durations and vendor responsiveness can be layered with delivery performance metrics to **identify** bottlenecks or delays. Moreover, HR metrics such

as employee attendance, task completion, and productivity tracking, already housed within Bitrix24, can be **visualised** in parallel with project deadlines and outputs for better resource planning. This holistic integration of CRM, HR, and supply chain datasets enables SC to build performance dashboards tailored to departmental and executive needs.

These relationships are mapped in the following entity-relationship diagram (Figure 4), which structures SC's key entities for BI use.

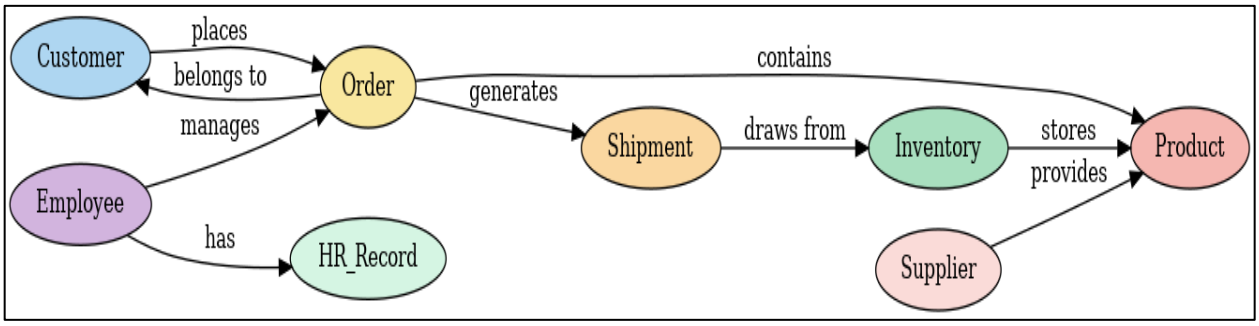

Figure 4: Entity-Relationship Diagram (Source: Author)

The ERD ensures that identifiers like Customer_ID and Order_ID are aligned across systems, enabling accurate joins and insights (Skavantzos and Link, 2025). The structure of this BI data model follows relational database principles, where entities such as Customers, Orders, and Products are linked via primary and foreign key relationships (Tseng and Chou, 2019). By formalising data relationships, the BI platform transforms SC's fragmented records into integrated analytics.

2.3. Support by Service Providers

To support implementation, SC may consider working with professional BI service providers such as Fingent, which offers tailored BI solutions using Power BI and Zoho Analytics (Fingent, no date). Alternatively, Thorogood provides end-to-end BI integration and support across tools like Power BI, Qlik, and Tableau, making it well-suited for growing businesses with cross-functional data needs (Thorogood, 2025). These providers can assist with initial setup, integration, and training without requiring long-term IT hires.

3. Evaluation of BI Platform

3.1. Benefits of Adoption

A. Operational Benefits

The BI platform directly addresses customer expectations of traceability, consistency, and responsiveness by improving visibility across SC's fragmented data landscape. Through real-time dashboards and automated data feeds, the platform enables departments such as Sales, Procurement, and Operations to access shared, up-to-date insights on orders, stock levels, and supplier performance (Hamza *et al.*, 2023). This reduces errors, enables faster response to international clients, and allows for early identification of issues that could compromise delivery timelines.

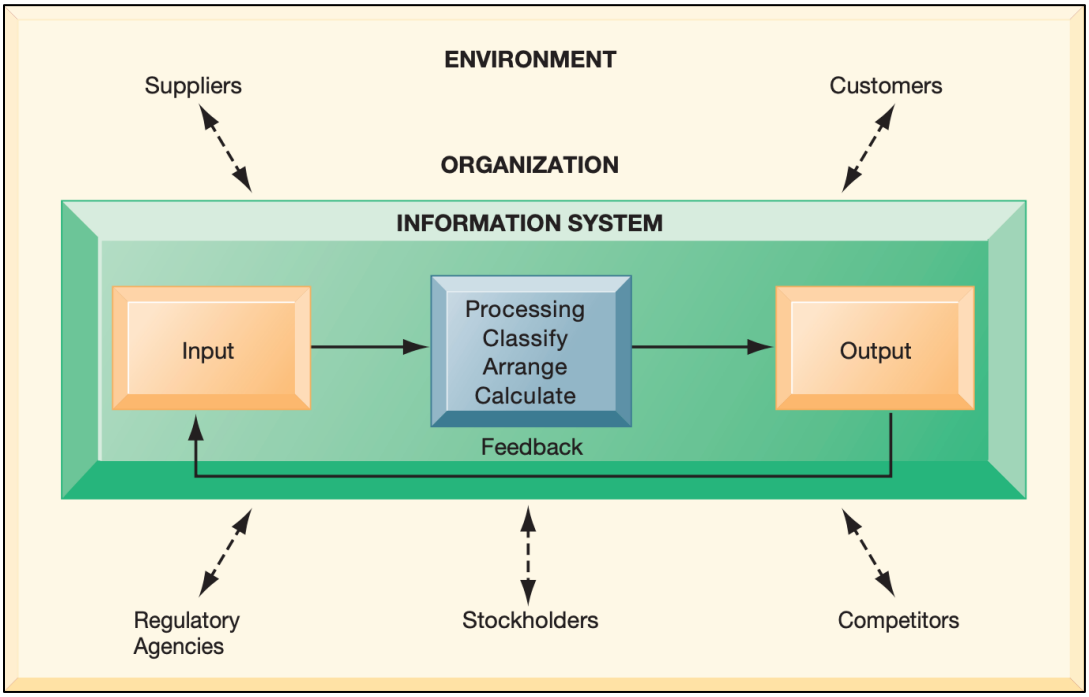

Figure 5: Information Systems Model (Source: Laudon and Laudon, 2017)

This benefit aligns with the **Information Systems Model** (Figure 5), where operational data (input) from systems like Bitrix24 and IMS is processed via ETL tools to produce actionable insights as output (Laudon and Laudon, 2017). With tools like Power BI, the output becomes more than raw data as it transforms into intuitive visualisations and trend-based dashboards that enable rapid interpretation (Cunningham and Stein, 2018). These visual formats empower managers to identify issues, track KPIs, and take corrective action more effectively. The feedback loop allows decision-makers to adapt quickly based on performance metrics and mitigating risks, improving delivery reliability and reinforcing client trust (Biswas, Hossain and Comite, 2024). As feedback is acted upon, it feeds into improved future inputs,

creating a dynamic, responsive operational cycle that strengthens SC's agility and customer satisfaction.

B. Strategic and Social Mission Benefits

SC's broader business objective includes promoting ethical sourcing and empowering local farmers. The BI platform supports this mission by making social impact data visible and measurable (Lea, Yu and Min, 2018). Managers can track farmer participation, monitor fair trade volumes, and evaluate supplier compliance with ethical standards. This data-driven visibility strengthens SC's credibility as a social enterprise while also informing procurement and partnership decisions.

Furthermore, integrating this platform with existing systems means these insights are derived from data SC already collects—transforming raw operational records into strategic intelligence. This allows SC to demonstrate both supply chain transparency and social accountability to its premium clients (Venkatesh *et al.*, 2020).

C. Cross-Functional Integration and Data Governance

Another major benefit lies in improved internal coordination. Currently, SC's teams operate with partial data silos across Bitrix24, custom IMS, and spreadsheets. The BI platform acts as a unifying layer, ensuring that departments operate from a consistent data source (Ong, Siew and Wong, 2011). Sales teams can anticipate procurement delays; HR can align workforce deployment with project timelines; finance can monitor cost-performance indicators.

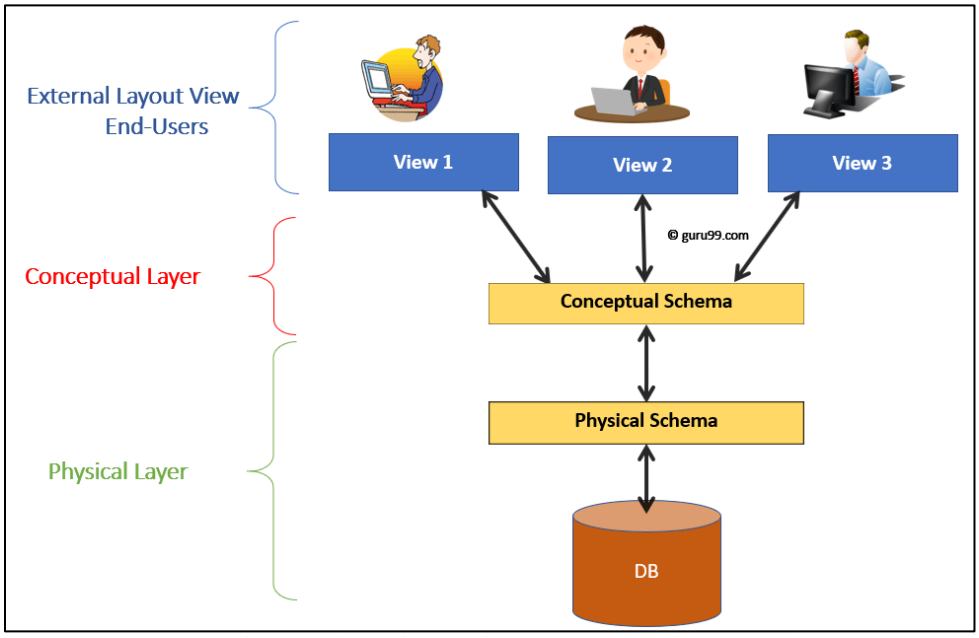

Figure 6: Three-Level Database Architecture (Source: Sharma, 2024)

This structure is best explained through the **Three-Level Database Architecture** in Figure 6 (Sharma, 2024). The BI platform creates an external layer of role-specific dashboards, built on a Conceptual Schema informed by the ERD, while drawing data from distributed systems (Physical Schema). This abstraction ensures usability without compromising system integrity and reinforces good data governance through consistency and standardisation.

D. Economic Impact

From an economic standpoint, the BI platform offers a cost-effective alternative to full-scale system overhauls (Wise, 2012). Rather than replacing Bitrix24 or the IMS, the BI tool integrates with them, maximising the value of existing investments. This minimises capital expenditure while enhancing analytical capability.

It also drives labour efficiency. With automated reporting and shared dashboards, manual data consolidation across teams is significantly reduced, freeing staff to focus on analysis and action (Yacob, 2022). Over time, improved order fulfilment, data-led procurement, and accurate inventory forecasting support better cash flow and margin preservation.

3.2. Challenges and Risks of Adoption

While the BI platform offers considerable advantages, its successful implementation depends on managing several operational and organisational challenges.

A. Risk of Underutilisation

If employees lack data literacy or do not receive adequate training on tools like Power BI, the platform may fail to deliver its intended value (Doherty, 2020). Without a culture of data-driven decision-making, even the most advanced dashboards could be ignored or misinterpreted, limiting the system's impact on operational and strategic goals.

B. Integration Fatigue and Data Inconsistencies

SC's current systems must be harmonised through APIs and ETL pipelines. If departments are not aligned during integration, data inconsistencies or workflow bottlenecks may emerge (Adepoju *et al.*, 2022). Additionally, legacy data quality issues pose a risk; inaccurate or incomplete records could compromise insights generated by the BI system (Rangineni *et al.*, 2023).

C. Resistance to Change

Teams accustomed to working with spreadsheets or manual reporting methods may initially perceive the paradigm shift as an added complexity (Bunker and Alban, 2012). his cultural resistance can slow adoption and limit impact. Addressing this requires change management strategies such as phased rollouts, stakeholder engagement, and the identification of BI champions within each department.

D. Lack of Governance Protocols

Proper data **governance** must be established to ensure access control, data validation, and accountability. As the BI platform integrates various business functions, the circulation of sensitive information like customer identities and employee records also increases. Without **ethical data** handling policies, SC risks potential privacy breaches or unauthorised access. Therefore, governance protocols should also address data ethics, ensuring privacy standards are met through anonymisation where necessary and role-based access controls (Felici and Pearson, 2015).

3.3. Managerial Impact

The introduction of a BI platform is likely to reshape managerial workflows at SC. Decision-making processes will shift from experience-based judgments to data-led evaluations, which can improve objectivity and accountability. Managers will be equipped with dashboards offering near real-time performance data, allowing them to respond more swiftly to issues, evaluate staff productivity, and monitor supplier reliability.

The dynamics are best understood through the **Socio-Technical Framework**, as illustrated in Figure 7 below (Bostrom and Heinen, 1977). The diagram captures the interconnected nature of four critical components: **People**, **Technology**, **Tasks**, and **Organisational Structure**.

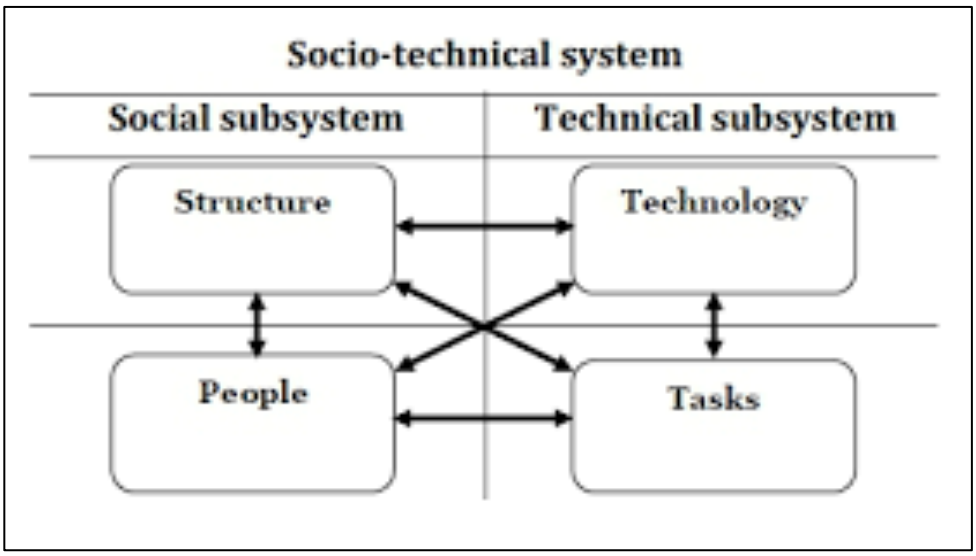

Figure 7: Socio-Technical Framework (Source: Bostrom and Heinen, 1977)

At SC, the **People** component involves users adapting to new BI-enabled workflows and developing skills to interpret data accurately. Managers must lead this cultural shift, ensuring staff engagement with the new tools while aligning individual roles with a more analytical, insight-driven environment (Persson, 2024).

The **Technology** component refers to the BI tools and their integration with SC's existing systems. From a managerial standpoint, this influences how decisions are made and who has access to critical data. Managers will not only rely on IT support but must also collaborate closely with data teams and interpret insights independently, changing the nature of leadership from directive to data-empowered (Bhargava, 2015).

Tasks encompass the redesign of internal workflows, such as reporting cycles and procurement coordination, which will become faster, more transparent, and more measurable. Managers will need to establish new review rhythms, KPIs through tools like Qlik Sense, and escalation protocols in line with the enhanced data visibility (Kobi, 2024).

Lastly, **Organisational Structure** relates to how roles and responsibilities adapt within a data-enabled environment. Rather than displacing employees, the BI platform allows SC to reallocate staff previously focused on manual data checks or error tracking into roles that support analytics interpretation, departmental reporting, and insight validation. This transition not only preserves employment but also enhances internal capacity for evidence-based decision-making. Managers will be responsible for enabling this shift through reskilling initiatives and structural adaptations that support collaboration across teams. This reallocation supports SC's long-term digital maturity goals but may require upskilling or the redistribution of responsibilities (Chen, Chiang and Storey, 2012).

3.4. Alignment with IT Strategies and Further Technical Impacts

The proposed BI platform is technically feasible for SC, complementing its existing digital infrastructure and aligning with its IT strategy: **low-cost, cloud-based systems and seamless integration**. The existing system already manages structured data and supports API-based integration. The BI platform builds on this by using ETL processes to extract, harmonise, and centralise data across systems, ensuring seamless integration across systems without disrupting operations. Given that the BI platform includes a data warehouse layer to support cross-functional analytics, the company will also need to expand its cloud storage capacity to accommodate increased data volumes from all departments (Spillner, Müller and Schill, 2013).

In terms of infrastructure, the BI platform can be deployed through cloud-based services such as Zoho Analytics or Power BI, which reduce the need for local hardware or server maintenance (Sano, 2014). SC's existing internet-based workflows position it well for cloud adoption, and the relatively lightweight nature of BI applications ensures that they remain scalable as the business grows. Technical maintenance, including periodic data pipeline checks and report updates, can be managed by internal champions or third-party support providers.

Additionally, SC's IT strategy emphasises **gradual digital maturity and internal capability-building**. By layering BI on top of existing systems without the need for a full ERP overhaul, the platform supports learning-by-doing and allows for phased adoption (Ryu *et al.*, 2005). It empowers internal staff to incrementally configure dashboards and reports, reducing reliance on external consultants and making the system more sustainable in the long term.

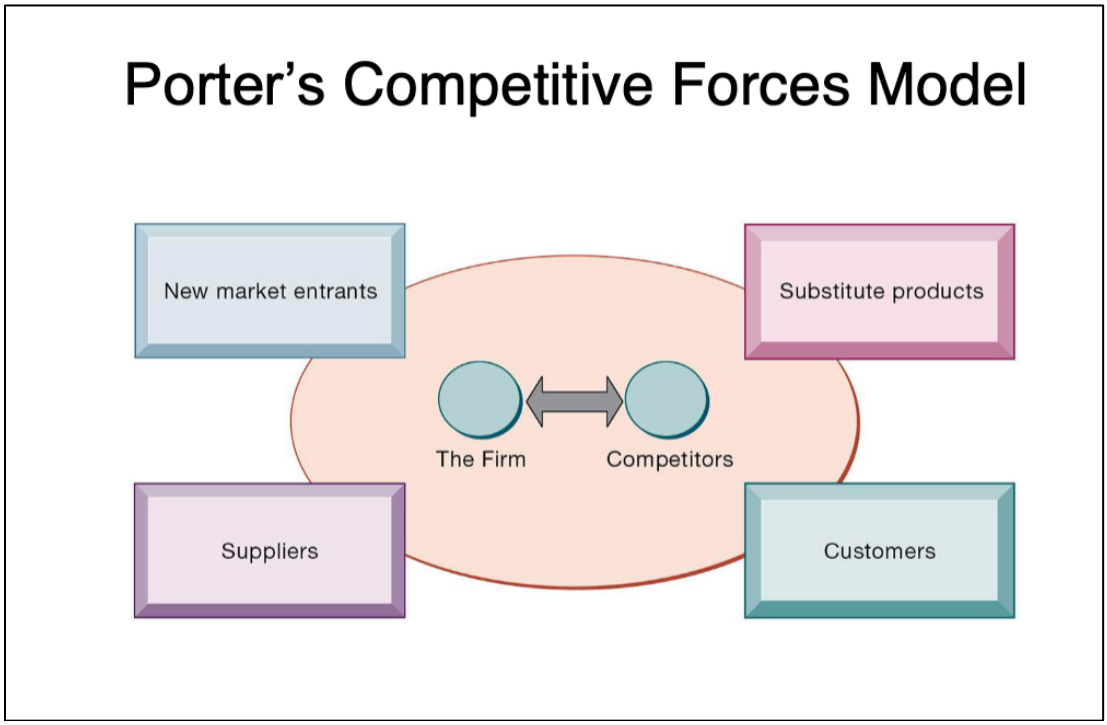

Figure 8: Porter's Competitive Forces Model (Source: Laudon and Laudon, 2022)

In addition to supporting internal operations, the BI platform also aligns with SC's broader IT strategy of **enhancing strategic responsiveness in a competitive global market**. Through the lens of Porter's Competitive Forces Model in Figure 8, the BI platform offers clear advantages (Laudon and Laudon, 2022). By using tools like Power BI to deliver client-facing dashboards that display real-time traceability and sourcing transparency, SC can **reduce the bargaining power of international buyers** who demand proof of ethical and organic sourcing (Krmac, 2011). The platform's capacity to track quality and compliance data helps reinforce SC's premium position, mitigating the threat of lower-cost **substitutes** that lack such verification (Gendron, 2012).

Moreover, SC can use BI's performance reporting features to monitor delivery timelines, farmer participation, and procurement delays, thereby strengthening its negotiation leverage with **suppliers** (Sanabia-Lizarraga *et al.*, 2024). The system's ability to centralise OBM order data and project statuses also enables SC to offer more reliable fulfilment and communication to **clients**, a **competitive edge** in a market where private-label service differentiation matter. Thus, the adoption of BI supports not only operational scalability but also strategic positioning, reinforcing SC's IT strategy to balance global competitiveness with local empowerment through data-driven responsiveness.

4. Conclusion

While upgrading the ERP or replacing the CRM might seem viable, both would involve high costs, configuration challenges, and significant disruption. These options also fail to address the need for integrated, cross-departmental insights. Walmart's Global People Analytics team leverages Tableau to provide data-driven insights, facilitating faster decision-making processes (Tableau, no date). Similarly, Coca-Cola has implemented Power BI and Azure solutions to democratize data across its brand, enhancing data accessibility and decision-making (Microsoft, 2022). Therefore, a BI platform builds on SC's existing systems, enhances data visibility across functions, and delivers strategic value with minimal operational interruption, making it the more practical and impactful choice to achieve its primary objective.

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