School of Higher Commercial Studies



Thesis submitted to obtain the degree of Master
in Commercial Sciences
Major: Supply Chain Management

Subject:

Optimizing Logistics Operations In a Multi-Site Supply Chain Through a Pre-Deployment Framework for Digital Platforms

Case study: Bibars Group

Elaborated by:
Ms. GHALMI Wissal

Supervised by:
Pr. BOBAKOUR Farès
Professor at EHEC Algiers

13th Promotion
June 2026

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Dedication

First and foremost, I am deeply grateful to God for guiding me throughout this journey, granting me strength in moments of doubt.

To my ***mother****,* for your unconditional love, endless prayers, and silent sacrifices that shaped every part of who I am. You are my heart, my safe place, and my greatest source of strength. No words can ever truly express my gratitude for everything you have given me.

To my ***father****,* for your constant support, discipline, and unwavering belief in my potential. Your guidance has been my compass, and your encouragement gave me the courage to dream bigger. I carry your strength with me in everything I do.

To ***myself****,* for staying, for trying, and for continuing even when everything felt overwhelming. For choosing resilience over doubt and persistence over fear. This achievement is a reminder that I am capable of far more than I once believed.

To my brothers, ***Latif*** *and* ***Raouf****,* for your presence, your support, and the comfort you brought into my life throughout this journey.

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To my family and friends especially **Feriel** for your constant belief in me throughout this journey.

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Wissal

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"Say, are those who know equal to those who do not know?"
Only those who are mindful will take heed.
— **Surah Az-Zumar (39:9)**

Abstract

This thesis examines the organizational conditions required for the successful deployment of a digital logistics platform within a multi-site supply chain. Through a qualitative case study of **Bibars Group**, operating across Algeria, France, and Poland, the research analyses the company's current logistics dysfunctions and proposes a contextualized pre-deployment framework. The findings confirm that the success of digital transformation depends less on the technological capabilities of the platform itself than on prior organizational readiness, process standardization, and strategic alignment across all operational levels.

Keywords: multi-site supply chain, digital transformation, logistics platform, pre-deployment framework, organizational readiness.

Résumé

Ce mémoire examine les conditions organisationnelles nécessaires au déploiement réussi d'une plateforme logistique numérique au sein d'une chaîne logistique multi-sites. À travers une étude de cas qualitative portant sur le Groupe Bibars, opérant entre l'Algérie, la France et la Pologne, la recherche analyse les dysfonctionnements logistiques actuels et propose un cadre de pré-déploiement contextualisé. Les résultats confirment que le succès de la transformation numérique dépend moins des capacités technologiques de la plateforme que du niveau de préparation organisationnelle, de la standardisation des processus et de l'alignement stratégique préalables à l'implémentation.

Mots-clés : chaîne logistique multi-sites, transformation numérique, plateforme logistique, cadre de pré-déploiement, préparation organisationnelle.

ملخص

تُركز هذه الدراسة على كيفية تحسين العمليات اللوجستية داخل سلسلة إمداد متعددة المواقع الجغرافية من خلال التحضير الاستراتيجي لتبنّي منصة رقمية لوجستية. ومن خلال دراسة حالة نوعية لمجموعة بيبارس، التي تنشط بين الجزائر وفرنسا وبولندا، يحلل البحث الاختلالات اللوجستية الحالية التي تواجهها الشركة، ويقترح إطاراً مرحلياً للتحضير قبل تبنّي المنصة الرقمية. وتؤكد نتائج الدراسة أن نجاح التحول الرقمي لا يعتمد أساساً على القدرات التقنية للمنصة بحد ذاتها، بل يرتبط بدرجة أكبر بمستوى الاستعداد التنظيمي، وتوحيد العمليات، والتوافق الاستراتيجي قبل مرحلة التبنّي.

الكلمات المفتاحية: سلسلة إمداد متعددة المواقع الجغرافية، التحول الرقمي، المنصة اللوجستية الرقمية، إطار ما قبل التبنّي، الاستعداد التنظيمي.

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List of Abbreviations

Abbreviation	**Full Form**
AI	Artificial Intelligence
AFNOR	French Standardisation Association(Association Française de Normalisation)
AS-IS	Current-State Process Model (existing process documentation)
AVS	À Votre Service (halal certification)
B2B	Business-to-Business
BPMN	Business Process Model and Notation
BPR	Business Process Re-engineering
BRC	British Retail Consortium (food safety standard)
CMR	Convention on the Contract for the International Carriage of Goods by Road (Convention relative au Contrat de transport international de Marchandises par Route)
CSCMP	Council of Supply Chain Management Professionals
CSF	Critical Success Factor
ERP	Enterprise Resource Planning
EU	European Union
FMS	Freight Management System
GDPR	General Data Protection Regulation
HACCP	Hazard Analysis and Critical Control Points
IoT	Internet of Things
IT	Information Technology
KPI	Key Performance Indicator
LCGPRO	Distribution entity of the Bibars Group (France)
PESTEL	Political, Economic, Social, Technological, Environmental, Legal (strategic analysis framework)
QAFB	Quality Assurance for Food Business (certification)
ROI	Return on Investment
RTA	Road Transport Authority (compliance certification)
SC	Supply Chain
SCM	Supply Chain Management

List of Abbreviations (continued)

Abbreviation	Full Form
SCN	Supply Chain Network
S&OP	Sales and Operations Planning
SSAJ	SSAJ Services (Algerian operational entity of the Bibars Group)
STEF	STEF (French cold-chain logistics provider)
SWOT	Strengths, Weaknesses, Opportunities, Threats (strategic analysis framework)
TMS	Transportation Management System
TO-BE	Target-State Process Model (redesigned future process)
WMS	Warehouse Management System

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General Introduction

In an era marked by fast digital transformation, logistics organizations are under pressure to modernize their operations through integrated digital systems capable of ensuring coordination, visibility, responsiveness, and operational efficiency. In highly dynamic supply chain environments, particularly those operating across multiple geographical sites, traditional coordination methods based on fragmented information flows and informal communication structures are becoming increasingly insufficient. In consequence, digital platforms are no longer perceived as optional technological tools, but as strategic infrastructures essential for ensuring supply chain synchronization and long term competitiveness.

However, despite the growing adoption of logistics digitalization initiatives, both academic literature and professional practice demonstrate that many digital platform implementation projects encounter significant operational difficulties or fail entirely. These failures are rarely caused by the technological solution itself. They are often caused from inadequate organizational preparation. A logistics system cannot be reduced to software or technological architecture alone; it represents a complex network of coordinated human activities, information exchanges, operational routines, and interdependent processes that must first be structured and aligned before digital integration can generate sustainable value.

It is within this context that the present thesis is developed. This research investigates the challenge of pre-deployment preparation for digital transformation within **Bibars Group**, a multi-site agri-food supply chain operating across Algeria, Poland, and France. The company is currently engaged in a digital transition process through the planned adoption of **Freightmee**, a digital logistics platform improves coordination and operational visibility across its international logistics network. Nevertheless, this study does not focus primarily on the technological characteristics of the platform itself. Instead, it examines the organizational, operational, and strategic conditions that must be established beforehand in order to ensure a successful deployment process.

The choice of this research topic is motivated by both objective and subjective considerations. From an objective perspective, the increasing complexity of international supply chains and the accelerated digitalization of logistics activities have transformed platform integration into a major managerial challenge for organizations. Numerous

studies emphasize that the success of digital transformation initiatives depends largely on the organization's level of preparedness, process maturity, and coordination capacity. Despite the growing importance of this issue, relatively few studies have addressed the question of pre-deployment preparation in the context of multi-site logistics systems, particularly within the agri-food sector, where product perishability, traceability requirements, and cross-border operational constraints make coordination dysfunctions costly. This research therefore seeks to contribute to the academic literature by proposing a structured and adapted framework capable of preparing logistics organizations for digital platform implementation.

The subjective motivations behind this research are equally significant. Our interest in logistics optimization and supply chain coordination in Agri-food sector was strengthened through participation in a Global Sustainability Supply Chain Student Competition GS3 2025 , during which we worked on a case involving the optimization of agri-food supply chain operations under complex coordination constraints. This experience allowed us to better understand the operational realities of the supply chain in a complex agriculture network. It also reinforced our interest in the relationship between digital transformation and operational performance within complex logistics environments.

In addition, this research reflects a strong personal ambition to contribute to the development of more structured, resilient, and digitally integrated supply chain. Beyond its academic dimension, this work represents an opportunity to link theoretical knowledge with real organizational challenges by proposing practical and actionable recommendations adapted to the operational reality of a multi-site supply chain.

The problem addressed in this thesis emerges from the operational situation observed at **Bibars Group**. Current logistics operations are characterized by fragmented information flows, the absence of standardized procedures between sites, coordination mechanisms relying heavily on informal communication, and limited real-time visibility across operations. These dysfunctions do not constitute isolated operational issues, but rather reveal deeper structural limitations affecting the organization's capacity to optimize its operations. Under such conditions, deploying a digital system without prior organizational preparation would likely encounter operational inefficiencies, not because organizational actors reject technological change, but because the organizational environment itself remains insufficiently prepared to absorb and support digital integration.

It is on the basis of this diagnostic observation that the central research question guiding this thesis is formulated as follows:

"How can pre-deployment organizational preparation in a multi-site logistics environment ensure the successful implementation of a digital platform and lead to the subsequent optimization of logistics coordination, visibility, and operational efficiency? "

To guide the investigation and structure the analytical framework, the following sec-

ondary questions are formulated:

- **SQ1:** What logistics dysfunctions prevent a multi-site supply chain from successfully adopting a digital platform?
- **SQ2:** How can an organization assess its level of strategic, operational, and human readiness before deploying a digital logistics platform?
- **SQ3:** How do operational constraints across multiple countries influence the preparation needed before implementing a digital platform?

To answer these questions, the following hypotheses are proposed:

- **H1:** The operational dysfunctions observed within the logistics system, information delays, coordination failures, lack of cross-site visibility, are structural in nature and cannot be resolved through incremental organizational adjustments alone, but require a digitally-integrated platform architecture.
- **H2:** The success of a digital platform deployment within a logistics environment depends less on the technology itself than on the quality of the organizational preparation that precedes it, including strategic alignment, process standardization, and actor readiness.
- **H3:** A structured pre-deployment framework, grounded in a field diagnosis of existing flows and coordination mechanisms, provides a more viable and contextually adapted implementation road map than a generic technology adoption model.

This thesis is organized into four main chapters. Chapter One establishes the theoretical foundations related to supply chain coordination in multi-site logistics environments and examines the role of digitalization in enhancing operational integration. Chapter Two explores digital platform implementation frameworks and emphasizes the strategic importance of pre-deployment preparation as a determinant of implementation success. Chapter Three presents the host organization, the methodological framework adopted for the research, and a strategic analysis of **Bibars Group** and its operational environment. Finally, Chapter Four presents the empirical findings derived from field investigation, the diagnostic analysis of the current logistics system, and the proposed pre-deployment framework designed to support the successful implementation of the Freightmee platform within the organization.

Theorical Analysis

Part 1

Supply Chain Coordination in Multi-Site Environments

Chapter 1

Supply Chain Coordination in Multi-Site Environments

Chapter Introduction

In an increasingly globalized and competitive environment, supply chains have become complex, interconnected systems involving multiple actors and locations. Their performance now depends less on individual efficiency and more on effective coordination across the entire network, making supply chain management a strategic function. At the same time, the growing complexity of logistics networks introduces significant structural constraints. that make coordination more difficult and often limit visibility and responsiveness. These challenges highlight the need for more integrated and adaptive approaches to managing supply chain operations. In this context, digitalization has emerged as a key of transformation. By leveraging digital technologies, organizations can enhance information sharing, improve real-time decision-making, and achieve greater synchronization across supply chain actors. Digital tools thus offer new opportunities to overcome traditional coordination barriers and improve overall performance. This chapter aims to provide the theoretical and conceptual foundations necessary to understand these dynamics. It first examines the core concepts of supply chain management and logistics coordination, before analyzing the structural constraints of multi-site logistics networks. It then explores the role of digitalization as a response to these challenges.

Thus, this chapter is structured around three main sections:

- **Section 1.1: Theoretical Foundations of Supply Chain Management and Logistics Coordination**
- **Section 1.2: Multi-Site Logistics Networks: Structural Constraints**
- **Section 1.3: Supply Chain Digitalization**

1.1 Theoretical Foundations of Supply Chain Management and Logistics Coordination

Supply chain management and logistics coordination play a fundamental role in ensuring the efficient flow of goods, information, and resources across interconnected operations. As supply chains become increasingly complex and globalized, effective coordination between actors and processes has become essential for operational performance and competitiveness. This chapter presents the main theoretical foundations and key concepts related to supply chain management and logistics coordination.

1.1.1 Conceptualizations of Supply Chain Management of agri-food

For any framework, it is essential to understand the key concepts of supply chain, this notion have been evolving within organizations and experienced profound changes over time, due to the complexity of the business environment.

1.1.1.1 Definition of supply chain

"Supply Chain is a structured manufacturing process wherein raw materials are transformed into finished goods, then delivered to end customers" (Beamon, 1998). A supply chain includes not only physical resources, *"It is the set of processes through which transformed the value-added outputs, it is a connected set of resources and processes that starts with the raw materials sourcing and expands through the delivery of finished goods to the end consumer"* (Janvier-James, 2012)

The previous definitions are more focus on supply chain as a combination of resources and processes. therefore, a complementary definitions will provide a more operational understanding.

"Supply Chain is the group of manufacturers, suppliers, distributors, retailers and transportation, information and other logistics management service providers that are engaged in providing goods to consumers" (Chow & Heaver, 1999). This definition integrate the relational perspective of the supply chain, emphasizing the role of interconnected actors and the coordination of multiple flows.

Based on these definitions, we can conclude the following: supply chain is a set of activities required to control the flow of goods, and information, in order to ensure the delivery of the right product, in the right conditions, at the right time, at the right place,with the right cost, in the right required quantity, and with the appropriate packaging. it includes all operations that ensure proper coordination between supply and demand, such as purchasing, handling, warehousing, inventory management, order pro-

cessing, packaging, transportation, distribution, as well as the management of returned goods.

1.1.1.2 Definition of supply chain management

Supply Chain Management (SCM) as defined by the Council of Supply Chain Management Professionals (CSCMP) *"is the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies. Supply Chain Management is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model. It includes all of the logistics management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, finance and information technology"*(Council of Supply Chain Management Professionals, 2013) it aims to increase the value contributed to the customer while optimizing functional costs of the Supply Chain.

1.1.1.3 Supply chain management in agriculture industry

"The agriculture supply chain is one of the high-risk industries needing accurate control systems in the face of perishable foods,supply variation, and the requirements to meet food standards and regulations" (Singh & Erdogdu, 2004). It is characterized by a high degree of complexity, primarily due to the perishable nature of food products and their vulnerability to spoilage and waste. Effectively managing these commodities across the various chain, from primary production to final consumption, presents formidable challenges for all stakeholders involved.

Ensuring the continuous availability of safe and adequate food supplies remains a paramount imperative, not only for human survival but also as a key driver of economic activity. However, achieving this objective is fraught with difficulties.

A central challenge resides in synchronizing supply with demand. The uncertainties are compounded by structural constraints, including intensifying competition and escalating global food demand, particularly for high-protein animal products.

In order to ensure a comprehensive understanding of agriculture supply chain, it is necessary to establish a clear definition of it, along with its main actors. An agriculture supply chain can be defined as a network of interconnected actors including farmers, processors, distributors, retailers, and supporting institutions, engaged in the production, transformation, and distribution of agricultural and food products to the final consumers.

this chain operates in an environment with a complex relationships, and high coordination requirement in order to meet the quality, safety, and market requirement.

Moreover, Agriculture supply chain management is responsible for the production and distribution of all fruits and vegetables, animal-based products .

Managing supply chains of agribusiness requires an integral approach in which chain partners jointly plan and control the flow of goods, information, technology and capital from 'farm to fork', meaning from the suppliers of raw materials to the final consumers and vice versa. To react effectively and quickly to consumer demand.

The importance of Agriculture Supply Chain Management in today's world is to help agribusinesses improve to meet consumers needs, by meeting quality standards at lower costs. Effective Supply Chain Management can deliver agribusinesses a competitive advantage and assess the risks associated with supply chain operations. Agriculture Supply Chain Management is necessary for the success of an agriculture farm that deals with the manufacturing and distribution of goods and services by:

- **Improving Efficiency:** Effective Supply Chain Management enables an agribusiness to better coordinate and integrate the various stages of its operations. improving the alignment between supply, production, and distribution activities, and increasing productivity in the supply chain and can result in improved customer satisfaction.

- **Reducing Costs and Waste**: A well-managed supply chain contributes to cost reduction by improving the efficiency of key operational processes . through better coordination of material flows and demand planning, firms can optimize inventory level, reducing holding costs and avoiding overstocking and stock-outs.

- **Managing Risks:** An effective supply chain strategy play a strategic role in identifying, anticipating, and mitigating various operational risks. by enhancing visibility across the supply chain and improving coordination between actors, firms are better equipped to detect potential issues early and respond proactively.

- **Enhancing Customer Service:** Supply Chain Management can enables agribusiness to improve their responsiveness to customer demand. Through enhanced coordination of material and information flows, firms can reduce lead times, improve delivery reliability, and ensure product availability.

- **Competitive Advantage:** Effective Supply Chain Management constitutes a key source of competitive advantage by enabling firms to outperform competitors in terms of cost efficiency, service quality, and responsiveness.

Overall, effective Supply Chain Management emerges as a critical driver of organizational performance in agri-food systems. By simultaneously reducing costs and waste, mitigating operational risks, enhancing customer service, and strengthening competitive positioning.

One of the fundamental challenges in agricultural supply chains lies in the perishability of products and the sensitivity of quality over time. More is the time length in processing and the time to reach the market lesser will be the price of produce. Hence time is considered as one of the major factors in the supply chain system(Bhatia & Janardhana, 2020) , it becomes a critical coordination variable. beyond perishability, there are major challenges faced in the agri-food sector The figure illustrates the key stages constituting



Figure 1.1: The Disruption of the Supply Chain Begins with Agriculture
Source: Agriculture.com (2022)

the food supply chain, capturing the flow of products from their origin as raw materials through processing, packaging, and distribution, until they reach the end consumer. The circular arrangement highlights the interdependent nature of these stages, reflecting the complexity of coordination required across actors to ensure supply chain continuity and efficiency.

1.1.2 Supply chain coordination mechanisms

1.1.2.1 Supply chain coordination

Supply chain coordination refers to *"the inter-firm operational coordination within a supply chain. it involves the coordination of continuous flows from the suppliers to the buyers and through to the end consumer"*(D. Lu, 2011). The purpose of coordination is to achieve collectively goals that individual actors cannot reach. The need for coordination is evident in supply chains, as companies forming a supply chain are dependent on the performance of other organizations. Supply chain coordination is achieved when a decision maker, acting rationally, makes decisions that are efficient for the supply chain as a whole(Gupta & Weerawat, 2006) . Moreover, Coordination plays a key role s a vital managerial function. It involves aligning decisions and actions across the various stages of the supply chain, ensuring each participant considers how their operations affect the entire system.

The increasing complexity of supply chains, fueled by globalization, a wider range of products, and new technologies, has made strong coordination mechanisms even more essential. These mechanisms offer the tools needed to handle interactions among multiple players, promote teamwork, and boost efficiency across the board. In this way, coordination serves as a strategic way to address the challenges arising from the interdependence of supply chain activities.

The absence of effective coordination within a supply chain can lead to significant inefficiencies and performance issues. One of the primary causes of these inefficiencies is the lack of information sharing and visibility across the different stages of the chain. When actors operate based on incomplete or delayed information, decision-making becomes fragmented and misaligned. additionally, inadequate integration between supply chain partners, limited ability to respond to real-time events, local optimization practices, and deficiencies in planning and process control, unexpected disruptions and delays further amplify the challenges that supply chain faces.

As a result, the lack of coordination generates multiple negative consequences. It often leads to increased variability in demand and supply, forcing firms to maintain high inventory levels to avoid stock-outs. At the same time, customer service levels may deteriorate due to the inability to meet demand consistently. Production planning and capacity management also become more complex, as firms must respond to fluctuating and unpredictable order patterns. This may result in higher operational costs, including expedited shipments, overtime production, and inefficient resource utilization. Furthermore, misalignment between supply chain actors can create conflicts, reducing overall system performance.

1.1.2.2 Coordination mechanisms

"Supply chain coordination mechanisms refer to the approaches and methods followed to align the decisions and actions of independent supply chain actors in order to improve overall performance and achieve system-wide optimization" (Gao et al., 2018). Coordination mechanisms are essential due to the inherently fragmented and interdependent nature of operations. Supply chains typically involve multiple actors, such as suppliers, manufacturers, distributors, and retailers, each operating with their own objectives and constraints. This structural fragmentation increases the complexity of managing flows and decision-making processes across the network. Moreover, the strong interdependence between these actors means that any disruption or misalignment at one stage can propagate throughout the entire chain. In the absence of effective coordination, this often leads to inefficiencies such as delays in deliveries, excess inventory, or stock shortages.
Additionally, poor synchronization of information and material flows can generate demand distortions, commonly referred to as the bullwhip effect. These issues ultimately result in increased operational costs and reduced service levels. Therefore, coordination mechanisms are necessary to align decisions, synchronize flows, and ensure coherent functioning of the supply chain as an integrated system.

The literature identifies a wide range of supply chain coordination mechanisms, including contractual, pricing, and organizational approaches, but our focus is on the flow coordination mechanisms. *"this mechanisms are designed to manage product and information flows in supply chains"*(Fugate et al., 2005) . The objective is to eliminate suboptimization, by ensuring the synchronization of physical and information flows across the supply chain, enabling actors to align their decisions with overall system objectives rather than local performance goals. Through real-time information sharing, integrated planning, and standardized processes, these mechanisms reduce inefficiencies, limit demand distortions, and promote global optimization of the network.

The implementation of flow coordination mechanism depends on the organizational context in which it is embedded. it supports a supply chain orientation that enables effective coordination, as coordination can also be achieved through simpler, manual systems when appropriate practices are in place. However, in increasingly complex and dynamic supply chain environments, technology becomes a key enabler, facilitating real-time information sharing, improving visibility, and supporting more efficient and responsive coordination among actors.

Three dimensions of flow coordination mechanisms were identified that needed to be carefully managed for improved supply chain performance: multi-functional involvement, standardization, and complexity according to (Fugate et al., 2005) :

- **Multi-functional involvement:** the involvement of multiple departments, in order to achieve the effective coordination.

- **Standardization:** it includes shared processes, data format, to ensure consistency and mutual understanding.
- **Complexity:** the mechanism is a sophisticated and detailed, requires precise timing and detailed procedures.

These three dimensions play a vital role in making flow coordination mechanisms effective in supply chains. Multi-functional involvement is key because material and information flows span multiple departments; without cross-functional teamwork, decisions stay isolated, leading to inconsistent execution. Standardization is equally critical, offers a shared structure for communication and operations that minimizes confusion and supports smooth interactions among participants. In its absence, coordination often is disrupted due to mismatched processes and data formats. The complexity dimension, meanwhile, addresses the demands of managing dynamic and interconnected flows, where basic methods fall short. Given the uncertainty and variability in supply chains, more advanced and organized mechanisms are needed to achieve precise timing and responsiveness. Overall, these dimensions help synchronize activities, cut down on waste, and drive better supply chain performance. consequently, achieving effective coordination goes beyond simple information exchange, it requires structured systems and processes, especially in a complex supply chain network.

1.1.3 Physical Flows and Information Flows as Levers of Logistics Coordination

"Supply chain flows are the movement of any resource across the supply chain"(Ashraf et al., 2024), and it has long been acknowledged that supply chain management concerns both physical movement of products from suppliers to customers and the information flows for synchronizing the supply chain management processes.

Three intrinsic flows can be distinguished in supply chain management: material flows, information flows, and financial flows. As this study focuses exclusively on material and physical flows it is necessary to first define them:

- **Physical flows:** occurs in one direction, from the manufacturer to the supplier to the seller and finally to the end customer. In some cases, however, the flow of materials may occur in the opposite direction if the product is being returned.
- **Information flows:** occurs in multiple directions simultaneously, with suppliers providing pricing quotes and order updates to sellers, sellers issuing purchase orders to suppliers and distributors, and customers and sellers communicating with each other about individual orders.

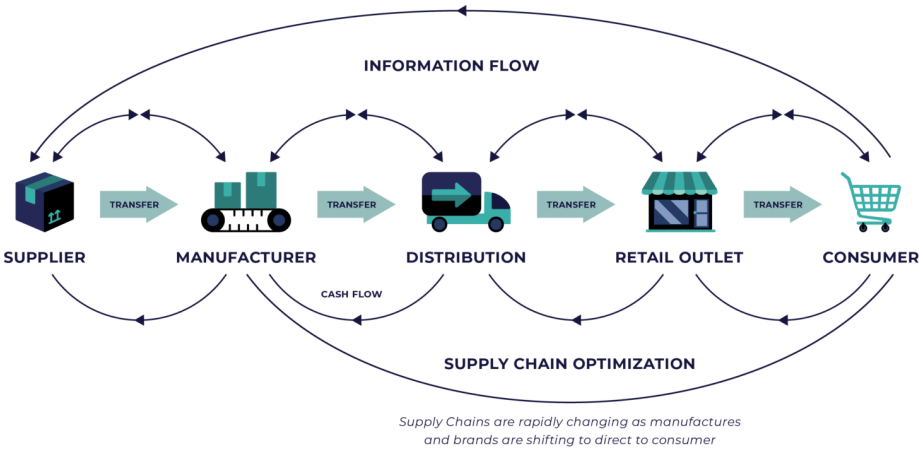

Figure 1.2: Physical and Information Flows Across the Supply Chain
Source: noelmassie.com (2020)

The figure illustrates the fundamental flows governing supply chain operations physical, information, across five successive stages from supplier to consumer. This representation underscores that effective supply chain management extends beyond the movement of goods, requiring the seamless integration of all flows to achieve overall chain optimization.

Although *"the design of information flow has traditionally followed the physical flow along the chain"*(Lewis & Talalayevsky, 2004) both flows are fundamentally interdependent. Physical and information flows are inherently interdependent and must be managed together in a supply chain and can not be isolated. Information flows drive physical movements by triggering, guiding, and controlling the transfer of materials across the chain. For example, demand forecasts, orders, and inventory data shape production amounts, restocking choices, and delivery plans. Without accurate and timely information , physical flows become inefficient leading to issues in the production, shortages, or late deliveries. Conversely, information flows only adds value when it leads to real actions, and remains ineffective without execution. Thus, logistics coordination depends on the synchronization of both flows, ensuring that decisions are not only well-informed but also properly implemented through aligned physical operations. .

A supply chain is fully coordinated when all decisions are aligned; conversely, a lack of coordination occurs when decision-makers possess incomplete information or operate under incentives that are incompatible with system-wide objectives. (Sahin & Robinson, 2002) . information flows therefore ensure the alignment and synchronization of operations across the supply chain. accurate and timely information underpins decision-making. and any delay in information sharing risks disrupting physical flows, generating operational inefficiencies. Moreover, effective coordination depends on the alignment of the flows. A mismatch between flexibility of physical flows and the level of information sharing can

generate inefficiencies. Therefore, achieving an appropriate balance between physical and information flows is essential to ensure efficient and responsive supply chain operations. (Kaipia, 2009).

1.2 Multi-Site Logistics network: Structural Constraints

Multi-site logistics networks are characterized by the coordination of operations across geographically dispersed facilities, suppliers, and distribution points. While these structures offer flexibility and broader market coverage, they also generate significant structural constraints related to communication, synchronization, transportation, and information flow. This section examines the main operational and organizational challenges associated with managing multi-site logistics networks.

1.2.1 Supply chain network characteristics

Most companies do not only operate within a single linear supply chain. As soon as several suppliers and customers and an extensive product portfolio are involved, a multidimensional network inevitably forms. For large corporations, this do not necessarily have to involve external companies. The complexity of a supply chain network is also evident within the company.

1.2.1.1 Definition of supply chain network

The supply chain network consists of suppliers, manufacturing centers, warehouses, distribution centers, and retail outlets, as well as raw materials, work-in-process inventory, and finished products that flow between the facilities. It is the collection of physical locations, transportation vehicles and supporting systems through which the products and services the firm markets are managed and ultimately delivered. All organizations have or can purchase the components to build a supply chain network. Physical locations included in a supply chain network can be manufacturing plants, storage warehouses, major distribution centers, ports, etc. Transportation modes that operate within a supply chain network can include the many different types of trucks, trains, container ships or cargo planes. The many systems which can be utilized to manage and improve a supply chain network include order management systems, warehouse management system, transportation management systems, strategic logistics modeling, inventory management systems, replenishment systems, supply chain visibility, optimization tools and more. Emerging technologies and standards are now making it possible to automate these supply chain networks in a real time mode making them more efficient than the simple traditional supply chain Supply chain is not just a group of stages involved to satisfy customers, but rather a network of interrelated stages involved to do customer requests. We want to manage this network's flow and also find the best network structure or supply chain design to maximize the beneficially A large numbers of manufacturing models have been

proposed for the design and planning supply chain network . The selection of partners in the supply chain network management is important because SCN really needs the inter cooperation of the partners at the upstream, midstream and downstream echelons along the supply chain (Matinrad et al., 2013) A supply chain network is defined as a system composed of three distinct stages that manage the flow of goods and services from raw materials to the final customer (Erenguc et al., 1999) . the three stages of the network are :

- **The Supplier Stage:** This includes the network of suppliers providing raw materials, fabricated parts, service parts, and other services to manufacturing plants.
- **The Plant Stage:** This is the transformation stage consisting of plants where the actual product or service is created. These plants can be organized into sequential sets, subassembly, and final assembly or grouped so that each facility manufactures a complete set of products.
- **The Distribution Stage:** Consists of distributors, dealers, or customers and is responsible for generating and satisfying the final demand for the product or service.

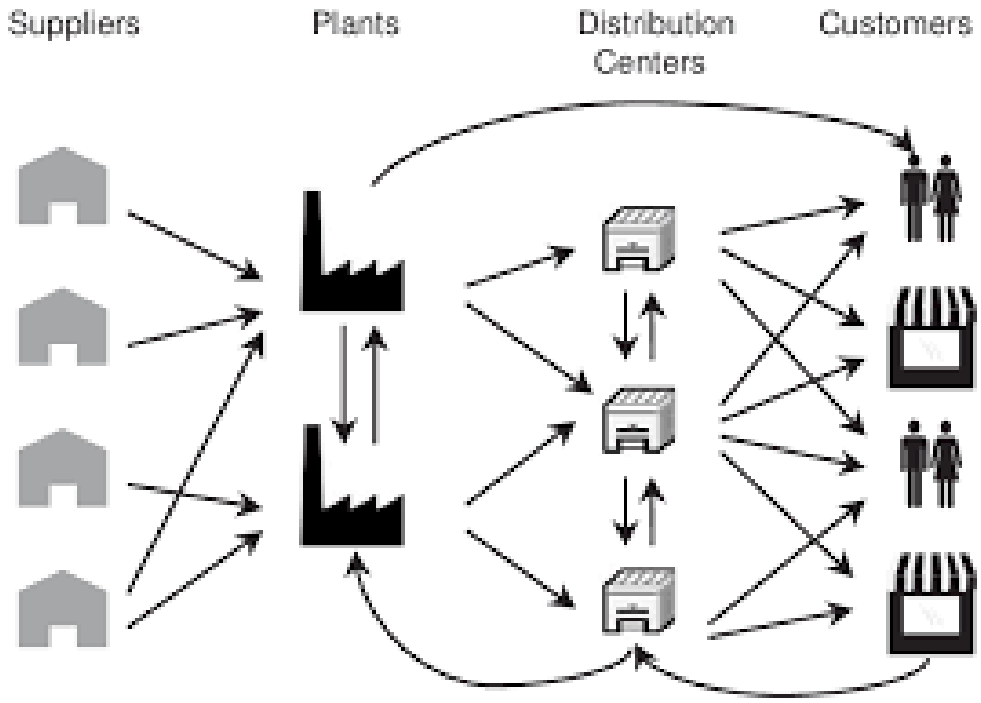

Figure 1.3: Example of a Supply Chain Network
Source: ResearchGate (2022)

The figure illustrates the structure of a supply chain network, depicting the flow of goods across four interconnected actors, suppliers, plants, distribution centers, and customers. highlighting the complexity of relationships and inter-dependencies that characterize real-world supply chain systems.

The design of a supply chain network is influenced by a set of strategic, operational, and environmental factors that collectively determine its efficiency, responsiveness, and sustainability.

- **Centralization vs. Regionalization :** A major choice in designing supply chain networks is how centralized to make the distribution facilities. Centralized setups lower facility and operating costs by taking advantage of economies of scale, whereas decentralized or regional networks improve speed and service quality. The best setup balances trade-offs between transport costs, facility expenses, and customer needs, while also factoring in risk spreading and capacity limits.

- **Operational Costs:** Cost is a key factor in designing supply chain networks, as it affects operational efficiency and a company's ability to compete. Supply chain costs include several parts, such as transportation, warehousing, inventory storage, handling, and administrative expenses. Choices about the number, location, and size of facilities greatly influence the balance among these cost elements.

- **Flexibility and Adaptability:** Today's supply chains face high levels of uncertainty, so flexibility is an essential design goal. Distribution networks need to adjust to changes in demand, product types, and market conditions. This calls for scalable facilities, flexible processes, and equipment that can meet shifting operational needs.

- **Globalization and Market Dynamics**: Growing global markets mean supply chain networks must be built for international operations. This involves managing cross-border logistics, following customs rules, and handling worldwide transport flows. Networks also need to serve far-flung markets while keeping service levels steady.

- **Regulatory and Institutional Environment:** Government policies and regulations have a major influence on supply chain structures. Tax systems, labor laws, transport rules, and infrastructure projects all shape network design choices. Companies must follow these rules while finding ways to optimize their operations.

- **Information Systems and Digital Integration:** Advanced information systems are essential for effective supply chain coordination. Real-time data sharing, system integration, and digital platforms enhance visibility, improve decision-making, and enable better synchronization of flows. Standardized and paperless systems also reduce errors and increase operational efficiency.

- **Modularity and Scalability:** Supply chain networks need modularity to support expansion or changes as business demands shift. This means building scalable facilities, adaptable workforce skills, and flexible management systems that handle growth or shifts in demand.

- **Speed and Responsiveness :** As customers demand quicker deliveries, supply chains must speed up their operations. Network design needs to enable shorter lead times, faster order processing, and better inventory turnover. This calls for close coordination among logistics, information systems, and supplier abilities.
- **Human Factors and Organizational Capabilities:** The success of a supply chain network also relies on its people and organizational culture. Skilled workers, teamwork practices, and effective leadership help improve coordination and overall performance across the network.
- **Cost and Competitive Positioning:** A main goal in network design is to achieve cost efficiency without sacrificing service quality. Companies must streamline operations to provide value at competitive prices, which strengthens their position in the market.
- **Accountability and Performance Management:** Strong supply chain networks need clear performance measures, tracking systems, and ways to ensure accountability. These tools support ongoing improvements, smarter decisions, and alignment between daily operations and long-term goals.
- **Product Variety and Value-Added Services:** Rising product variety and customer-specific needs, like custom packaging, labeling, or personalization. Make supply chain operations more complex. Networks must be built to manage these differences while keeping efficiency and service levels high.

In summary, supply chain network design is a complex process influenced by economic, operational, and environmental factors. Instead of focusing only on cutting costs, companies must aim for strong overall performance, including efficiency, speed, and resilience. These elements are closely linked, so changes in one area can affect the whole system. Effective design demands balancing competing goals and a focus on long-term strategy. This built-in complexity calls for organized management methods to keep all parts of the network aligned and performing well.

1.2.1.2 Definition of supply chain network management

SC network management can be defined as *" an integration of key business processes from end users through original suppliers for effectively providing various forms of products and adds value to customers and other stakeholders"* (T.-P. Lu et al., 2013) . Competition in the global marketplace has moved from brand versus brand to SC versus SC. Many companies invested significant resources to develop effective SC network management. However, due to the complicated nature and often large scope of SC network management system implementation, few of them are successful (Wu & Chuang, 2009). Supply chain

network must be built up in a superordinate and holistic manner, otherwise numerous inefficiencies will arise. Because of this, it is important for a company to introduce an active supply chain network management that takes the entire network into account.

It shows the shift from supply chain to supply chain network due to the increase of the complexity and the need for supply chain network management that improve the overall efficiency and coordination of the entire supply chain network. rather than optimizing each operation separately, it ensures that suppliers, manufacturers, and distributors work together efficiently instead of acting in isolation, focusing on improving collaboration and alignment between them, and the ultimate objective is to make the network responsive, flexible, and customer-oriented.

To meet the requirements, supply chain network management focuses on four central dimensions; Network, management system, information management or IT systems and planning:

- **The network:** which is a configuration of different parties, such as production facilities, hardware and software developers, delivery hubs, suppliers and their subcontractors as well as logistics service providers, sales and distribution partners and even end customers.
- **Management systems:** the regulating force in a supply chain network. This involves aspects such as strategy and organizational development or network-wide change management.
- **Planning:** which is essentially understood in terms of Sales & Operations Planning (S&OP) and Product Life-cycle Management. This requires end-to-end consideration in order to achieve an optimal result.
- **Information management :** provide the applications and digital tools without which a supply chain network cannot be built: Digitization facilitates networking.

Managing supply chain networks is crucial because it aligns all players, flows, and decisions in a complex, linked system. By treating the network as one unit instead of separate parts, companies cut waste, handle uncertainty, and gain clear views of physical, information, and financial flows. Strong management also boosts responses to demand shifts, disruptions, and outside changes, while balancing costs and service quality. In the end, it lifts overall performance by turning strategic goals into smooth, coordinated actions across the network.

1.2.2 Multi-Site Network Complexity

the complexity of a supply chain is not a simple linear structure where a small change often results in a chain reaction. *"When supply chain complexity increases, monitor-*

ing and managing the interaction between different elements of the chain becomes more difficult"(Cheng et al., 2014).

Supply chain networks act as complex systems because of the non-linear and linked relationships among their players. Unlike simple linear models, they function as dynamic networks with many connected parts, including upstream suppliers, manufacturers, logistics firms, distributors, and end customers. These players are tied together through multi-level relationships, creating detailed interaction patterns rather than just direct links.

This complexity s further reinforced by the coexistence and interaction of different types of flows within the network. Physical flows move goods and materials, information flows aid planning, coordination, and decisions, and financial flows handle payments between partners. These flows depend heavily on each other, meaning that a disruption or inefficiency in one can quickly spread across the network effecting performance. As a result, supply chains show feedback loops and sensitivities to changes and risks.

The variety among participants adds more layers of complexity. Each player has its own goals, limits, and ways of deciding, which may not always be aligned with those of other partners. This sparks coordination issues, conflicting interests, and waste, especially where sharing information or collaborating is weak. Additionally, players often join multiple networks at once, boosting connections and management challenges.

1.2.2.1 Sources of complexity:

Supply chain complexity does not solely arises from the network's structure, but rather emerges from two main sources: the interactions among supply chain actors and the uncertainty inherent in their operating environment. A supply chain typically involves a wide range of participants, including suppliers, manufacturers, logistics providers, distributors, and customers, each performing distinct functions and operating under different objectives, constraints, and performance priorities. These actors are interdependent, meaning that decisions made at one point in the network can propagate and influence performance outcomes across multiple stages of the system.

On the one hand, the interactions between these actors generate complexity, since supply chain is composed of interconnected relationships that requires coordination and alignment rather than isolated entities. The more the number of actors increases, the difficult the coordination becomes due to difference in priorities.

On the other hand, complexity is reinforced by uncertainty, which arises from fluctuations in demand, variability in production and transportation processes, and the unpredictability of external conditions. Since each actor operates in a dynamic environment, their decisions are often based on incomplete or delayed information, which can lead to mismatches in expectations and execution across the supply chain. This uncertainty increases the risk of inefficiencies, delays, and suboptimal decisions, particularly when

coordination mechanisms are insufficient or poorly integrated.

Furthermore, the combination of multiple interactions and persistent uncertainty amplifies the overall complexity of the system. Supply chain actors are often embedded in multiple overlapping networks, which increases the number of inter-dependencies and reduces the ability to anticipate system-wide outcomes. As a result, the behavior of the supply chain cannot be fully understood by analyzing individual components in isolation, but rather must be considered at the level of the entire network.

Therefore, supply chain complexity should be understood as the combined outcome of interaction intensity and environmental uncertainty. Effectively managing this complexity requires improving coordination across actors, enhancing information sharing, and developing adaptive mechanisms capable of responding to variability while maintaining overall system alignment and performance.

1.2.2.2 Types of multi- sites complexity:

Supply chain network complexity can be broadly categorized into two interrelated dimensions: structural complexity and operational complexity. These two dimensions provide a useful framework for understanding how complexity arises within supply chain systems and how it affects their management and performance.

Structural complexity refers to the static configuration of the supply chain network. It is primarily concerned with the physical and organizational structure of the system, including the number of actors involved, such as suppliers, manufacturers, logistics providers, and distributors, as well as the density and pattern of connections between them. A higher number of entities and more interconnected relationships increase the structural complexity of the network, making it more difficult to map, coordinate, and manage.structural complexity is Investigating the structure of supply chain networks, including system size, degrees of order (linkage) and categories of elements; analyzing the relationship between those dimensions and the structural uncertainty of the supply chain network to reduce its structural complexity and uncertainty; designing or redesigning the structure of supply chain networks(Cheng et al., 2014).

In contrast, **operational complexity** focuses on the dynamic behavior of the supply chain over time. It relates to the variability and uncertainty in day-to-day operations, including fluctuations in demand, supply disruptions, transportation delays, and changes in production or delivery schedules. This type of complexity reflects how the system behaves under real-world conditions and how effectively it responds to internal and external disturbances.Investigating the dynamic logistics of supply chain networks, including the degree of connection and the degrees of predictability and uncertainty within the system; using a known and unchanged supply chain network structure to analyze the relationship between those dimensions and the uncertainty of dynamic logistics or information flow of the supply chain network, which managers can refer to manage supply chain (Cheng et

al., 2014).

Together, these two dimensions highlight that supply chain complexity is not only a function of how the network is structured, but also how it operates under uncertainty. Understanding both aspects is essential for improving coordination, enhancing visibility, and ensuring efficient supply chain performance.

1.2.3 Supply Chain Performance Measurement in Multi-Site Networks

In today's fast-changing economy, performance is key to company strategy. It helps measure how well and how efficiently activities work, using both numbers and quality checks.

Performance is more than just money matters; it covers operations, organization, and relationships too. This section explains the basic ideas behind performance, its main parts, and why it is vital for managing the whole company.

1.2.3.1 Definition of performance

Performance measurement describes the feedback on operations which are geared towards customer satisfaction and strategic decisions and objectives. They further pointed out that *"performance measurement reflects the need for improvement in operational areas which are found wanton in performance measures "*(Bhagwat & Sharma, 2007). *"Performance can be defined as what a person is capable of accomplishing; it is a physical act, and even if the performance is mental (such as mental arithmetic), it must be expressed physically (adding numbers on a piece of paper) "*(Selmer, 1998). A company's performance is *"the result it achieves within its competitive environment, enabling it to increase its competitiveness, profitability, and ability to influence other firms in the sector (strengthening its bargaining power) "*(Meier, 2009). *Performance is a metric that measures the effectiveness and/or efficiency of all or part of a process or system (real or simulated) relative to a specific figure, plan, or objective established as part of a corporate strategy* (AFNOR, 1991). The Project Management Dictionary defines performance as: *"The concept of project performance encompasses the pursuit of efficiency—understood as the optimization of project activities based on available and deployed resources—and that of effectiveness, understood as the degree to which project requirements (particularly scope, cost, and schedule) are met."* (Lerat & Mallo, 2007).

1.2.3.2 Definition of logistics performance

Logistics performance can be defined as a company's ability to meet customer needs by delivering quality products and services in the right volume, at the right time, to the right

place, and at lower cost, while minimizing environmental impact. It covers control of key operations such as production, transport, storage, packaging, and distribution. Efficient logistics performance translates into product availability, customer satisfaction, and the optimization of resource consumption. *"It contributes to value creation for the company's stakeholders, enhances competitiveness by improving the quality and timeliness of the supply chain, and reduces coordination costs and transaction risks through the effective use of IT and technological tools"* (Christopher, 2016).

In supply chain settings, performance measurement is key to linking daily operations with strategic goals and customer needs. It acts as a management tool that gives feedback on processes and flows, helping firms spot inefficiencies, boost coordination, and drive ongoing improvements across the network. Beyond tracking, it supports decisions by weighing trade-offs in cost, service quality, speed, and resource use. This is especially vital in multi-site chains, where site links raise coordination challenges and make local issues affect the whole system. Here, performance management keeps distributed operations in sync with big-picture priorities. It also highlights differences between planned and real results, guiding fixes and strengthening control. In the end, logistics performance management focuses less on standalone metrics and more on fostering alignment, clear visibility, and steady progress among linked supply chain players.

1.2.3.3 Balancing Complexity and Performance in Multi-Site Supply Chains

Managing the tension between complexity and performance in multi-site supply chains poses a core challenge for firms in dynamic, geographically spread settings. As companies grow across locations, their supply chains grow more complex, with more interactions, dependencies, and coordination needs. While this brings benefits like flexibility, scalability, and market reach, it also hinders efficiency, uniformity, and quick responses across the network. Performance comes not from eliminating complexity but from organizing it to enable smooth coordination and decisions. Success in this balance hinges on spotting complexity sources and using targeted tools to limit their downsides, all while keeping operations agile and the system strong overall.

The main driver of complexity in multi-site supply chains is the geographic spread of operations across different locations, which brings extra levels of coordination and control challenges. Each site typically functions under its own unique managerial framework and decision-making structure, often resulting in varying priorities, approaches to tasks, and execution styles among them. On top of that, fluctuating demand patterns across these locations make planning even more difficult, as teams must repeatedly adjust production schedules, allocate inventory wisely, and adapt distribution strategies to keep up.

This challenge intensifies due to differences in how sites handle daily operations, particularly when efforts to standardize processes are weak or applied unevenly. Furthermore, linking transport, inventory management, and production efforts across multiple sites

creates tight inter-dependencies, meaning that decisions made at one location can have widespread effects on the entire network. Lastly, gaps in information—often from slow data sharing or inconsistencies—limit clear visibility between sites and lead to mismatched decision-making. All these factors combine to produce significant operational complexity, demanding reliable coordination mechanisms to achieve proper alignment and sustain strong performance throughout the system.

Key Trade-offs in Balancing Complexity and Performance:

Managing multi-site supply chains means balancing key trade-offs that shape performance. These reflect the challenge of aligning competing goals in linked, complex systems:

- **Centralization vs. Decentralization:** This involves where decision power lies. Centralization offers tight control, uniform processes, and cost savings from shared planning and resources. But it can slow site responses to local issues or markets. Decentralization lets sites act independently for faster adaptation, yet risks uneven practices and poor network-wide coordination without alignment.

- **Efficiency vs. Responsiveness:** Firms weigh cost cuts against agility amid uncertainty. Efficiency tactics like lean stock and optimized transport reduce waste and boost resource use. However, they limit flexibility for demand shifts, supply issues, or urgent needs. Focusing on responsiveness means extra stock, spare capacity, or pricier fast logistics, raising costs.

- **Standardization vs. Local Adaptation:** Standard processes ensure consistency, ease coordination, and allow site comparisons via shared methods and data. Yet sites face varied demands, facilities, and rules. Rigid standards may block local fit, while some adaptation improves site efficiency but can weaken overall unity if overdone.

- **Cost Reduction vs. Service Level:** A core issue is pitting cost savings against service quality. Cutting costs optimizes transport, lowers stock, and streamlines work, but hurts delivery speed, reliability, and availability. High service demands more investment in stock, transport, and setup, increasing expenses. The right mix meets customer needs without financial strain.

- **Global Optimization vs. Local Optimization:** Local best choices do not always benefit the full chain. A site might cut its stock or transport costs, creating issues elsewhere. Global views consider network-wide effects, using integrated planning and coordination to link local actions with big-picture goals.

These trade-offs show the importance of balanced, integrated management to handle competing goals in multi-site supply chains. Instead of favoring one aspect over others,

companies should take a whole-system view that accounts for links between cost, service, flexibility, and coordination. Advanced analytics prove vital here, aiding smart decisions through scenario testing and disruption forecasting. Strong governance structures are also key, aligning local efforts with global strategies while clarifying roles, duties, and decision powers across sites. Collaboration within teams and between partners, further drives success by enabling data sharing, activity alignment, and joint problem-solving. In the end, handling these trade-offs needs the right tools and systems, plus unified leadership that turns supply chain complexity into a managed source of value, supporting strong performance amid change and uncertainty.

The Objective of Balancing Complexity and Performance:

Ultimately, the aim in multi-site supply chains is to balance complexity and performance for overall efficiency without losing the flexibility to address local operational realities. This careful equilibrium makes sure that high-level corporate strategies translate smoothly into consistent, well-aligned actions at every site, cutting down on mismatches between what is planned and what actually happens on the ground. At the same time, allowing some local adaptability equips organizations to deal effectively with environmental uncertainties, fluctuating demand, and unique constraints at each location, such as regional regulations or market differences.

From this viewpoint, resilience stands out as a vital benefit of this balance. Supply chains gain the ability to withstand disruptions like supplier issues or transport delays, adapt to unexpected changes, and recover swiftly, all while keeping performance steady and avoiding big setbacks. Effective complexity management is therefore more than just streamlining daily operations; it builds a strategic edge that helps firms maintain strong results, ensure business continuity, and stay ahead in fast-changing, highly connected global environments where volatility is the norm.

1.3 Supply Chain Digitalization

Supply chain digitalization has become a major driver of transformation in modern logistics and operational management. By integrating digital technologies into supply chain processes, organizations can improve visibility, coordination, responsiveness, and decision-making across their networks. This section explores the main concepts, technologies, and strategic implications associated with supply chain digitalization.

1.3.1 Digital Transformation in Logistics:

Supply chain is facing growing pressure to improve its efficiency, responsiveness, and resilience. all along in an increasingly complex and dynamic economic environment. Therefore, it is important to define the key concepts of it. Understanding the conceptual difference between digitalization, Digitization and digital transformation.

1.3.1.1 Definition of Digitization

Digitization is a technical process of converting data from physical objects into digital format, enabling data to be stored, processed, and transmitted through information systems. *"The term has been used to refer to a variety of different phenomena including, the creation of a digital product and the use of digital technology as part of the new product development process"* (Gradillas & Thomas, 2025). *"It mainly seeks to boost operational efficiency, cut down errors, and ease data gathering, while leaving core business models and organizational setups largely unchanged"*(Gobble, 2018).
Digitization is foundational due to its role in connecting between physical world and data software. It supports a shift to data-driven methods by enabling the gathering and use of digital information, helping business practices evolve. Yet, while digitization is key for better operations and handling fast-changing settings, it is just one part of a larger change process. True digital transformation demands a full, company-wide effort that extends past data changes to include shifts in structure, strategy, and teamwork across functions.

1.3.1.2 Definition of Digitalization:

We define *"digitalization as the process through which the use of data, digital platforms and advanced analytics (such as machine learning and artificial intelligence) transforms the process and interactions with other economic agents "*(Faucher & Houle, 2023), By using the term digitalization, we mean the deep changes brought by information and communication technologies to economic and social systems. It goes beyond just adopting digital tools; it describes how these technologies transform organizational setups, business processes, and relationships between players.
Digitalization shows how digital tools alter the creation, sharing, and use of information,

creating fresh ways to coordinate, communicate, and generate value. Overall, it covers not just tech shifts but their wider effects on performance, decisions, and linked systems like supply chains. *"It is a systematic process for knowingly collecting and analyzing data and information from all possible sources to produce insights of the competitive environment, business trends and daily operations "*(Murphy, 2016), These insights are designed to guide decisions that advance an organization's operational goals. This definition fits well for modern businesses and, with a broader and proper understanding, applies equally to public sector operations.

Digitalization offers great benefits for the supply chain, such as increased availability of information, optimization of logistics practices, real-time data collection, more efficient inventory management and increased transparency(Bigliardi et al., 2022), It is deeply reshaping daily life and work structures in our postmodern, increasingly globalized and digital society. As a result, organizations must effectively plan their digital transformation to stay flexible and competitive in the market. Understanding digitalization and its key concepts is therefore important.

1.3.1.3 Definition of Digital Transformation

Digital transformation is defined as *"the complete remaking of a business around the new opportunities and demands presented by digital technology is described as a journey that requires a clear road-map and a silo-spanning approach to reshape an entire organization"* (Gobble, 2018). Digital transformation goes beyond the use of digital tools, it reshapes the company's daily operations. It's not only a technological change rather than an organizational change that impacts the entire company, including internal processes and external relationships.

The digital transformation of supply chains represents more than technological upgrades; *"it embodies a comprehensive re-imagining of how goods and services flow from suppliers to end customers"* (Shah, 2025), It is reshaping supply chain management by enhancing efficiency and optimizing operational processes (Aksu, 2025). Furthermore, Digital transformation in supply chain goes beyond implementing and adopting new technology. It requires a fundamental redesign of supply chain activities, focusing on their organization. Digital transformation enables a more integrated and interconnected system where information flows exchange in real time across all actors. Consequently, companies respond quickly to the demand, reduce inefficiencies, and improve overall coordination. importantly, supply chain becomes data driven and proactive, rather than reactive.

1.3.2 Digital Maturity Levels of Supply Chains

Most organizations have some digital capabilities. Many have acquired numerous systems, technologies, and platforms to support business functions (Charette, 2020). However, the

degree of digital adaption varies, reflecting the different levels of technological maturity. Digital maturity is determined by two key dimensions according to (MacCarthy & Ivanov, 2022), which are the degree of connectivity between supply chain actors, and the level of integration of digital technologies within and across organizational operations. Based on these dimensions, it is possible to distinguish between three different levels of digital maturity in supply chain :

1.3.2.1 Digitally Immature Supply Chain

"Where the principal supply chain players utilize conventional technologies and systems to support business processes and supply chain transactions and interactions" (Charette, 2020), without achieving strong integration or connectivity. To illustrate, Tools like ERP and WMS are used to manage activities like inventory, production, and order processing, but they are used independently. In the digitally immature supply chain, communication and coordination between organizations and their partners remains relatively basic and limited. therefor There are few exchanges through digital tools, but they are not continuous, integrated, or real-time. The lack of integration and data exploitation means that organizations do not fully benefit from digital technologies. They frequently miss opportunities to enhance performance, improve coordination, and optimize operations. As a result, digitally immature supply chains remains fragmented, less responsive, and constrained to reach efficiency and service levels.

1.3.2.2 Digitally Enabled Supply Chains

"Organizations within the supply chain have some interoperable digital technologies within their operations and have relevant automation supporting high productivity operations" (Charette, 2020), This indicates that it has a higher level of connectivity and the partial integration of technologies across organizational operations. Organizations at this level uses traditional systems with complemented advanced solutions and analytical tools.

A digitally enabled supply chain represents an intermediate stage of digital development. its main objective is to improve operational efficiency, enhance productivity, and better meet customer service requirement. through the use of digital technologies. Companies aim to optimize processes. Despite these improvements, there still remain some important limitations. Since the integration of systems remains incomplete, and data is not fully shared or exploited across all the supply chain actors. Consequently, organizations at this stage miss opportunities to fully optimize their operations, reduce costs further, and achieve a fully synchronized and agile supply chain.

1.3.2.3 Digitally Transformed Supply Chains

"Represents the most advanced stage of digital maturity. where the principal actors in the supply chain demonstrate strong digital connectivity aimed at achieving all service-level goals" (Charette, 2020). This implies that supply chain processes are completely redesigned and optimized using digital tools and automation, allowing operations to run more efficiently and with minimal human intervention. In this stage, Data plays an essential role, as it is collected and analyzed in real time to provide full visibility and traceability across the entire supply chain. This allows companies to identity and resolve problems, anticipate changes, and make faster data-driven decisions.

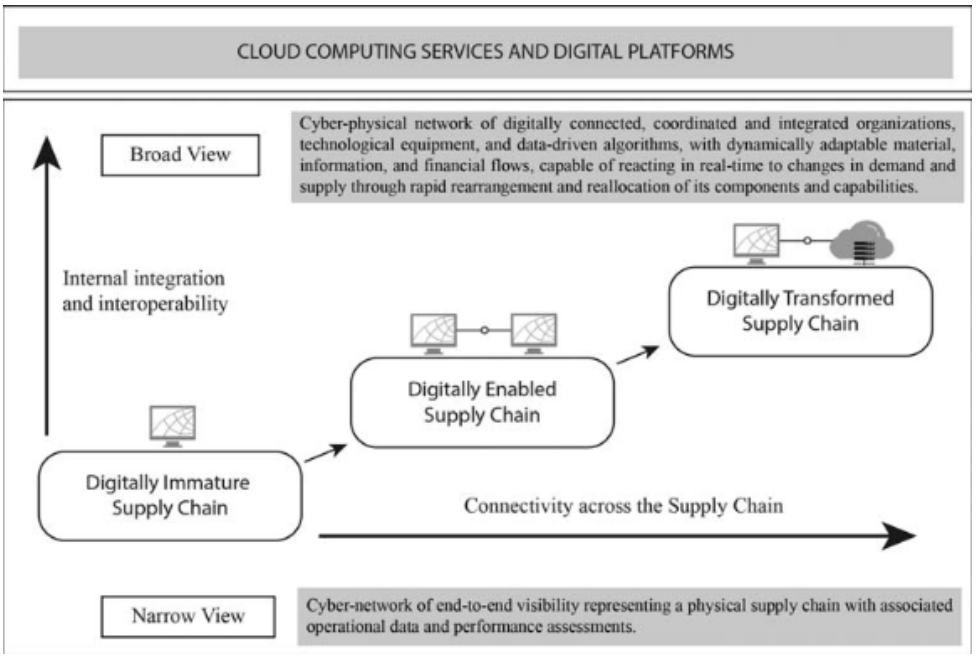

Figure 1.4: Digital maturity levels of supply chain
Source: MacCarthy & Ivanov (2022)

The figure provides a conceptual mapping of supply chain digital maturity. As illustrated, the progression across the three stages reflects an organization's advancing capacity to leverage digital technologies for supply chain optimization, offering a structured framework through which the digital readiness of organizations can be systematically evaluated and compared.

1.3.3 Digitalization and Supply Chain Coordination

The increasing complexity of supply chains, combined with high customer expectations and competition, has made effective coordination a critical success factor for organizational performance. Traditional coordination practices, often based on fragmented information flows and delayed communication, are no longer sufficient to ensure efficiency and responsiveness. Thus, *" digitalization enhances supply chain resilience and performance by*

improving absorptive, response, and recovery capabilities in uncertain environments"(Zhao et al., 2023), This implies that Digitalization enhances the supply chain capacity to absorb disruptions, respond effectively, and recover efficiently in uncertain environments.

1.3.3.1 Role of Digitalization in Coordination

Digitalization strengthen supply chain coordination by deepening collaboration and improving relationship quality between partners. Digital tools enable real-time data exchange, which improves how firms align plans, synchronize activities, and respond to disruptions(Oubrahim et al., 2023).

First, technologies enable real-time visibility, traceability, and transparency of flows and processes, which supports faster, more informed joint decisions and reduces conflicts caused by information asymmetry (Tiwari et al., 2024). Through the use of digital platforms that provides real-time insights into logistics movements, production planning, demand, and inventory levels, creating end-to-end visibility across the network (Hirna, 2025), organizations can continuously collect and access data on the movement of goods, and logistics activities. The real-time visibility provided allows supply chain actors to monitor operations as they occur.

the continuous flow of information enhances coordination by supporting dynamic and flexible planning. This flexibility occurs in the capability of adjusting and modifying planning and operations based on actual conditions provided by the real- time data. Unlike traditional supply chain, where planning decisions are often based on static data and periodic updates. This creates a time lag between what is happening in reality and the decisions being made, leading to inefficiencies and poor alignment between supply chain actor.

Furthermore, digitalization builds technology-driven infrastructure that integrate physical and information flows. *"This integration enables seamless connectivity and communication among diverse stakeholders and strategic integration of entities"* (Tiwari et al., 2024). Given that digitalization is defined as implementing digital systems for seamless transactions, real-time information exchange, and enhanced communication and collaboration across the network (Salamah et al., 2023), this integration eliminates fragmentation and reduces the gaps between information and physical flows.

Moreover, Digitalization enhances coordination by strengthens digital collaboration and information sharing by providing shared platforms, integrated systems, and data-driven tools that connect supply chain partners. *"Supply chain collaboration then integrates internal and external information and supports joint decision making, mediating the impact of digitalization on resilience and robustness "*(Li et al., 2023).

Overall, digitalization plays a crucial role in enhancing supply chain coordination by enabling real-time information exchange, improving visibility, and facilitating collaboration among actors.

Chapter Conclusion:

this chapter has established the fundamental concepts and contextual elements necessary to understand the evolution and challenges of modern supply chains. It has shown that supply chain management is no longer limited to the optimization of isolated operations, but rather relies on the effective coordination of interconnected activities across multiple actors and locations.

The analysis of multi-site logistics networks has highlighted the structural constraints inherent in such configurations, particularly in terms of geographical dispersion, limited visibility, and coordination complexity. These constraints underline the difficulties organizations face in maintaining efficiency and responsiveness within increasingly fragmented systems.

In response to these challenges, the chapter has emphasized the growing importance of supply chain digitalization. Digital technologies offer new opportunities to enhance integration, improve information flows, and support more data-driven decision-making processes. However, their successful adoption requires a clear understanding of both organizational needs and operational realities.

Overall, this chapter demonstrates that mastering supply chain performance today requires a combination of strong theoretical foundations, awareness of structural constraints, and the ability to leverage digital solutions. These elements provide the basis for the following chapter, which will further explore the conditions and mechanisms necessary for the effective implementation of digital platforms in supply chain management.

Theorical Analysis

Part 2

Digital Platform in Supply Chain: Organizational and Pre-Deployment Framework

Chapter 2

Digital Platform in Supply Chain: Organizational and Pre-Deployment Framework

Chapter Introduction

Supply chain is becoming increasingly complex and interconnected. As a result, digital platforms now play a vital role in connecting people, coordinating activities, and enabling faster, better decisions. However, selecting the right technology is only part of the solution. For these platforms to succeed, organizations must also prepare the human resources, align the structures and processes. Digitalization should therefore be viewed not merely as a technical project, but as a comprehensive transformation of the entire organization.

Building on the concepts of logistics coordination introduced in Chapter 1, This chapter explores what is required to effectively implement and use digital platforms in the supply chain, emphasizing that digitalization should not be viewed merely as a technological upgrade, but as a comprehensive organizational transformation.

It begins by examining digital transformation and the implementation of digital platforms, highlighting how these solutions enable better coordination, real-time visibility, and improved decision-making across interconnected supply chain actors. This section outlines the fundamental principles, objectives, and challenges associated with transitioning from traditional systems to digital platforms.

The chapter then focuses on the pre-implementation phase, a critical stage that determines the success or failure of digital initiatives. It places particular emphasis on organizational readiness, key success factors, and the main risks associated with deployment. Special attention is given to leadership, change management, and strategic alignment, as well as to the challenges faced in multi-location or geographically dispersed environments where coordination is more complex.

Finally, the chapter examines the managerial tools and methods used prior to imple-

mentation, including process modeling approaches such as AS-IS and TO-BE analysis, BPMN, and standardization practices. These tools support organizations in structuring their transformation, identifying inefficiencies, and ensuring a smoother transition toward integrated digital platforms.

Thus, this chapter is structured around three main sections:

- **Section 2.1: Implementation of Digital Platforms**
- **Section 2.2: The Pre-Deployment Phase of Digital Platforms**
- **Section 2.3: Managerial Tools and Methods for Pre-Implementation**

2.1 Implementation of Digital platforms

The implementation of digital platforms in supply chain management requires a clear understanding of the key fundamentals that structure this transformation. Beside technology context, it is essential to define the role of digital platforms, the role of the pre-deployment phase, and the notion of organizational readiness. These elements provide the theoretical foundation necessary to analyze how organizations can effectively prepare for and adopt digital solutions

2.1.1 Digital Supply Chain platforms

Digital platforms in supply chains have become a fundamental driver of performance improvement, they are essential to reduce the overall cost of logistic activities between supply chain partners, to improve the overall efficiency of logistics and to integrate social resources. Therefor a definition of supply chain digital platform is needed to understand its functionalities and role.

2.1.1.1 Digital Platform Definition

In supply chains, *"platforms are seen as network cooperation spaces or ecosystems where independent participants interact in a shared information environment, reducing transaction costs and enabling coordinated logistics and supply chain management"* (Shcherbakov & Silkina, 2021). In this context, a digital platform can be defined as a organizational infrastructure that enables interactions and coordination between interdependent actors within the supply chain. It functions as a network ecosystem connecting producers, intermediaries, and customers. By integrating these actors within a shared environment, the platform enhances visibility, supports real-time information flows, and strengthens operational synchronization.

2.1.1.2 Core Characteristics of Digital Platforms in Supply Chains

Beyond the definition and value creation, digital platforms are distinguished by a set of characteristics that collectively determine their capacity to transform the supply chain. Five functional characteristics occur across the literature. *"Digital supply chain platform lies on its multi-sided connectivity capacity, it's the ability to connect multiple actors, it act as multi-sided infrastructure that connect buyers, suppliers, logistics providers and financial institutions within a single integrated environment "*(Bhatti et al., 2022). It allows actors to interact through shared interface using standard data. Moreover, one of it's characteristics is real-time visibility, providing all the actors with continuous data, this visibility covers the supply chain flows, it provides end-to-end, real-time visibility over material, information and financial flows across the supply chain network (Srhir et

al., 2023). Digital supply chain platform relies in its capacity of data sharing and advanced analytics. It gathers information across the supply chain network and analyze it, providing insightful overview on the performance. *"It enables extensive data sharing and employ advanced analytics and AI to generate predictive and prescriptive insights for decision-making"* (Gammelgaard & Nowicka, 2023). Unlike traditional systems, Digital supply chain platform automate processes that were previously performed manually. This reduces processing time, limits errors, and frees operational staff to focus on more complex tasks. *"Digital platforms facilitate ecosystem-based collaboration in which multiple stakeholders jointly create and capture value through shared processes and services"* (Bhatti et al., 2022), it represents the fifth characteristic of digital supply chain platform which is value co-creation, the process by which platform participants jointly produce economic, operational, and relational value that none of them could generate alone.

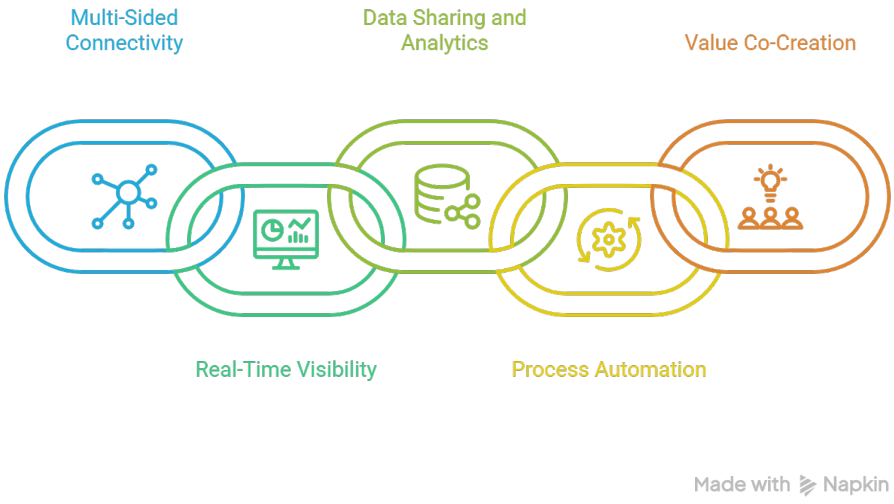

Figure 2.1: Characteristics of a Digital Supply Chain Platform
Source: elaborated based on Napkin AI

2.1.1.3 Value Creation Enabled by Digital Platforms

Digital platforms play a central role in reshaping how value is generated within modern supply chains:

- **Visibility:** *"Supply chain digitalization with real-time analytics provides real-time insights into logistics, inventory, and production planning "*(Tiwari et al., 2024), it enhances visibility by enabling end-to-end access to real time data across all actors.

- **Synchronization & collaboration:** it significantly enhances coordination across supply chain actors by enabling higher level of integration and strategic alignment through information sharing.
- **Ecosystem & multi- actor:** it creates a interconnected system that brings together all the supply chain actors within a shared digital environment.
- **Transaction & coordination costs:** by replacing fragmented, manual, and inconsistent communication and coordination with an integrated, standardized, and transparent digital platform. it will assure the optimization of transition and coordination costs.

Digital platform enhances supply chain performance by improving coordination, integration, and collaboration across actors. By enabling real-time data sharing, it reduces operational delays, strengthen synchronization across processes, and support more efficient logistics and production flows.

2.1.1.4 Digital Platforms vs Traditional Systems

The implementation of digital platforms in supply chain environments can be more clearly understood by comparing them with traditional systems that have historically underpinned logistics and planning activities. Traditional tools such as spreadsheets (e.g., Excel) and early-generation ERP systems have long been used to manage supply chain operations; however, these systems are often characterized by fragmented data structures, limited integration capabilities, and sequential information flows. In traditional environments, data is typically stored in isolated files or functional modules, resulting in poor visibility across the supply chain. Excel-based planning, for instance, relies heavily on manual updates and individual responsibility, which increases the risk of errors, inconsistencies, and delayed decision-making. Similarly, conventional ERP systems, while more structured, often operate within organizational silos and lack real-time interoperability across multiple actors in the supply chain network. In contrast, digital platforms are designed as integrated and interconnected ecosystems that enable real-time data sharing, cross-functional coordination, and end-to-end visibility. They consolidate information from multiple stakeholders into a unified environment, ensuring that all actors operate on a shared and continuously updated dataset. This eliminates data fragmentation and supports synchronized decision-making across the supply chain. Furthermore, traditional systems are largely oriented toward analysis of past data, whereas digital platforms support predictive and prescriptive functions through real-time processing and advanced analytics. This evolution improves responsiveness, increases the accuracy of planning, and enhances overall supply chain agility. From an implementation perspective, the transition from traditional systems to digital platforms represents not only a technological upgrade

but also an organizational transformation. It requires the standardization of processes, integration of data flows, and alignment of stakeholders around a common digital architecture. As a result, the success of digital platform implementation depends heavily on the organization's ability to move beyond fragmented tools toward a unified and collaborative information system.

2.1.2 implementation of digital supply chain platform

Digital platform adoption in logistics environments is not a procurement decision but a managed organizational transformation. Its success depends on the quality of the strategic diagnosis that precedes it, the rigor of the process analysis that informs it, the integrity of the data infrastructure that supports it, the depth of the stakeholder alignment that enables it. Therefor, we define Digital platform implementation in supply chains as the structured process through which an organization integrates a digital platform into its supply chain operations in order to enable coordination, real-time information sharing, and process optimization across multiple actors. It involves not only the technical deployment of the platform, but also the alignment of business processes, data flows, and organizational structures to ensure effective collaboration and value creation within the supply chain network. According to (Damanik et al., 2025) The implementation of digital supply chain practices can be conceptualized as a progressive and structured transformation of core operational processes through the integration of digital tools and data-driven mechanisms. Rather than occurring as a single-step technological shift, this implementation unfolds across a series of interconnected stages that collectively enhance coordination, visibility, and operational control.

2.1.2.1 Key Drivers for Adoption

The adoption of digital technologies in Supply Chain Management (SCM) is driven by a combination of operational, strategic, and organizational factors that collectively shape the digital transformation

1. **Efficiency Improvement:** Efficiency improvement emerges as the primary driver of digital technology adoption in supply chain management, particularly in fragmented environments. From a strategic perspective, efficiency is not perceived as an operational benefit but as a core objective of digital transformation. it is evident that the capacity of digital tools to enhance performance, reflected in streamlining processes and improving coordination. Operationally, digital technologies are adopted to address persistent inefficiencies, including project delays, cost overruns, and lack of coordination. In particular, efficiency gains are strongly associated with:

    - **Inventory optimization and demand planning**, identified as the most

impactful application area,

- **Real-time monitoring and visibility**, enabling faster and more informed decision-making,
- **Automation of repetitive tasks**, contributing to productivity improvements.

However, the realization of efficiency gains depends on the presence of a **clear strategic vision and governance mechanisms**, which allow organizations to translate technological adoption into measurable performance improvements and competitive positioning.

2. **Competitive Advantage:** Competitive advantage constitutes a strategic driver of digital transformation. Unlike efficiency, which acts as a direct trigger for adoption, competitive advantage represents the long-term outcome of digitalization efforts. Organizations leverage digital technologies to enhance their ability to respond to market demands, optimize operations, and differentiate themselves in increasingly complex and competitive environments. Digital supply chain capabilities such as integrated platforms enable firms to:

   - Improve service responsiveness and delivery speed.
   - Offer greater product and service customization.
   - Achieve enhanced end-to-end visibility across the supply chain.

   Nevertheless, achieving a sustainable competitive advantage requires overcoming significant organizational barriers, including resistance to change and reliance on traditional practices. In this context, leadership and strategic alignment play a critical role in ensuring that digital initiatives contribute not only to operational improvements but also to long-term market positioning. Thus, competitive advantage can be understood as the strategic objective, while efficiency serves as the operational foundation enabling its realization.

3. **Top Management Support:** Top management support is identified as a critical enabling driver, acting as the bridge between the recognition of digital transformation benefits and their effective implementation. Although there is general acknowledgment among leadership of the strategic value of digital technologies, It exists a gap between perception and action. While managers recognize the long-term benefits of digital investments, practical support such as resource allocation, active involvement, and guidance remains insufficient in many cases. The role of top management includes:

- Providing strategic direction and vision, ensuring alignment between digital initiatives and organizational objectives,
- Driving change management, by fostering a culture that supports innovation and reduces resistance,
- Ensuring resource mobilization, including financial, technological, and human resources,
- Mitigating risks, particularly those related to cybersecurity and data governance.

Furthermore, effective leadership is essential to overcome implementation barriers by introducing incentive systems, supporting continuous learning, and establishing performance measurement frameworks. In this regard, top management support is not only a facilitating factor but a determinant of organizational readiness, directly influencing the success or failure of digital transformation initiatives.

4. **Innovation Culture:** Innovation culture represents both a key driver and a critical challenge in the adoption of digital technologies. It is recognized as one of the primary motivators for digital transformation, with a high level of importance. Organizations that foster an innovation-oriented culture are better positioned to:

   - Encourage experimentation and adoption of new technologies.
   - Enhance collaboration and information sharing among stakeholders.
   - Address structural inefficiencies within the supply chain.

   However, the transition toward such a culture requires overcoming deeply rooted barriers, including resistance to change, adherence to traditional work methods, and reluctance to share information. These factors contribute to a generally low level of digital readiness. The development of an innovation culture is closely linked to leadership, as top management plays a central role in:

   - Promoting a forward-thinking organizational mindset.
   - Implementing change management strategies,
   - Establishing incentive mechanisms that reward innovation and participation in digital initiatives.

   Therefore, innovation culture can be considered a foundational driver, as it shapes the organizational environment necessary for the successful adoption and integration of digital platforms.

2.1.2.2 Implementation Purposes:

According to (Matarneh & Mohsen, 2024) the implementation of digital platform in Supply Chain Management (SCM) is primarily driven by the need to address persistent operational inefficiencies and structural fragmentation. These technologies are not adopted randomly; rather, they respond to a set of clearly defined purposes.

1. **Efficient Inventory Management and Demand Planning:** Efficient inventory management and demand planning is identified as the most important purpose for the implementation of digital technologies. Which highlights the central role in improving supply chain performance in a sector characterized by uncertainty and frequent disruptions. The primary objective of this purpose is to optimize resource utilization by ensuring that materials are available at the right time and in the right quantity. Digital technologies enable firms to avoid both shortages, which lead to project delays, and overstocking, which increases storage costs and waste. In parallel, these tools significantly enhance demand forecasting capabilities, allowing organizations to better anticipate project requirements despite the complexity and variability of construction activities. Technological enablers support real-time material tracking and integrated planning processes. Overall, this purpose is perceived as one of the most impactful aspects of digital transformation, as it directly contributes to operational efficiency, cost control, and improved coordination across the supply chain.

2. **Cost Reduction:** Cost reduction represents a central objective and key driver of digital technology implementation, and a primary purpose. In a sector where cost overruns are a persistent issue, digitalization is seen as a critical tool for improving financial performance. The implementation of digital technologies aims to map processes, eliminate inefficiencies, and optimize resource allocation, which leads to reducing both operational and administrative costs. By improving planning accuracy, enhancing coordination, and minimizing errors, firms can significantly reduce waste. However, the pursuit of cost reduction is closely linked to the challenge of investment justification. Organizations must evaluate the return on investment (ROI) of digital technologies and conduct cost-benefit analyses to ensure financial viability. In addition, cost reduction is associated with broader impacts such as improved energy efficiency, optimized logistics operations, and enhanced sustainability. As a result, it is not only a short-term operational goal but also a contributor to long-term economic resilience.

3. **Risk Mitigation:** Risk mitigation is identified as a high-priority purpose. It reflects the need to manage the uncertainties and disruptions that characterize the supply chain. Digital technologies enable organizations to proactively identify, as-

sess, and mitigate risks through the use of data analytics, predictive models, and real-time monitoring systems. These tools allow firms to anticipate potential issues such as project delays, cost overruns, and coordination failures, and to take corrective actions before they escalate.

4. **Real-Time Tracking and Monitoring:** Real-time tracking and monitoring is a foundational purpose of digital implementation. It plays a critical role in improving visibility and coordination within a highly fragmented supply chain. Through technologies, organizations can continuously monitor the movement of materials, equipment, and project activities. This real-time visibility enables faster and more informed decision-making, reduces information delays, and enhances operational responsiveness. One of the key contributions of real-time monitoring is its ability to reduce fragmentation by creating a shared and updated view of the supply chain. This improves coordination among stakeholders and helps address common challenges such as miscommunication and lack of synchronization. Furthermore, real-time data supports performance tracking and transparency, allowing firms to detect inefficiencies and implement corrective measures promptly. As such, this purpose serves as a critical enabler of both operational efficiency and strategic control.

5. **Stakeholder Engagement and Collaboration:** Stakeholder engagement is recognized as a strategic purpose of digital technology implementation. In a sector involving multiple actors, effective communication and collaboration are essential for successful project execution. Digital technologies facilitate integrated communication and information sharing among stakeholders. Platforms such as enable a shared data environment where all participants can access accurate and up-to-date information. This improved connectivity enhances decision-making processes, as stakeholders can rely on consistent data and coordinated actions. It also supports continuous improvement. However, achieving effective stakeholder engagement remains challenging due to barriers such as resistance to change, lack of digital infrastructure, and slow adoption among traditional partners. As a result, the success of this purpose depends heavily on organizational readiness and the development of an innovation-oriented culture.

Overall, digital technologies in supply chain management aim to improve both operational efficiency and strategic performance. They help optimize resources, reduce costs, enhance visibility, and improve coordination among stakeholders. More broadly, they support the transition toward a more integrated, transparent, and resilient supply chain system.

2.1.3 Implementation Readiness for Digital Transformation

The pre-deployment phase constitutes a critical stage in digital platform implementation, it involves assessment of the organization's capability to adopt this platform. Moreover, *"the organizational readiness significantly predicts adoption and effective use"* (Shahzad et al., 2024). The pre-deployment assessment phase requires a clear understanding of structures, capabilities, resources, processes, and level of capability. Complementing this perspective, it provides a structured approach to evaluating readiness. enabling organizations to anticipate challenges, ensure coherence between the system and existing operations, and establish the necessary conditions for a successful and sustainable implementation.

2.1.3.1 Assessment Dimensions

According to(Mdima et al., 2017) the core assessment dimensions determines an organization's overall readiness status. These dimensions are: Strategic Readiness, Business Readiness, Technology Readiness, and Change Readiness. Collectively, these dimensions allow an organization to predict its current state and identify specific areas requiring improvement before beginning the costly and complex process of implementation

- **Strategic Readiness:** It focuses on the high-level alignment between the proposed platform and the organization's long-term objectives, ensuring the project is a deliberate step toward achieving a competitive advantage, it ensures that the adoption of a digital platform is driven by clear organizational objectives rather than purely technological considerations.

- **Business Readiness**: It focuses primarily on the alignment between business processes and information technology, ensuring that the software can effectively support the organization's functional requirements. It is the degree of mutual fit between the platform and the organization's work processes. Because digital platforms are designed with predefined standard processes, the organization must evaluate how well these match its own requirements. Achieving this fit often involves:

  - Process Redesign: Adjusting existing workflows to align with the platform's capabilities.
  - Standardization: Configuring the platform so that it meets the specific needs of the enterprise while maintaining its integrated nature.

- **Technology Readiness**: It focuses on the technical infrastructure, data integrity, and system architecture required to support a complex, integrated software solution. it's measured through Technological Infrastructure which includes the hardware, software, and networking capabilities of the organization, the Information

Systems Alignment that evaluates existing information systems to ensure they can be integrated or replaced to support the business value chain in real-time, and Data Accuracy A significant technical hurdle in platform implementation is managing dirty data. Readiness involves ensuring that data is accurate and reliable before it is migrated to the new centralized system.

- **Change Readiness**: It focuses on the human, cultural, and organizational transitions required to successfully integrate an ERP system, which the sources describe as a source of massive change that must be carefully managed, he model include human Resources by Assessing the availability and mindset of personnel and the level of top management commitment, training and User Support by Evaluating whether programs are in place to enhance employee knowledge and skills, which is considered a critical post-implementation concern that must be addressed early, Communication by Ensuring that plans and goals are communicated enterprise-wide so they are understood by all users, and Organizational Culture by Managing the cultural structures and socio-economic contexts that influence how technology is accepted.

Overall, the various dimensions of readiness highlight that assessing an organization before implementation is a multidimensional and highly integrated process. Each dimension focuses on a specific aspect of preparedness, but their true effectiveness comes from how well they align and support one another. This perspective is consistent with the findings of (Somers & Nelson, 2001), whose study of critical success factors in enterprise system implementations identified pre-implementation activities, including top management support, project team competence, and clear goal definition, as among the most decisive determinants of deployment outcomes, reinforcing the argument that preparation, rather than the system itself, drives implementation success.

2.2 The Pre-Deployment Phase of Digital platform

in organization's processes requires a pre-deployment strategy that ensures the platforms effectiveness and viability. *" The organizational preparation and alignment are as important as the technology itself for successful implementation "*(Chari et al., 2023). Before any digital platform can be deployed within a logistics environment, the transformation initiative must be grounded in a clear and coherent strategic framework. the established framework assure the alignment of the project of the implementation with the strategic objectives.

2.2.1 The pre-implementation framework of digital platform

Digital transformation research stresses that readiness and structured preparation (strategy, processes, data, people) are prerequisites for successful implementation and to avoid failure causes such as weak process understanding, poor data, and lack of change management (Kusmiarto et al., 2021). Thus, the preparation for the implementation of digital platforms in supply chains has been addressed in the literature through various perspectives, often focusing on specific dimensions such as organizational readiness, process transformation, or technological integration. Rather than presenting a standardized model or framework, existing studies tend to highlight a set of recurring dimensions that influence the success of digital transformation initiatives. As a result, the understanding of the pre-deployment phase emerges from a synthesis of these contributions.
In order to provide a structured understanding of the pre-deployment phase, the insights derived from the literature can be organized into a set of key phases that capture the main areas influencing digital platform implementation:

1. **Strategic Diagnosis phase:** a strategic diagnosis is a structured assessment of the organization's current competitive position, performance gaps, and digital transformation ambitions. Diagnosis models start with assessing current digital situation, capabilities, and strategic goals, forming the baseline and business case for transformation (Machado et al., 2021). The main objective is to form a clear transformation vision, identifying strategic performance gap, A structured performance gap analysis quantifying the distance between current and target performance, it is a central output of digitalization strategic planning. Overall, strategic diagnosis serves as a critical foundation for digital platform implementation by identifying performance gaps, clarifying strategic objectives, and ensuring alignment between technological initiatives and business needs.

2. **Process Analysis phase:** With the transformation vision established, digitaliza-

tion roadmaps explicitly include detailed mapping and analysis of existing processes as the analytical basis for later design and technology decisions (Aldoseri et al., 2024), therefor, organization must map its current process. This phase involves the systematic mapping of all logistics coordination processes (transport planning, order management, carrier communication, load consolidation, delivery confirmation, and exception handling) across all sites in the network, using formal process modeling tools. Process modeling creates an organizational transparency, of how processes actually function, which is frequently different from how they are formally specified or assumed by management. By understanding current process architecture in detail, the organization can make informed decisions regarding which processes should be standardized, which require reengineering, and which should be configured within the platform.

3. **Data Structuring phase:** To ensure that the digital platform implemented can deliver its analytical and visibility capabilities the organization must structure its data that is accurate, consistent, complete, and accessible. Therefor, data quality and governance must be addressed before platform deployment, as they are foundational to any data-driven or AI-enabled solution (Cichosz et al., 2020). A platform built on poor-quality, fragmented data produces unreliable visibility and inaccurate analytical results, in consequence, the platform fail to deliver the expected added value.

4. **Stakeholder Alignment phase:** Digital platform adoption is not only a technical process, but also organizational. it includes leadership vision, communication, culture, skills, and change management as central conditions (Kusmiarto et al., 2021). Assuring the stakeholders alignment by organizing communication sessions to explain the objectives and benefits of the implementation project, discussions to clarify roles and responsibilities, collaborative workshops to identify concerns and improve cooperation, and the development of a change management plan covering training, and support measures. The main objective of this phase is stakeholder engagement and commitment, which are essential to ensure successful adoption of the platform and effective integration into organizational practices.

5. **Requirements Definition and Readiness Validation phase:** The final pre-implementation phase translates the outputs of all preceding phases into a precise, validated specification of what the digital platform must do and what organizational conditions must obtain before deployment can begin. It serves as the bridge between analytical preparation and the actual configuration of the digital platform. The primary goal of this phase is to translate the output gathered in the first four phases (strategic goals, current process dysfunctions, data audits, and stakeholder

needs) into a formal, validated set of specifications, by the development of (TO-BE) process models, which describe the desired future state of logistics processes once the platform is deployed. This is followed by a gap analysis, which compares the current (AS-IS) processes with the (TO-BE) models in order to identify the necessary operational, informational, and organizational changes. On this basis, the organization defines the requirements, these include functional requirements, which specify what the platform must enable (such as transport planning, real-time visibility, and exception management), and technical requirements, which relate to how the system should operate in terms of integration, data exchange, and system performance.

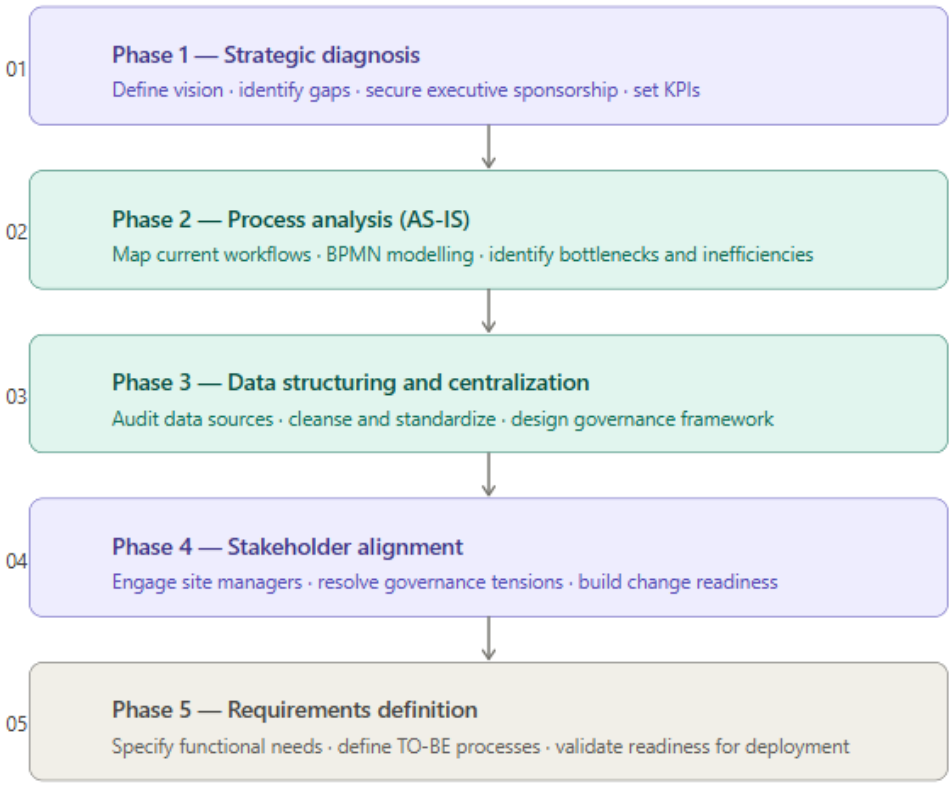

Figure 2.2: The pre-implementation roadmap of digital platform
Source: Author's elaboration

2.2.2 Key Success Factors of Implementation

Digital transformation in supply chain depends less on individual technologies and more on aligning strategy, organization, people, and infrastructure.Therefor the concept of Critical Success Factors (CSFs) was introduced, it is *" the limited number of areas in which satisfactory results will ensure successful competitive performance for the organization"* (Rockart, 1979). In the context of digital platform implementation, CSFs refer to the

specific conditions, capabilities, and organizational behaviors that must be present and actively managed in order for the implementation to achieve its expected results . They are essential conditions, rather than optional features; whose absence significantly increases the probability of implementation failure

The importance of CSFs in digital transformation is well established according to shows that most digital system implementation failures are not caused by technical limitations, but rather by organizational, managerial, and behavioral factors that were not adequately addressed. In supply chain and logistics environments, where platform deployment affects multiple actors, processes, and systems simultaneously, The number of factors that can compromise success is particularly high. Identifying and actively managing CSFs before and during implementation is therefore not an optional best practice, rather it is a fundamental risk management discipline.

CSFs also serve a prioritization function. Since organizational resources, whether time, budget, or managerial focus are limited, CSFs help decision-makers focus on the most critical areas that directly influence implementation success, understanding which factors matter most allows implementation teams to focus their preparation efforts where the risk of failure is highest.

2.2.2.1 CSFs categories:

According to (Alquraidi et al., 2024) CSFs are devided into four analytical categories: technology, people, organizational governance, and environment.

1. **Technology Factors Category:** System integration capability is among the most technically critical success factors in supply chain platform implementations. Digital platforms must connect with existing enterprise systems as well as with the systems of external supply chain partners. When integration architecture is poorly designed the platform cannot access the data it needs to function, making its visibility and analytics features less effective. Therefore, preparing integration mapping and selecting integration tools before deployment is necessary.

   Data quality and availability represents a second technology CSF of high importance. A platform is only as reliable as the data it processes. If input data is incomplete, inconsistent, or poorly structured, conditions that are common in organizations where operational data is managed through spreadsheets and disconnected local systems, the platform may produce incorrect results, which reduces user trust and weakens adoption. Therefore, ensuring data quality before deployment through cleaning, standardization, and proper data governance design is a critical preparation step.

Scalability and platform flexibility determine whether the implemented solution can adapt to evolving business requirements without requiring full redevelopment. In supply chain environments characterized by network growth, volume fluctuation, and partner change, a platform that cannot scale or be reconfigured becomes a constraint rather than an enabler. Assessing the platform's architecture for modularity and flexibility during the selection phase is therefore a key technological success factor that should be addressed in the pre-implementation stage.

2. **People Factors Category** Top management support is consistently identified across the CSF literature as the most influential factor determining the success of digital transformation. Senior leadership commitment determines resource allocation, supports the organizational changes required for transformation, and clearly signals to middle managers and operational staff that the initiative is a strategic priority rather than a purely technical IT project. Without real involvement from top management, implementation programs often lose momentum when they face the expected resistance and complexity of large-scale organizational change.

   Change management and employee training address the human dimension of platform adoption. Digital platforms change how people work: they replace familiar tools and routines with new interfaces, data entry requirements, and decision-making processes. Without structured change management, employees will resist the platform, develop workarounds, or use it in ways that do not generate the intended benefits.

   User competence and digital literacy constitute a related but distinct people factor. Change management addresses willingness to adopt; digital literacy addresses capability to adopt. In supply chain environments where a significant proportion of the workforce has limited experience with digital tools, investment in foundational digital skills training is a necessary precondition for effective platform use.

3. **Organizational Governance Factors Category** Clear project governance and accountability ensure that the implementation program has well-defined decision-making authority, clear roles, and transparent ways to escalate issues. Without this structure, decisions are delayed, responsibilities become unclear, and the project can move away from its original scope and objectives. In multi-site logistics environments, governance must clearly define how authority is shared between central project teams and local site managers, as unclear roles can lead to inconsistent implementation across sites.

   Process standardization and documentation is both a preparatory activity and a governance CSF. Digital platforms require standardized process inputs to function effectively. The governance dimension of this factor concerns the organizational

mechanisms through which standardization is enforced and maintained after deployment.

Stakeholder alignment across organizational boundaries is particularly critical in supply chain contexts where platform adoption requires the cooperation of external partners (suppliers, carriers, and customers) who have their own systems, priorities, and change management challenges. Achieving alignment across organizational boundaries requires early partner engagement, shared definition of integration requirements, and, in some cases, contractual incentives for platform participation.

4. **Environmental Factors Category** Regulatory and compliance environment shapes the constraints within which the platform must operate. In logistics and supply chain management, platforms must comply with customs regulations, data protection laws, electronic invoicing requirements, and sector-specific standards that vary across operating geographies. Failure to account for regulatory requirements during platform design generates compliance gaps that may require costly post-deployment modifications.

   Competitive and market pressure can function as either a driver or a constraint for digital platform adoption. Organizations operating in highly competitive logistics markets, where customers increasingly demand real-time visibility and digital interaction, face strong external pressure to accelerate platform adoption, which can be strategically helpful in securing internal commitment but can also create unrealistic timelines that compromise preparation quality. Partner and ecosystem readiness reflects the fact that supply chain platform value depends on network participation. Even a technically excellent platform generates limited coordination value if the suppliers, carriers, and customers it is intended to connect are not digitally capable or willing to integrate. Assessing ecosystem readiness, the digital maturity and integration willingness of key supply chain partners is therefore an environmental CSF that must be addressed in the pre-implementation phase.

The successful implementation of digital platforms in supply chain management is contingent upon a complex interplay of organizational, technological, and environmental conditions. Rather than relying on a single determinant, success emerges from the alignment and interaction of multiple factors that collectively influence the trajectory of digital transformation initiatives. This complexity has led researchers to develop Critical Success Factor (CSF) frameworks, which aim to systematically identify and organize the key elements that must be effectively managed to achieve desired implementation outcomes.

(Alquraidi et al., 2024) summurize the factors in the table that provide a structure through which digital transformation can be analyzed, recognizing its multidimensional nature. In most cases, CSFs are grouped into broad, interrelated categories that capture the different dimensions of digitalization. These typically include technological aspects

such as infrastructure and system capabilities; human and leadership-related factors that address skills, culture, and managerial commitment; governance mechanisms that ensure strategic alignment, coordination, and control; as well as environmental conditions that shape the external context in which organizations operate.

Main Category Description	**CSF**	**Description**
Technology: This criterion encompasses the organizational technological capabilities in terms of IT infrastructure such as: Data-driven digital process automation, Technology readiness, Data security, and Data management.	Data-driven digital process automation	To establish digitalized and data-driven process for automation with deploying different technologies to improve the efficiency of services.
	Technology readiness	The organizational capability to adopt and accept new technologies and digital transformation. As well as organizational resilience and its adaptability to such change.
	Data Security	It reflects on the importance of the organization's capability to maintain data security, user privacy, and data-governance consistently with digital transformation.
	Data Management	The organization's capability to manage data in terms of data integration, information management, and systems integration.
People: This criterion describes both internal and external parties in terms of individuals including: Leadership, Top management support, Organizational culture, and Training.	Leadership	It reflects on the importance of having active leadership will enable smooth transformation towards digitalization in supply chain and cascading decisions down the hierarchy.
	Top management support	This factor represents organizational top management support and commitment to provide adequate resources and support for supply chain management digital transformation objectives.
	Organizational culture	It includes employees at all levels in an organization, top to bottom, and their adaptability and perception toward the importance of digitalization.
	Training	This factor revolves around the availability of competencies in the organization and the capability of the organization to share knowledge transfer and equip their employees with the required skills.

Main Category Description	**CSF**	**Description**
Organizational Governance: This criterion encompasses the overall supply chain management governance of an organization in terms of strategy and processes such as: Resource availability, Strategy alignment, Change management, and Communication management.	Resource availability	This factor reflects on the availability of resources in an organization which includes and not limited to, human, finance, and technology resources to achieve supply chain digitalization objectives.
	Strategy alignment	The availability and alignment of a supply chain management strategy across different stakeholder with the overall business strategy.
	Change management	It describes the organizational capability towards the adaptation and continuous change to cope with a rapidly changing environment to improve its readiness and responsiveness.
	Communication management	It defines both the internal and external communication channels to deliver the communication strategy in terms of information and knowledge sharing, fostering a collaborative environment to communicate effectively through the supply chain network ensuring openness and visibility.
Environment: This criterion defines the external environment around the organization including: Competitive pressure, Customer satisfaction, Continuous improvement strategy, Governmental incentives and rewards.	Competitive pressure	It refers to the aptitude and the promptness of the organization towards the adoption of new technologies motivated by external pressure and the desire to achieve competitive advantage.
	Customer Satisfaction	It defines the use of digitalization to promote easiness and convenience to customers in accessing the organization's services.
	Continuous improvement strategy	It describes the governmental initiatives, regulations, and legislations towards the overall continuous improvement of services in organizations.
	Governmental incentives & rewards	It reflects on how the government perceives the importance of digitizing the supply chain management processes and they encourage public organizations to adopt new technologies; giving incentives and rewards.

Table 2.1: Critical Success Factors for Supply Chain Digital Transformation

While all four categories of Critical Success Factors (CSFs) contribute to the success of digital platform implementation, the literature indicates that their relative importance is not equal.

Within the Technology category, data security stands out as a primary concern. In multi-actor platforms where sensitive commercial information is exchanged across organizational boundaries, fears related to data exposure remain one of the most significant barriers to adoption among supply chain partners. In addition, data-driven process automation and overall technological readiness play a crucial role in determining an organization's ability to sustain digital transformation over time.

In the People category, leadership commitment and strong top management support emerge as central drivers of success. These elements provide direction, legitimacy, and resource backing to implementation efforts. Alongside them, organizational culture and employee training are critical, as the success or failure of such initiatives often depends more on human and behavioral factors than on purely technical considerations.

With regard to Organizational Governance, effective change management and communication management are particularly decisive. The capacity to adapt internal processes while ensuring clear and consistent information flows across the supply chain network directly influences the realization of digitalization objectives. Furthermore, adequate resource allocation and alignment with the overall business strategy are essential to maintain coherence and long-term effectiveness.

Finally, Environmental factors such as competitive pressure, customer expectations, continuous improvement dynamics, and governmental incentives primarily shape the external context in which adoption occurs. Although these factors can strongly influence the motivation to implement digital platforms, they are generally less controllable by the organization and tend to be prioritized based on the specific regulatory and market environment.

2.2.3 Managing Risks Through the Pre-Deployment Preparation

Pre-deployment preparation is defined as the structured set of analytical, organizational, and managerial activities undertaken before a digital platform is implemented, with the explicit purpose of identifying, understanding, and mitigating the risks that could com-

promise implementation success. It is fundamentally a proactive discipline, rather than waiting for problems to emerge during implementation and resolving them re-actively, at high cost and disruption. Pre-deployment preparation converts anticipated risks into managed preparation tasks that can be addressed in a controlled environment before the pressures of live deployment apply.

This distinction between proactive and reactive risk management is analytically important. In practice, many organizations treat risk management as a parallel work-stream within the implementation project itself. This approach systematically underestimates the cost of late-stage risk discovery. affectively, the risks that are identified and addressed before deployment cost a fraction of what they cost to resolve after.

Pre-deployment preparation should therefore be understood not as a preliminary phase before the real work begins, but as the most cost-effective risk management investment available to an organization pursuing digital transformation.

2.2.3.1 Types of Risks in Digital Platform Implementation

Digital platform implementation in supply chain environments is exposed to four categories of risk, each rooted in a distinct dimension of organizational and technical complexity.

1. **Operational risks:** appears from misalignment between the platform's process logic and the organization's actual operational practices. When existing processes are poorly documented, inconsistently executed, or significantly different across sites, the platform cannot be configured to support them accurately. The result is a system that does not reflect operational reality, generating user frustration, manual workarounds, and a gradual return to pre-platform coordination methods. In multi-site logistics environments, operational risk is amplified by process heterogeneity: each site may execute the same function differently, making it impossible to configure a single platform workflow that serves all sites without prior standardization.

2. **Technical risks:** relate to integration failure, data inconsistency, and infrastructure incompatibility. Digital platforms require reliable, structured data inputs from multiple systems and organizational actors. When legacy systems lack integration capability, data formats are incompatible across sites, or when network infrastructure is insufficient to support real-time data exchange, the technical foundations

of the platform are compromised. Technical risks are not visible until integration testing, a late stage of the implementation process at which redesign is expensive and disruptive.

3. **Organizational risks:** Employees and managers who have not been involved in the transformation design, who do not understand the rationale for the change, or who perceive the platform as a threat to their autonomy or employment are likely to resist adoption, either openly or through passive non-compliance. Organizational risk is highest in multi-site environments where the implementation affects large, geographically distributed workforces with established local cultures and routines.

4. **Strategic risks:** emerge when the platform is deployed without clear alignment to business objectives. If the strategic rationale for the initiative has not been explicitly defined and communicated, implementation decisions are made without a consistent reference point. The result is a platform that is technically deployed but strategically misaligned: it may function correctly but fail to address the coordination, visibility, or cost challenges that motivated the investment.

2.3 Managerial Tools and Methods for Pre-Implementation

In supply chains, *" process models help analysts understand inter-organizational workflows and requirements and are more effective than text alone for domain understanding "*(Leukel & Sugumaran, 2021), it is essential for visualizing and representing processes operations, describing activities, decisions, information flows, and actors involved in process. the purpose of process modeling is to standardize workflows and make it visible. it eliminate inefficiencies, misunderstandings, and duplicated tasks. By modeling, the hidden complexities appears, allowing to identify bottlenecks, redundancies, delays, and the opportunities for improvement appear.

2.3.1 Process Mapping and Structuring (AS-IS / TO-BE)

2.3.1.1 Process Definition

The process definition covers all aspects of input and output factors of the processes and the definition of the level of significance of the three processes dimensions quality, performance and costs. A process is seen as a structure that consists of tasks with logical consequences. A process has measurable, predefined input and output and exists to bring a specific value for the customer. Therefore a process must always add value. The input triggers the process by determining a preliminary task, a predefined point of time or by modified environmental conditions. *"Customers are all individuals, departments and enterprises that acquire any output from the process"* (Mau, 2002).

2.3.1.2 AS-IS approach:

The AS-IS process model is a structured, documented representation of an organization's processes as they currently exist and operate, not as they are formally specified, or managerially assumed. It captures the actual sequence of activities, decision points, information flows, actor responsibilities, system interactions, and material movements that constitute operational reality at the time of analysis (Dumas et al., 2018). It is used because organizations consistently overestimate the coherence and efficiency of their existing processes. Without formal documentation, process knowledge is distributed across

individuals, embedded in local habits, and invisible to organizational leadership. This invisible complexity becomes acutely problematic when a digital platform is introduced: systems that are configured to support undocumented or misunderstood processes will systematically fail to reflect operational reality, generating user rejection and integration failures. The AS-IS approach is therefore used to:

- Create a shared organizational understanding of how work is actually performed
- Surface hidden inefficiencies, bottlenecks, redundancies, manual workarounds, and coordination gaps that would otherwise be embedded in the digital platform
- Establish a documented baseline against which future process improvements can be measured
- Provide the empirical foundation for gap analysis and TO-BE design

In the pre-implementation context specifically, the AS-IS analysis serves as the primary diagnostic instrument. Without it, platform decisions are made on assumptions rather than evidence. a condition that is identified as one of the most reliable predictors of ERP and digital system implementation failure.

For multi-site logistics organizations in particular, the AS-IS analysis must capture inter-site process variations, the differences in how the same process is executed at different sites, because these variations determine the standardization effort required before platform deployment and the governance decisions that must precede it.

Moreover, in the pre-implementation phase, the AS-IS model fulfills three essential roles. First, it supports the specification of platform requirements by identifying the processes and functionalities that need to be maintained, improved, or replaced. Second, it enhances stakeholder communication by providing a shared visual reference that facilitates alignment between technical and operational actors. Third, it enables gap analysis by establishing a baseline that allows for a clear assessment of the differences between the current state and the intended TO-BE model.

2.3.1.3 TO-BE approach:

The TO-BE process model is a structured specification of how organizational processes should function after the digital transformation is complete. It represents the target operational state; the redesigned, optimized, and platform-aligned version of the processes

documented in the AS-IS analysis. Unlike the AS-IS model, which is derived from observation, the TO-BE model is analytically constructed, it reflects deliberate design decisions about how processes should be restructured to eliminate identified inefficiencies, leverage platform capabilities, and support strategic objectives.

The TO-BE model is used as a transformation target. Without a clear, documented vision of the desired future process state, platform configuration decisions lack a reference point, integration requirements cannot be precisely specified, and the success of the transformation cannot be meaningfully evaluated.

It also serves a critical communication function. By explicitly representing and visualizing the future state, the TO-BE model enables informed stakeholder alignment. Operational actors are able to clearly understand the nature of the anticipated changes, the evolution of their roles, and the functions that will be assumed by the platform, thereby reducing uncertainty and mitigating potential resistance.

In the pre-implementation context, the TO-BE model is essential as it defines the target structure and functioning of the digital platform before any development or system setup begins. When organizations postpone the design of the TO-BE model to the implementation phase, they often face scope creep, repeated system changes, and budget overruns. This occurs because requirements that should have been clearly defined beforehand are instead identified during deployment, when adjustments are more complex and significantly more costly.

The TO-BE model performs three functions in the pre-implementation phase: it defines the functional requirements that the digital platform must satisfy; it establishes the process standardization targets that must be achieved across sites before deployment; and it provides the evaluation criteria against which post-deployment performance will be assessed, enabling the organization to determine whether the transformation has achieved its intended outcomes.

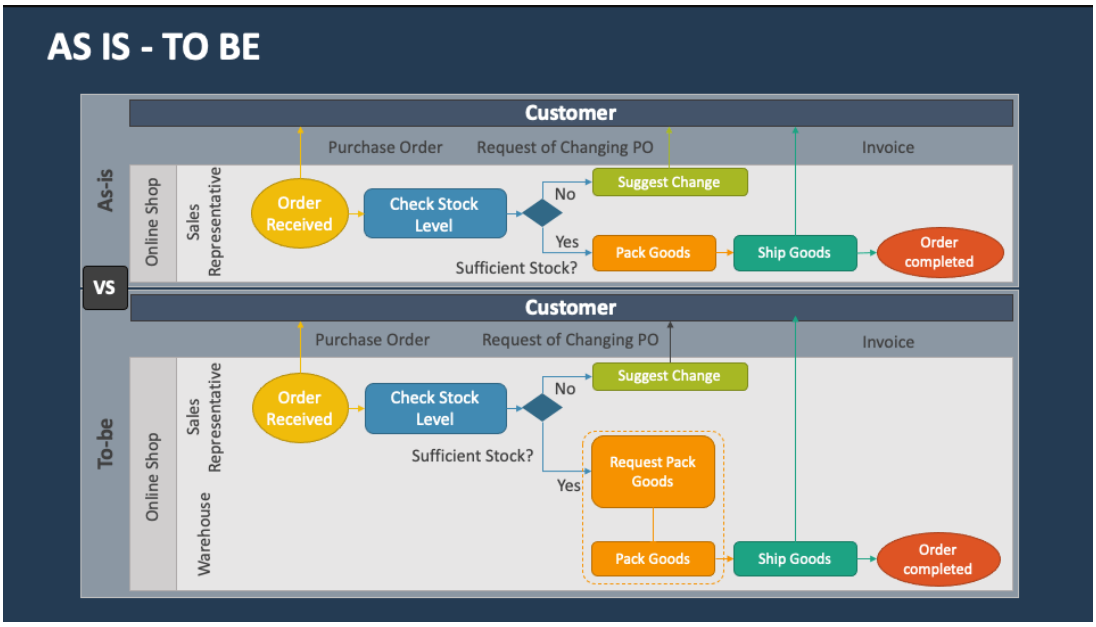

Figure 2.3: AS-IS vs TO-BE Mapping example
Source: Adapted from PowerSlides AS-IS TO-BE Template

The figure illustrates a simple process through an AS-IS TO-BE representation, enabling a direct comparison between the current state and the proposed optimized version. The AS-IS model highlights existing inefficiencies, such as potential bottlenecks that negatively impact process performance.

In contrast, the TO-BE model reflects a redesigned process that streamlines workflows, and improves coordination between actors. This comparison makes it possible to clearly identify points of improvement, particularly in terms of enhancing information flow, diagnosing inefficiencies and supporting continuous improvement.

2.3.1.4 Gap analysis AS-IS VS TO-BE

Gap analysis is a structured analytical process that compares the AS-IS state with the TO-BE state in order to identify, categorize, and prioritize the changes required to transition between the two states. It results in a systematic mapping of differences, including process, data, system, and capability gaps, that must be addressed to ensure successful deployment of the digital platform.

Gap analysis is necessary because the distance between the current and future state is often not fully visible or is underestimated during digital transformation initiatives. Without a structured approach, these gaps are typically discovered during implementation, leading to delays, scope adjustments, and additional costs. Conducting gap analysis

before deployment allows organizations to anticipate these challenges and transform them into planned, resourced, and sequenced actions.

Gap analysis is typically structured across four complementary dimensions:

- **Process gaps:** refer to activities, workflows, and coordination mechanisms that are absent, incomplete, or inefficient in the AS-IS state but required in the TO-BE model. These gaps define the scope of process redesign.
- **Data gaps:** refer to missing, inconsistent, or non standardized data structures that prevent the AS-IS environment from supporting the TO-BE requirements. These gaps define the data standardization and preparation work.
- **System gaps:** refer to limitations in the existing IT infrastructure that prevent integration with or support of the TO-BE platform. These gaps define the technical development and integration requirements.
- **Capability gaps:** refer to missing skills, knowledge, or organizational competencies needed to operate the TO-BE environment effectively. These gaps define the training and change management needs.

Overall, gap analysis acts as the bridge between AS-IS understanding and TO-BE design by translating differences into concrete transformation requirements that structure the entire implementation roadmap.

2.3.2 Business Process Model and Notation (BPMN)

Business Process Modeling is an activity that represents a company's business processes so that these business processes can be analyzed, improved, and automated. Business Process Modeling is used primarily to map workflows. *"Each element that plays a role in the process can understand, research, and make changes to a process that better fits the workflow or process"* (Sugiyartomo, 2018), BPMN serves as the standard format for visualizing and simulating business workflows, is a standard way to represent business processes from beginning to end. It's designed to remove the ambiguity of process specifications and provide the context needed to complete it. The primary purpose of BPMN is to support business support process management through transforming complex, intricate

workflows into a clear visual diagram, allowing organization to better define and structure procedures. moreover, it promotes standardization by unifying notation for all level of stakeholders. In addition, BPMN improves communication by bridging gaps between different departments, strengthens collaboration, as it enables multiple stakeholders to participate in reviewing and validating processes. BPMN is not only a modeling tool, it's also a fundamental element that supports organizational management. Firstly, it helps establishing process boundaries, identify inputs and outputs, and represent the logical linkage between activities, ensuring that the process is both coherent and value-driven. Secondly, BPMN provides a common visual language that bridges the gap between who design processes (planning) and who implement and manage them (execution and control). By enhancing communication and alignment across different organizational levels, BPMN contributes to more effective process governance, continuous improvement, and overall operational efficiency.

In the pre-implementation phase specifically, BPMN serves as the primary instrument for producing the AS-IS documentation and TO-BE design. It is particularly valuable in supply chain contexts because its message flow notation, which represents communication between different organizational entities, it allows inter-organizational processes to be represented with a high level of clarity and precision. BPMN also supports process simulation in tools such as Bizagi Modeler, allowing organizations to test the performance characteristics of their TO-BE process designs before system implementation . This simulation capability reduces the risk of designing processes that are theoretically correct but operationally impractical, helps identify potential inefficiencies or operational constraints early

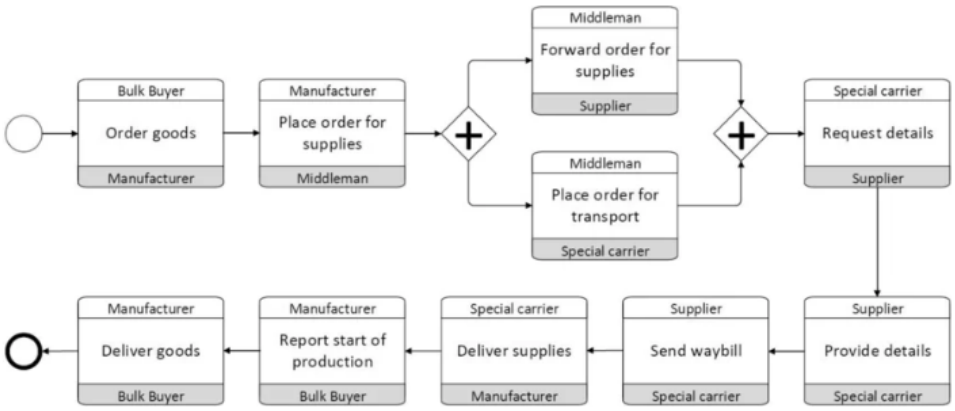

Figure 2.4: Example of BPMN Choreography Diagram of the Supply Chain Process
Source: ResearchGate

2.3.3 Process standardization and redesign

Process standardization is the organizational activity of establishing uniform, documented, and consistently applied process definitions across all units, sites, or functions that perform the same or similar operational activities. It involves replacing local process variations, with a single process standard that serves as the operational template for all participants.

Process redesign, often implemented through the methodology of Business Process Reengineering (BPR), goes further; rather than improving existing processes, it involves the fundamental rethinking and restructuring of processes to achieve improvements in performance in cost, speed, quality, and coordination.

Process standardization is used because digital platforms operate most effectively and in many cases, on standardized process and data inputs. A platform that receives transport orders in five different formats from five different sites cannot consolidate loads, optimize routing, or generate reliable network-level reports. Standardization is therefore not an organizational preference but a technical prerequisite for platform functionality.

Process redesign is used when the AS-IS state reveals that existing processes are structurally dysfunctional, organized around assumptions (manual coordination, weak communication) that are incompatible with the networked, data-driven logic of the digital platform.

In the pre-implementation phase, process standardization and redesign are important because they directly influence the complexity of the digital platform design. When processes are standardized before deployment, the platform can be set up once using a

single, consistent process model. However, when organizations move to implementation without prior standardization, they often need to adapt the platform multiple times to fit different process variations, or impose a standard model that users are not prepared for. This can lead to resistance, informal work practices, and reduced system adoption. Since platform does not create standardization, it requires it. Standardization must be achieved organizationally, through process redesign and governance decisions, before the platform is deployed. Expecting the platform to impose standardization on an organizationally unprepared workforce is one of the most reliable pathways to implementation failure.

Chapter conclusion:

In conclusion, the successful implementation of digital platforms in the supply chain goes far beyond the mere adoption of new technologies. As discussed throughout this chapter, it requires a profound transformation that integrates technological, organizational, and managerial dimensions.

The analysis first demonstrated that digital platforms play a central role in enabling coordination, visibility, and data-driven decision-making within increasingly complex and interconnected supply chains. However, their effectiveness depends largely on how well the implementation process is designed and managed.

The chapter then highlighted the critical importance of the pre-implementation phase, emphasizing that organizational readiness, alignment of stakeholders, and the identification of key success factors are essential to ensure sustainable adoption. At the same time, it underlined the various risks both organizational and operational that may arise, particularly in multi-site or geographically dispersed environments, where coordination challenges are amplified.

Finally, the discussion of managerial tools and methods showed that structured approaches such as AS-IS and TO-BE analysis, BPMN modeling, and process standardization are indispensable for guiding the transformation process. These tools enable organizations to better understand their current operations, design optimized processes, and ensure consistency in implementation.

Overall, this chapter demonstrates that the success of digital platforms in supply chain management relies on a holistic approach that combines strategic vision, careful preparation, and rigorous execution. Without such an approach, digital initiatives risk remaining fragmented and failing to deliver their full potential.

Chapter three

Research Context and Methodological Approach

Case Study: Bibars Group

Chapter 3

Research Context and Methodological Approach

Chapter Introduction

Following the presentation of the theoretical foundations related to supply chain management, logistics coordination, and digitalization in the previous chapters, this third chapter focuses on the empirical analysis of **Bibars Group** and its operational entity, **SSAJ Services**. Operating in the agri-food sector within a multi-site international environment, the group faces increasing coordination and responsiveness requirements that directly affect the efficiency and reliability of logistics operations. In such a context, the organization of supply chain activities and the management of information flows become critical factors for operational performance and decision-making.

The chapter begins with a presentation of the host organization in order to provide a clear understanding of the structure, activities, and operational configuration of both **Bibars Group** and **SSAJ Services**. Particular attention is given to the organization of logistics activities, the distribution of responsibilities between the different entities, and the configuration of the supply chain network. This overview establishes the organizational context necessary for understanding the operational challenges examined throughout the study.

The second section presents the methodological approach adopted for the empirical research. It explains the data collection process, the field investigation methods, and the analytical framework used to examine existing practices and coordination mechanisms. The methodology is primarily based on direct observation, documentary analysis, and

semi-structured interviews conducted with operational and managerial actors involved in logistics coordination and supply chain management.

The final section develops a diagnostic analysis of the organization's logistics and coordination practices. The objective is to identify the principal operational constraints affecting multi-site coordination, highlight existing inefficiencies in information and process management, and evaluate the organizational conditions surrounding the future deployment of digital supply chain platforms. This diagnosis ultimately provides the analytical basis for identifying improvement opportunities and supporting the company's digital transformation process. Thus, this chapter is structured around three main sections:

- **Section 3.1: Presentation of the the Host Organization.**
- **Section 3.2: Research Methodology.**
- **Section 3.3: Strategic and Environmental Analysis of Bibars Group.**

3.1 Presentation of the the Host Organization

3.1.1 General Presentation of the Bibars Group

3.1.1.1 Bibars Group presentation

Bibars Group is a company operating in the agri-food sector, specializing in the production, distribution, and commercialization of food products, particularly poultry and meat products certified according to halal standards. Based in France, the group has progressively developed its activities to become a recognized actor in the European halal food market. With more than ten years of experience in the halal sector, the group has built a strong network of partners and suppliers that allows it to meet the growing demand of this expanding market.

The company's activity is primarily oriented toward a business-to-business (B2B) model, supplying food products to professional clients such as wholesalers, fast-food operators, and food industry professionals. It offers a diversified portfolio of more than 350 product references (Bibars, n.d.), which are regularly renewed in order to meet consumer expectations and market trends. This ability to innovate enables the company to maintain a competitive position while responding to the evolving needs of its professional customers.

Bibars Group operates as a supplier of halal-certified food products, with its core activity centered on the production and distribution of halal meat products, representing its main value proposition. The group's operations are geographically dispersed across different countries, enabling a division of functions across entities. Production activities are carried out by Reydrop in Poland, which ensures the transformation of products based on client demand. Reydrop by Bibars offers a wide range of products, including fresh and frozen meat, processed meat products, as well as meat preparations.

These products are marketed under different brands developed by the group, including MACELLARIUS, My Baluchon, and Mum's Fine Sauce (Bibars, n.d.). The diversity of these brands reflects a strategy aimed at structuring the offer through identifiable product lines and market-oriented positioning, allowing the group to address different segments within the food service market.

For distribution, the company adopts a dual distribution model. On one hand, Bibars

supplies its products to independent wholesalers operating in the French market. On the other hand, it relies on its own distribution entity, LCGPRO, which functions as a wholesale platform offering not only meat products but also complementary goods for restaurants and food service professionals. Through this approach, the group positions itself beyond a simple supplier, acting as a provider of a complete solution for food service professionals. By combining halal meat production with the sourcing of complementary products within the same distribution channel, the group simplifies procurement processes and enhances operational efficiency for its clients.

In addition, the group benefits from significant logistics capabilities, including cold chain infrastructure with a capacity of nearly 1,000 pallets, allowing efficient management of product flows and ensuring a reliable and continuous supply.

3.1.1.2 History and development of the group

Founded in 2004, the **Bibars Group** emerged from an initiative within the restaurant sector, where professionals identified significant inefficiencies in the procurement of food products. Restaurants were often required to deal with multiple suppliers to obtain halal-certified meat and complementary goods, which created operational complexity, coordination difficulties, and time-consuming purchasing processes.

In response to these challenges, the founders developed a centralized supply model aimed at offering a diversified range of food products through a single supplier. This approach was designed to simplify procurement activities, improve supply reliability, and facilitate logistics operations for food service professionals.

Over time, the group progressively expanded its activities by diversifying its product portfolio and strengthening its organizational structure to serve a broader range of professional clients. This development included the establishment of partnerships with wholesalers and distributors, enabling the company to extend its market presence and reinforce its distribution capabilities across different regions.

Today, the **Bibars Group** operates through an international supply chain network involving procurement, production, logistics coordination, storage, and distribution activities spread across multiple countries. This evolution reflects the company's transition from a local supply initiative into a structured international logistics and distribution organization.



Figure 3.1: Bibars description card (Source: internal document)

3.1.1.3 Mission, Vision, and Strategic Objectives

The mission of the **Bibars Group** is to provide high-quality halal-certified food products to professional clients while ensuring reliability, efficiency, and continuity of supply. The group aims to support its clients in optimizing their procurement processes through an integrated and diversified offering. The vision of the group is to strengthen its position as a key player in the halal food distribution market, while continuously improving its operational performance and adapting to the evolving needs of the food service sector. To achieve this vision, the group pursues several strategic objectives:

- Improving supply chain efficiency through better coordination of operations
- Expanding and diversifying its product portfolio
- Strengthening relationships with suppliers and distribution partners
- Enhancing service quality and responsiveness
- Supporting operational performance through process optimization and digitalization

These strategic orientations reflect the group's commitment to maintaining competitiveness in a complex and dynamic market environment.

3.1.1.4 Corporate values and quality policy

The **Bibars Group** operates based on core values that guide its activities and decision-making processes. These values include quality, reliability, transparency, and customer

satisfaction. The group places strong emphasis on ensuring product quality and safety, particularly given the nature of the agri-food sector and the importance of halal certification. Strict procedures are implemented to ensure compliance with regulatory standards, product traceability, and quality control throughout the supply chain. In this context, the group adheres to recognized halal certification standards, notably those established by **A Votre Service (AVS) certification body** which is known for its rigorous control processes. This certification imposes strict requirements at every stage of the supply chain, including sourcing, handling, storage, and distribution, and other certificate like BRC, QAFB, RTA, HACCP, and HALAL STRICT (Reydrob, n.d.). conformity with such standards requires not only operational discipline but also a high level of traceability and process control. In addition, the company promotes a culture of continuous improvement, with the aim of optimizing its processes and enhancing its operational performance. This approach is essential in managing the complexity associated with multi-product distribution and multiple supply chain actors.

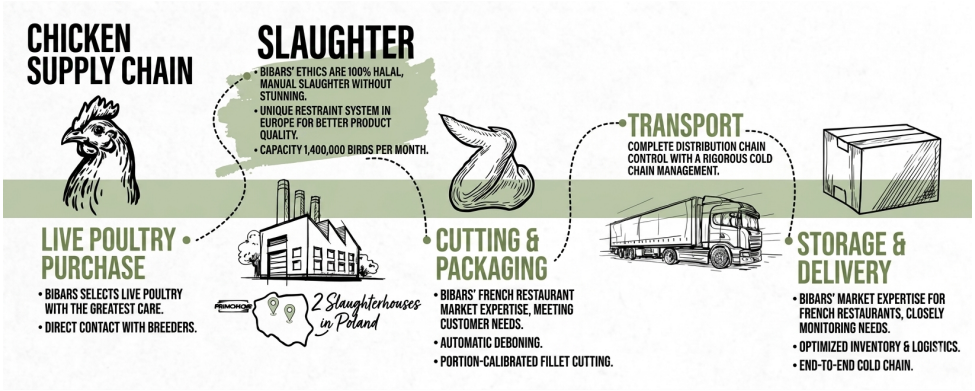

Figure 3.2: Bibars Supply Chain

Source: Internal Document

3.1.2 SSAJ services: part of the Bibars Group

3.1.2.1 presentation of SSAJ services

SSAJ services is an affiliated entity of **Bibars group**, established in Algeria in 2024 with an objective to support the group's logistics and commercial activities related to its operations in Europe. it was founded to satisfy the need for a dedicated entity capable of ensuring effective coordination from production and storage to transport and final delivery.

Based in Algeria, **SSAJ services** plays a strategic role as an operational and coordination center, it acts as an intermediary between the production in Poland and the commercialization in France, ensuring the smooth transformation of information and the proper planification of logistics activities,

This entity is responsible for managing key functions such as order processing, client communication, logistics coordination, operational tracking, and after sales services. it ensures the transformation of the information flow properly, the efficiency organization of transport operation, and that deliveries meet both quality and timing requirement.

it also plays an important role in improving visibility over activities and performance, which contributes to better decision-making and identify areas for improvement.

3.1.2.2 Role of SSAJ within the Bibars Group

Within the multi-site and multi-entity organization of **Bibars Group**, **SSAJ Services** plays a central role in ensuring coordination between production, logistics, and distribution activities. It acts as an intermediary between production sites located in Poland and commercialization activities in France, facilitating the circulation of both physical and informational flows.

SSAJ Services is responsible for several key functions, including order processing, client communication, logistics coordination, operational tracking, and after-sales services. It ensures the proper transformation and transmission of information across the supply chain, supports the planning and organization of transport operations, and contributes to meeting delivery requirements in terms of quality and timing.

In addition, **SSAJ** plays an important role in improving visibility over operations and performance. By centralizing information and monitoring activities, it supports better decision-making and helps identify areas for operational improvement.

3.1.2.3 Host Department

The internship took place in the logistics department at **SSAJ Services**. This department mainly coordinates the flow of goods and information across **Bibars Group** entities.

The logistics department plays a key role in planning and managing supply chain operations. It works closely with the warehouse in France and production sites in Poland to match production plans with market needs. This ensures smooth movement of products

from production to storage and delivery.

In detail, the department handles transport planning, order tracking, and aligning production with delivery schedules. It keeps open communication between production, storage, and distribution teams to maintain steady operations and improve supply chain performance.

3.2 Research Methodology

In order to rigorously assess the coordination dysfunctions and digital deficiencies within the multi-site logistics system under study, we adopted a qualitative methodological approach centered on the analysis of internal practices and operational flows. This section presents the tools and techniques mobilized for data collection, the selection of respondents, and the conditions under which the study was conducted. The objective is to ensure the reliability of the information gathered and the relevance of the results obtained, in direct relation to the goals of this research.

3.2.1 Study Objective

The study was designed to answer the following main research question: **"How can a multi-site logistics organization be strategically prepared for the deployment of a digital platform, and what pre-deployment framework best ensures its operational effectiveness and organizational viability?"**

It will also allow us to verify the research hypotheses established beforehand:

H1: The operational dysfunctions observed within the logistics system, information delays, coordination failures, lack of cross-site visibility, are structural in nature and cannot be resolved through incremental organizational adjustments alone, but require a digitally-integrated platform architecture.

H2: The success of a digital platform deployment within a logistics environment depends less on the technology itself than on the quality of the organizational preparation that precedes it, including strategic alignment, process standardization, and actor readiness.

H3: A structured pre-deployment framework, grounded in a field diagnosis of existing flows and coordination mechanisms, provides a more viable and contextually adapted implementation road map than a generic technology adoption model.

In our case study, we structure our approach and achieve the objectives of this thesis:

- First, we will carry out a situational analysis of how physical flows, information flows, and coordination mechanisms currently operate across the logistics system, documenting the existing dysfunctions and their structural causes.

- Then, we will conduct a diagnostic study assessing the organization's digital maturity and its readiness for platform deployment, identifying the gaps that must be addressed before implementation can begin.
- Finally, we will construct a pre-deployment framework that the organization can follow in order to prepare its processes, people, and strategic alignment for the successful implementation of a digital logistics platform.

3.2.2 Internship context

This research was conducted within an internship carried out at **SSAJ services** entity of **Bibars Group**. Where we were integrated into the team directly responsible for the digital transformation project, which provided privileged access to internal processes, discussions, and decision-making that would not have been accessible through conventional data collection methods alone. This positioning allowed us to actively participate in several brainstorming sessions held with the platform providers, during which the functional scope of the platform was discussed, operational priorities were identified, and the deployment approach was progressively defined. Among the key outcomes of these sessions was the decision to adopt a phased implementation strategy, beginning with the integration of the platform for the transportation function before extending it to warehousing operations. This choice reflected the organization's need to manage the digital transition gradually, reducing operational risk while allowing teams to build familiarity with the tool.

3.2.3 Choice of Methodological Approach

"Methodology in management and logistics is presented as a structured, deliberate way of conducting research, where methods and techniques are chosen to fit the research problem and objectives, including data collection, analysis, and interpretation" (Dźwigoł, 2022). Methodology is essential in any scientific research. It represents an ordered way of conducting a study, using tools and techniques adapted to answer a research problem. In management and logistics sciences, several methods can be employed depending on the objectives of the study, whether the aim is to collect, analyze, or interpret data.

In the context of this thesis, specific methods will be used to explore the relationship

between organizational readiness, coordination practices, and the conditions for successful digital platform deployment, ensuring that the approach remains clear, precise, and adapted to the needs of the study.

We adopted a descriptive, analytical, and exploratory approach:

1. **Descriptive Method:** The descriptive method was used to establish a clear picture of the existing logistics system, by mapping physical flows, information flows, and coordination mechanisms across the different sites. This method constitutes a necessary step: before interpreting dysfunctions, it is necessary to document precisely what exists, how goods move, what tools are used to share information, and according to what logic decisions are made. It thereby provides the objective and structured baseline on which the diagnostic analysis is built.

2. **Analytical Method:** The analytical method complements the descriptive method by enabling the examination and interpretation of results arising from the data collection phase. It is used to identify critical failure points and to trace these dysfunctions back to their root causes.

3. **Exploratory Method:** The exploratory method was adopted given the nature of the research problem. The question of how to prepare a multi-site logistics organization for digital platform deployment is not yet addressed by a well established literature offering answers. We are therefore not testing a known theory against new data, but rather exploring an under-documented phenomenon in order to construct a structured and contextually adapted response.

This study is positioned within a constructivist and exploratory research paradigm. Constructivism holds that knowledge is not discovered as an objective and pre-existing reality, but is rather constructed through the interaction between the researcher and the phenomenon being studied (Thiétart & coll., 2003). Since the organizational conditions for digital platform deployment cannot be observed in isolation from the people who experience them, our understanding was built progressively through direct engagement with organizational actors, interpretation of internal documents, and field observation. This paradigm is particularly suited to our exploratory approach, as it acknowledges that the goal is not to verify universal laws, but to produce a situated and actionable understanding of a specific organizational reality. We therefore opted for a qualitative methodology.

The reason for this choice lies in the nature of the phenomena we are studying. The organizational conditions for digital platform success, that cannot be captured through numbers. They must be understood through direct engagement with the people who operate the system, observe it daily, and experience its failures. We are seeking to understand how a specific organization functions, where it falls short of the conditions necessary for a successful digital transformation, and what structured preparation it needs to undertake before deployment begins.

3.2.4 Data Collection and analysis Methods and Tools

In order to obtain a comprehensive view of the current logistics system and assess the organization's readiness for digital platform deployment, we conducted a qualitative investigation combining multiple complementary data collection techniques. The objective is not simply to describe what exists, but to collect data rich enough to support both a structural diagnosis and the construction of a pre-deployment framework grounded in field reality.

Following careful reflection, we determined that the subject required engagement at three distinct levels: the theoretical level, addressed through bibliographic research; the operational level, addressed through in-situ observation and internal document analysis; and the organizational level, addressed through semi-structured interviews with key actors across the logistics functions.

The main tools mobilized are as follows:

- bibliographic research;
- in-situ observations;
- semi-structured interviews;
- internal document analysis.

Bibliographic Research

Bibliographic research constitutes an indispensable step before engaging in any empirical study. It allows the collection of information from written sources whether academic, institutional, or specialized, which are valuable for understanding the theoretical foundations of the subject and situating the research within existing knowledge.

According to (Pochet & Thirion, 2005), *"documentary research represents the central part of access to information. It consists of choosing and using available documentary tools with relevance, and extracting adequate information from them".*

In the context of our study, this step served two purposes. First, it allowed us to build the conceptual framework of the research, covering supply chain digitalization, digital platform deployment, organizational readiness, and pre-implementation strategy. Second, it provided reference models and frameworks against which the field findings could be interpreted and the proposed pre-deployment framework could be structured and validated.

We drew on several academic platforms including ScholarVox, ResearchGate, and Google Scholar, as well as specialized works and institutional reports relevant to logistics digitalization. Every source used has been referenced in the bibliography.

Observations

Observations were conducted directly within the company, during communication exchanges between teams and across sites. This method is particularly valuable in our case because it captures what actors actually do, not only what they report during interviews.

practices developed by operators to manage tasks in the absence of integrated systems are generally neither documented nor captured in formal records. Even though they are analytically crucial, as they highlight the precise locations of structural shortcomings within the system. Their identification enables a more targeted approach to pre-deployment preparation. Such routines can only be effectively uncovered through direct observation.

Attention was directed specifically toward delays, moments of confusion, repetitive manual tasks, and breakdowns in information transmission between teams or between sites; all of which constitute observable indicators of the coordination and digital deficiencies that the proposed framework must address.

Semi-Structured Interviews

In the context of qualitative research, the interview is a technique that allows the collection of in-depth data concerning a specific organizational phenomenon. It provides access to actors' practices, perceptions, and representations, making it an appropriate instrument

for understanding complex situations that involve both technical and human dimensions.

As (Thiétart & coll., 2003) note, *"the interview is a technique intended to collect discursive data reflecting the mental universe of individuals"*. Among the three types of research interviews; directive, semi-directive, and non-directive, we chose to conduct semi-structured interviews, in which respondents are guided by a set of prepared questions while retaining the freedom to develop their responses and raise issues we had not anticipated. This balance between structure and openness is particularly well suited to a diagnostic and framework-building study, where unexpected field realities must be allowed to surface.

Semi-structured interviews were selected as the main data collection method due to their ability to combine consistency and flexibility of answers. An interview guide was developed to ensure that all participants addressed key themes related to logistics coordination, information flow, and digital platform readiness. The semi-structured format allowed the researcher to explore further into relevant issues and clarify responses when necessary. This approach was particularly suitable for the exploratory nature of the study, as it enabled the collection of rich, contextualized data on actual logistics practices and organizational challenges within a multi-site environment.

The interviews were structured around three thematic axes, designed to cover both the diagnostic and framework-construction dimensions of the research:

Table 3.1: Analytical Themes of the Semi-Structured Interviews

No.	**Theme**	**Analytical Objective**
1	Coordination and operational management	Examine how logistics activities are coordinated across actors and identify the organizational mechanisms generating operational fragmentation and reactive decision-making.
2	Information circulation and visibility	Analyze how operational information is shared, identify visibility gaps, and assess the impact of fragmented information flows on planning and operational synchronization.
3	Digitalization needs and implementation readiness	Identify the operational need for a centralized digital platform and assess the organizational conditions and constraints affecting its successful implementation.

Source: Elaborated by the author.

For each respondent profile, a dedicated interview guide was developed. The interviews took place under favorable conditions, with participants actively engaged and willing to provide an accurate account of operational realities. When clarification was required, the interviews were complemented by direct field observations.

Table 3.2: Interviewed Respondents

No.	**Position**	**Analytical Contribution**
1	Regional Director	Strategic perspective on digital transformation, organizational constraints, and managerial priorities.
2	Head of Logistics	Transversal perspective on logistics coordination, planning difficulties, and operational inefficiencies.
3	Logistics Coordinator	Operational perspective on day-to-day coordination practices, information fragmentation, and execution challenges.

Source: Elaborated by the author.

The qualitative investigation relied on three semi-structured interviews conducted with actors involved in logistics coordination within **SSAJ Services**. Respondents were selected based on their roles, ensuring coverage of strategic, transversal, and operational perspectives on logistics fragmentation. The Regional Director of **Bibars** provided insights into strategic priorities and digitalization constraints, the Head of Logistics addressed coordination and planning challenges, and the Logistics Coordinator reflected the daily operational realities of information flows and reactive execution.

The qualitative investigation relied on three semi-structured interviews conducted with actors involved in logistics coordination within SSAJ Services. Respondents were selected based on their roles, covering strategic, transversal, and operational levels: the Regional Director of Bibars France, the Head of Logistics, and the Logistics Coordinator. These were the only relevant profiles available and directly concerned by the scope of this study. These were the only relevant profiles available and directly concerned by the scope of this study, and the only ones of interest given its focus and field accessibility.

Internal Document Analysis

To complete the qualitative investigation, we collected and analyzed the internal documents through which coordination is formally attempted within the organization: plan-

ning files, dispatch records, stock tracking spreadsheets, and operational reports.

These documents were not examined solely for their informational content. Their structure itself constitutes diagnostic evidence. The fragmentation of data across multiple separate files, the absence of shared formats between sites, and the volume of manual re-encoding required to transfer information from one document to another are direct indicators of a structural integration deficit and therefore of the preparation work that must precede any platform deployment. A digital platform cannot integrate data that has never been standardized; document analysis allows us to measure precisely how far from that standardization the organization currently stands.

3.2.4.1 Analysis and Interpretation of Collected Data

To analyze the qualitative data, three steps were followed. Prior to analysis, a careful review of all interview notes, observation records, and collected documents was conducted, organized by theme and respondent. This review constitutes the written and structured trace of the full empirical material gathered during the field phase.

Once this preparation was complete, the analysis itself proceeded in three stages:

- **Data analysis:** a descriptive phase presenting the responses and observations collected, organized according to the four analytical axes physical flows, information flows, coordination mechanisms, and digital readiness. This stage documents what exists without yet interpreting it.

- **Data interpretation:** an interpretive stage moving from raw observation to structural understanding identifying not simply what was said or seen, but what it reveals about the mechanisms generating the observed dysfunctions and the conditions that must be addressed before platform deployment can succeed.

- **Data synthesis:** finally, once results were interpreted, it became possible to draw general conclusions about the organization's current state, confirm or refute the research hypotheses, and use the diagnostic findings as the direct input for constructing the pre-deployment framework proposed at the end of this thesis.

3.3 Strategic and Environmental Analysis of Bibars Group

3.3.1 External Environment Analysis (PESTEL Framework)

"The PESTEL framework encompassing Political, Economic, Social, Technological, Environmental, and Legal dimensions provides a systematic instrument for mapping the macro-environmental forces that shape an organisation's strategic imperatives" (Johnson et al., 2017). Applied to Bibars Group, this framework reveals a convergence of external pressures that, taken together, create not merely an opportunity for digital transformation but a structural necessity. Each dimension is examined below for its specific impact on Bibars' logistics operations and its implications for platform adoption.

Political: European agri-food operations in Poland and France sit under overlapping regulatory regimes where Rules are applied differently, the rules concern food safety standards, cross-border transport rules, and traceability mandates that each country enforces differently. Without one central system, each site makes its own compliance decisions, which creates risks along the flow from Poland to France.

Economic: Costs rise across fuel, labor, and storage at the same time, but transport planning remains fragmented between sites. Trucks move without being fully loaded, routes are built without consolidation, and inefficiencies accumulate during execution rather than being prevented at the planning stage. Because information is not shared across the network, these costs do not appear early enough to be controlled. But after operations are completed, turning what could be managed variables into recurring losses.

Social: Halal consumers evaluate suppliers on traceability as much as on product quality, a certification gap harms trust faster than a quality issue, because it cannot be easily explained. The French market expects real-time visibility into where product has been and under what conditions.

Technological: European logistics runs on TMS platforms, real-time tracking, and integrated data layers that treat visibility as a baseline rather than a premium. **Bibars** coordinates a three-node chain (Polish production, French distribution, Algerian management) with tools that were not designed for this complexity. The absence of a shared data infrastructure that doesn't allow any node to see what the others are doing in real

time.

Environmental: Non-optimized transport between Poland and France generates excess emissions relative to what an equivalent optimized flow would produce. European regulatory pressure on carbon reporting, and large French buyers increasingly require suppliers to demonstrate efficiency as part of procurement criteria.

Legal: Two legal frameworks run in parallel: EU food safety law, which demands continuous cold-chain traceability from Polish farm to French consumer, and GDPR, which governs how supply chain data is stored and processed. Fragmented or manually maintained records create audit exposure under both frameworks simultaneously.

Table 3.3: PESTEL Analysis Summary: Bibars Group

Dimension	**Impact on Bibars' Logistics Operations**	**Implication for Digital Transformation**
Political	Agri-food regulations, transport policies, and import/export compliance impose strict documentation and traceability across **Bibars**' multi-site logistics. Regulatory differences among partners increase administrative complexity and delay transport authorization processes.	A digital platform with integrated compliance modules would automate regulatory documentation, reduce human error, and ensure consistent traceability standards across all sites.
Economic	Fuel price volatility, inflation in input costs, and supply chain disruptions compress operating margins. Lack of transport optimization increases cost inefficiencies, weakening competitiveness in price-sensitive agri-food markets.	Route optimization algorithms and demand-driven transport planning, enabled by a centralized platform, are essential levers to contain logistics costs and absorb macroeconomic shocks without proportional margin erosion.

Continued on next page

Table 3.3 continued from previous page

Dimension	**Impact on Bibars' Logistics Operations**	**Implication for Digital Transformation**
Social	Rising expectations for fast, reliable delivery and real-time tracking are reshaping industry standards. Supply chain transparency has become a key differentiator in customer perception rather than an added value.	A digital coordination platform providing end-to-end visibility from warehouse dispatch to last-mile delivery, directly addresses evolving customer expectations and supports service-level differentiation.
Technological	Rapid digitalisation (TMS, IoT, cloud systems, AI forecasting) is transforming logistics operations. Competitors adopting these tools gain superior efficiency, visibility, and decision-making capabilities.	The pre-implementation of a logistics digital platform represents a strategic response to technological disruption, creating the infrastructure needed to integrate these capabilities in a structured, scalable, and interoperable manner.
Environmental	Increasing pressure for sustainable logistics (carbon reduction, route optimization, and greener fleets) introduces both compliance obligations and reputation challenges for agri-food operators.	Digital platforms incorporating carbon tracking, load consolidation tools, and sustainable routing options enable **Bibars** to align with environmental standards while improving operational efficiency — turning compliance into competitive advantage.
Legal	HACCP, food safety laws, GDPR, and traceability regulations impose strict compliance requirements. Reliance on manual systems increases exposure to audit risks and legal liabilities.	Platform-based data governance structures — with built-in audit trails, access controls, and automated compliance reporting — are not merely operational improvements but legal necessities in the contemporary agri-food regulatory environment.

Source: Elaborated by the authors.

3.3.2 Internal Analysis of the Organization

3.3.2.1 Organizational Structure of the group

The organizational structure of the **Bibars group** is based on a functional model, the key activities are divided into distinct interdependent decision-making sites that's not necessarily where the operation is executed. Starting with procurement where the decision-making is based in Morocco but the suppliers are from Europe. than the production sites based in Poland. the commercialization and logistics planning in Algeria. and storage and final clients are based in France. each entity is responsible for managing physical and information flows, ensuring that the products meet both regulatory and client requirement in term of timing and quality across different international locations.

3.3.2.2 Multi-sites supply chain network

The supply chain of the **Bibars group** is structured around a multi-sites international network in which production, logistics planning, storage, and distribution activities are geographically dispersed across several countries. This configuration is based not only on the physical movement of goods but also on the distribution of decision-making processes between different entities operating within the supply chain.

The production activities are carried out in two production sites located in Poland, where products are manufactured and prepared according to strict quality and halal compliance standards. However, production planning and volume requirements are strongly influenced by market demand communicated by the Algerian entity **SSAJ services** responsible for commercialization and logistics coordination. Procurement decisions are mainly managed from Morocco, while suppliers are primarily located in Europe, creating an international procurement structure that connects multiple actors across different regions.

Once production is completed, products are either transferred through logistics and storage platforms or distributed to final clients located mainly in France. The distribution network therefore relies on the coordination of international transportation, warehousing activities, and third-party logistics providers to ensure product availability and delivery continuity which reassured by **SSAJ services** as well.

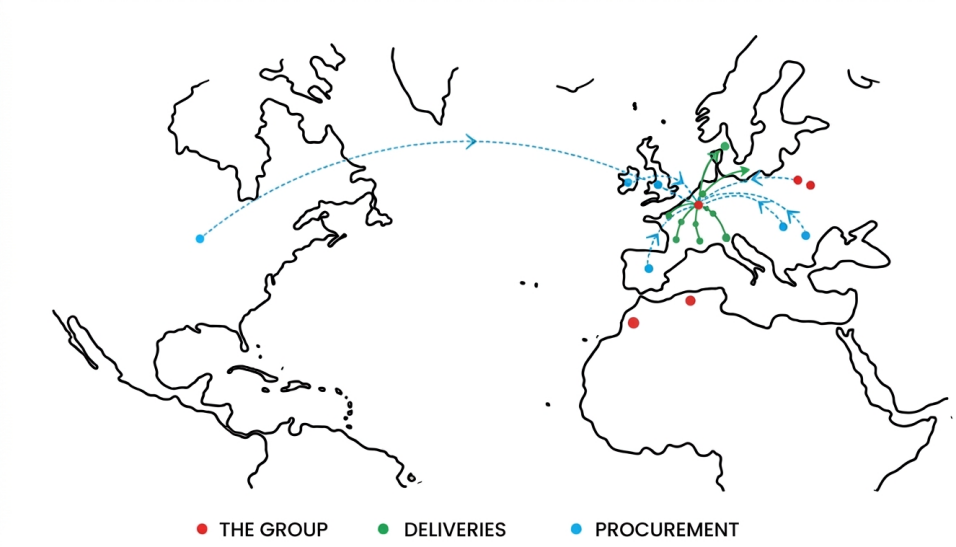

Figure 3.3: Bibars supply chain network (Source: internal document)

This multi-sites structure allows the company to benefit from geographical specialization and international market access. However, it also increases the complexity of logistics coordination, information sharing, and operational synchronization between the different actors involved in the supply chain. The dispersion of activities across multiple countries creates a strong need for effective coordination mechanisms and integrated information systems capable of ensuring visibility and continuity throughout the entire logistics process.

3.3.2.3 Coordination mechanisms

The coordination of logistics activities within the **Bibars group** is ensured through communication between the different entities involved in the supply chain. Since the operational activities are geographically dispersed across several countries, coordination plays a critical role in maintaining the continuity of flows and respecting delivery deadlines. Demand forecasts, production schedules, shipment planning, and delivery monitoring are regularly exchanged between procurement, production sites, logistics planners, transport providers, and distribution actors in order to synchronize operations across the network.

However, due to the absence of a fully integrated solution, several coordination activities are still managed manually through emails, phone calls, spreadsheets, and separate management tools. This creates a strong dependence on human intervention for information transmission and operational follow-up. The company relies heavily on third-party transport providers for international transportation and distribution activities. While this allows a certain level of operational flexibility, it also increases exposure to delays, coordination difficulties, and reduced

visibility over transport operations. Consequently, the effectiveness of coordination mechanisms depends largely on the responsiveness of stakeholders and the quality of information sharing between the different entities involved in the logistics chain.

3.3.2.4 Current level of digitalization

The current level of digitalization within the **Bibars Group** can be classified as a **Digitally Immature Supply Chain**, according to what presented in the theoretical framework. Although certain operational activities are supported by basic digital tools, the overall logistics system remains fragmented and lacks end-to-end integration. Information related to orders, inventory, transport planning, and delivery monitoring is managed through separate files, emails, and communication channels rather than through a centralized and interconnected digital platform.

As a result, data exchange between the different entities of the supply chain is largely manual and dependent on human coordination. This limits real-time visibility, reduces information reliability, and may generate delays or inconsistencies in operational processes. In addition, decision-making is still primarily based on manually processed data rather than advanced digital systems or integrated analytics, which constrains the efficiency of logistics planning and execution.

Despite these limitations, the organization shows a clear awareness of the need for digital transformation, particularly in relation to improving coordination, enhancing transport visibility, and centralizing logistics information. However, since these initiatives are not yet implemented in a structured and integrated manner, the supply chain remains at an early stage of digital maturity, corresponding to a Digitally Immature Supply Chain, with a potential transition toward a more **Digitally Enabled Supply Chain** in the future.

3.3.3 SWOT Analysis

The SWOT analysis translates the preceding environmental and internal analyses into a strategic synthesis that directly informs the design of the pre-implementation framework. The analysis presented here is constructed specifically through the lens of logistics performance and digital platform adoption.

3.3.3.1 Strengths

Bibars Group benefits from strong operational experience in agri-food logistics, enabling effective management of key constraints such as product perishability, cold chain requirements, and

demand variability. Its existing transport network and established relationships with suppliers, carriers, and clients facilitate operations. In addition, the multi-site organization has developed a degree of operational flexibility, allowing the company to adapt to disruptions and fluctuating market conditions, which can support the implementation of digital transformation initiatives.

3.3.3.2 Weaknesses

The company's operations are characterized by fragmented transport planning due to the absence of an integrated data system, which limits coordination across sites. Data silos reduce visibility and hinder effective planning, performance monitoring, and decision-making. The lack of real-time tracking further constrains responsiveness and affects service reliability. Moreover, coordination relies largely on informal communication practices, leading to delays and inconsistencies in execution. These structural limitations contribute to inefficiencies in routing, resource utilization, and overall operational performance.

3.3.3.3 Opportunities

The development of digital logistics technologies provides opportunities to improve coordination and efficiency. Data centralization would enable enhanced forecasting, performance measurement, and cross-site optimization. The integration of real-time tracking systems can significantly improve visibility and operational control. Furthermore, regulatory requirements related to traceability, food safety, and environmental performance can be incorporated into digital systems, transforming compliance constraints into opportunities for improved data management and decision-making.

3.3.3.4 Threats

The competitive environment is increasingly shaped by firms that adopt advanced digital logistics solutions, allowing them to achieve higher efficiency, better visibility, and lower operational costs. This creates growing pressure on companies that rely on less integrated systems. In addition, in the absence of transport optimization, operational costs increase. Delayed adoption of digital technologies may also increase future integration complexity and costs. Finally, stricter regulations in areas such as food safety, environmental standards, and data protection expose the company to compliance risks, especially when relying on manual or fragmented systems.

Table 3.4: SWOT Analysis: Bibars Group — Logistics and Digital Transformation

STRENGTHS	**WEAKNESSES**
S1. Established multi-site operational experience of agri-food supply chains, enabling contextually informed platform requirements specification. **S2.** Existing inter-site transport network and established supplier/customer relationships provide a structured foundation for platform integration. **S3.** Operational flexibility across distribution sites, reducing resistance to workflow-level change. **S4.** Sector-specific expertise in product handling, regulatory compliance, and perishability management.	**W1.** Fragmented transportation planning across sites, with no unified scheduling or load optimisation system, leading to duplicated efforts and cost inefficiencies. **W2.** Absence of centralised data infrastructure; operational data remains siloed within individual sites. **W3.** Limited real-time visibility over fleet movements, inventory levels, and delivery status. **W4.** Coordination inefficiencies driven by informal communication practices.
OPPORTUNITIES	**THREATS**
O1. Growing availability of scalable logistics management platforms solutions specifically designed for multi-site agri-food operations. **O2.** Digital data centralisation enables demand forecasting, and KPI-driven performance management. **O3.** IoT-enabled tracking and real-time visibility tools offer significant improvements in fleet management and cold-chain monitoring.	**T1.** Increasing competitive pressure from digitally mature logistics operators capable of offering superior reliability, cost efficiency, and visibility. **T2.** Dependence on third-party logistics providers may limit flexibility and negatively affect delivery reliability and operational performance. **T3.** Tightening regulatory and sustainability standards (e.g., food traceability) impose compliance burdens that manual systems cannot meet at scale.

Source: compiled by the author.

Chapter Conclusion:

This chapter provided the contextual and methodological foundations necessary for the realization of the present study. It first introduced the organizational environment of **Bibars Group** and the operational role of **SSAJ Services** within the company's multi-site supply chain structure connecting Algeria, Poland, and France. The analysis highlighted the complexity of the company's logistics activities, particularly in relation to cross-border coordination, fresh and frozen product management, customer delivery synchronization, and the increasing operational dependence on information exchange between geographically dispersed actors. The chapter also emphasized the strategic importance of digital transformation within such an environment characterized by fragmented communication flows, limited operational visibility, and growing coordination requirements.

The chapter then presented the methodological approach adopted for the research. Given the exploratory and diagnostic nature of the study, a qualitative descriptive-analytical case study methodology was selected in order to obtain an in-depth understanding of the organizational realities surrounding the potential deployment of a digital logistics platform. Data collection relied on multiple complementary sources, including semi-structured interviews, direct observation during the internship period, internal document analysis, and observation of operational exchanges related to the collaboration with the Freightmee platform. The analytical process was structured around three predefined thematic axes focusing on operational coordination, organizational readiness, and digital integration challenges within the logistics system.

Overall, this chapter established both the empirical and methodological basis upon which the remainder of the study is developed. The elements identified throughout the organizational analysis and field investigation now serve as the foundation for the diagnostic interpretation conducted in the following chapter. Chapter 4 therefore presents the main findings derived from the qualitative investigation, analyzes the principal operational dysfunctions affecting logistics coordination, and progressively develops the proposed pre-deployment framework intended to support the structured and effective deployment of a digital logistics platform within **Bibars Group**.

Chapter four

Preparation for the Deployment of Digital Supply Chain Platforms

Case Study: Bibars Group

Chapter 4

Preparation for the Deployment of Digital Supply Chain Platforms

Chapter Introduction:

Supply chain operations are becoming increasingly complex. In this context, digital platforms are emerging as essential tools for improving coordination, enhancing visibility, and enabling faster and more informed decision-making across logistics networks. However, the success of such platforms does not depend solely on technological selection or system capabilities. It also relies heavily on the level of organizational preparation, including the alignment of processes, structures, and human actors. Digital transformation should therefore be understood not as a purely technical upgrade, but as a comprehensive organizational change affecting the entire logistics system.

Building on the theoretical foundations of logistics coordination and digital transformation presented in Chapter 1 and 2, and the methodological approach outlined in Chapter 3, this chapter shifts the focus toward the reality of **Bibars Group**. It investigates the conditions required to ensure the successful preparation and future implementation of a digital logistics platform within a multi-site supply chain environment.

The chapter begins by presenting the results of the qualitative field study conducted within **Bibars Group**. This includes insights collected through semi-structured interviews with key organizational actors, as well as an analysis of the interactions and collaboration dynamics between **Bibars Group** and platform providers. This section aims to capture both operational perceptions and real-world coordination practices shaping the digitalization process.

The second part of the chapter focuses on the analysis and structuring of the pre-implementation foundations. It examines the current supply chain architecture, evaluates the organization's

readiness for digital deployment, and identifies the main operational and coordination challenges affecting performance. This analytical phase provides a structured diagnosis of the existing system and highlights the key barriers that must be addressed prior to platform implementation.

Finally, the chapter develops the proposed pre-implementation framework. This section translates the diagnostic findings into a structured deployment approach, supported by logistics monitoring tools and implementation control mechanisms. It also includes strategic recommendations designed to improve organizational readiness and ensure a smoother integration of the digital platform within **Bibars Group**'s multi-site logistics system.

Thus, this chapter is structured around three main sections:

- **Section 4.1: Qualitative Study: Results Presentation and Analysis**
- **Section 4.2: Analysis and Structuring of the Pre-Implementation Foundations**
- **Section 4.3: Development of the Pre-Implementation Framework**

4.1 Qualitative Study: results presentation and analysis

The qualitative study was designed to investigate logistics operations at **Bibars Group** and to understand the factors that generated the need for an integrated digital platform. The objective was first to examine how logistics activities are coordinated across actors, sites, and operational functions in order to understand daily operations and information flows. Through this analysis, the study identifies the operational dysfunctions affecting coordination, visibility, and decision-making, particularly in a context characterized by fragmented processes and partially manual operations. The interviews also aimed to explain why, despite the growing operational need for integration, the implementation process remained slow and complex. Particular attention was given to the organizational constraints affecting implementation readiness.

The collected data were analyzed according to three main thematic axes previously defined in the interview guide, namely:

- **Axis 1:**Coordination and operational management
- **Axis 2:**Information circulation and operational visibility
- **Axis 3:**Digitalization needs and implementation readiness

Each axis groups together several questions exploring different operational dimensions linked to logistics coordination, information sharing, operational constraints, and digital transformation. This structure made it possible to identify recurring operational problems, coordination gaps, and converging perceptions among the interviewed actors.

4.1.1 Interpretation of the Results Obtained from the Interviews

The interviews were conducted with three strategic actors involved in the operational management of the supply chain:

- The Regional Director
- The Logistics Responsible (Operations Manager)
- The Logistics Coordinator

These actors were selected because of their direct involvement in production coordination, warehouse management, transport planning, and daily logistics execution.

The interviews reveal that Bibars Group operates within a relatively complex logistics environment characterized by the coexistence of two different operational models:

- Frozen products managed through inventory and warehouse stock;
- Fresh products managed through direct operational flow without storage due to short shelf-life constraints.

This dual logistics structure creates significant coordination complexity between production, warehousing, and transport activities, especially because coordination mechanisms remain largely manual and fragmented.

The interviews also demonstrate that although the company possesses strong operational experience and flexibility, logistics activities still rely heavily on informal coordination practices, reactive decision-making, and disconnected information systems.

The following subsections analyze the principal findings derived from the interviews.

4.1.1.1 Axis 1: Coordination and Operational Management

The first axis aimed to understand how logistics activities are coordinated between the different operational actors and to identify the organizational mechanisms generating operational fragmentation and reactive decision-making.

Theme 1: Current Organization of Logistics Operations

Reformulation of the Obtained Responses

The interviewed actors explained that logistics operations within Bibars Group are organized around three principal operational functions:

- Production
- Warehousing
- Transport

These functions interact continuously in order to ensure product availability, warehouse preparation, and delivery execution.

The interviews revealed that logistics operations at Bibars Group are characterized by two forms of operational complexity. The first concerns product management, while the second concerns distribution organization.

Regarding product management, the Regional Director explained that logistics coordination differs depending on the product category:

> "Frozen products are managed through warehouse inventory, while fresh products are managed directly as operational flows because storage time is extremely limited."

This distinction creates two separate operational logics inside the same supply chain system:

- A stock-based logistics model for frozen products
- A flow-based logistics model for fresh products

Frozen products are stored and managed through warehouse inventory, while fresh products are dispatched immediately after production due to short shelf-life constraints.

The second level of complexity concerns customer delivery organization. The interviews revealed the existence of two different distribution models:

- Direct clients delivered directly by Bibars transport operations
- Bibars clients who collect their orders directly from the warehouse in France after product arrival from production sites in Poland

This operational structure requires continuous coordination between production scheduling, warehouse preparation, transport planning, and customer collection management.

The Logistics Responsible emphasized that his role mainly consists of maintaining synchronization between these different operational flows:

> "Frozen products depend on stock availability, while fresh products depend entirely on production timing and immediate dispatch."

The Logistics Coordinator similarly highlighted that fresh products require extremely precise operational timing because no storage buffer exists between production and transport dispatch.

The interviews therefore reveal that logistics coordination at Bibars Group is highly dependent on temporal synchronization between production output, warehouse preparation, transport availability, and customer collection scheduling.

Theme 2: Coordination Mechanisms and Operational Decision-Making

Reformulation of the Obtained Responses

The interviews demonstrate that coordination mechanisms remain largely informal and sequential.

Operational information is exchanged through:

- Phone calls
- WhatsApp messages
- Excel files
- Manual reporting procedures

The Regional Director explained that coordination occurs progressively between departments:

> "Production defines output availability, the warehouse prepares orders, and transport organizes dispatch operations."

However, this coordination process is not supported by a centralized operational system capable of synchronizing activities in real time.

The Logistics Responsible stated that operational interventions are frequently necessary when disruptions occur, particularly in situations involving:

- Production delays
- Delivery delays
- Frozen stock inconsistencies
- Transport availability conflicts
- Errors in customer orders caused during transport operations

The interviews also revealed that operational coordination becomes particularly difficult when fresh product dispatches overlap with frozen stock preparation or customer collection activities at the warehouse.

The Logistics Coordinator emphasized that many operational decisions depend heavily on personal experience and informal adjustments:

> "Fresh dispatch prioritization and transport reallocation are often managed manually according to operational urgency."

The interviews reveal that operational management within Bibars Group remains highly reactive. Decision-making is generally triggered after disruptions appear rather than through proactive operational planning.

Theme 3: Operational Dysfunctions and Coordination Constraints

Reformulation of the Obtained Responses

All interviewed actors identified the coexistence of frozen and fresh logistics flows, combined with multiple delivery models, as the principal source of operational complexity.

The Regional Director explained:

> "Managing inventory-based logistics and flow-based logistics simultaneously creates coordination asymmetry across production, warehouse, and transport."

Several recurring operational problems were identified during the interviews:

- Delays in fresh product dispatch
- Warehouse congestion for frozen products
- Transport inefficiencies and idle time
- Mismatch between operational execution and commercial orders
- Difficult synchronization between production and transport schedules
- Coordination difficulties between direct deliveries and customer warehouse pickups

The interviews also revealed that warehouse operations become more complex when customer pickups overlap with transport loading activities and urgent fresh product dispatches.

Similarly, the absence of real-time synchronization between production in Poland and warehouse operations in France complicates planning visibility and increases operational uncertainty.

The interviews demonstrate that operational fragmentation is reinforced by the absence of standardized coordination procedures and the strong dependence on manual intervention.

As a result, logistics performance becomes highly dependent on employee experience, informal communication, and operational improvisation.

4.1.1.2 Axis 2: Information Circulation and Operational Visibility

The second axis aimed to analyze how operational information circulates between actors, identify visibility gaps, and assess the impact of fragmented information flows on operational synchronization.

Theme 1: Information Sharing Processes

Reformulation of the Obtained Responses

The interviews reveal that operational information circulates through multiple disconnected tools and channels.

The principal systems currently used are:

- Shefteo for commercial order entry and invoicing
- Excel files for warehouse stock monitoring, customer orders, and transport organization
- WhatsApp and phone communication for operational coordination

The Regional Director clarified that Shefteo is mainly limited to commercial functions:

> "Shefteo handles orders and invoicing, but it is not integrated with operational execution."

The Logistics Responsible added that production updates, warehouse activities, customer pickups, and transport coordination remain largely manual and informal.

Consequently, no unified platform currently exists to centralize operational information between production, warehouse, transport, and customer collection activities.

The interviews therefore reveal a fragmented information environment characterized by dispersed operational data and limited real-time visibility.

Theme 2: Visibility Gaps and Information Constraints

Reformulation of the Obtained Responses

The interviewed actors identified several critical information gaps affecting operational coordination.

The most difficult information to access in real time includes:

- Fresh product availability
- Transport status
- Accurate frozen stock levels
- Customer pickup scheduling
- Production arrival timing from Poland

The Logistics Coordinator explained:

> "There is often a mismatch between Shefteo orders, production reality, and transport execution."

Similarly, the Logistics Responsible emphasized that manual updates between systems create operational inconsistencies and delays.

The interviews demonstrate that fragmented information flows reduce operational visibility and complicate synchronization between logistics actors.

This lack of real-time visibility generates several operational consequences:

- Delayed decision-making
- Increased coordination workload
- Higher risk of operational errors
- Reduced responsiveness to disruptions

The dependence on manual communication channels further reinforces operational uncertainty and reactive management practices.

4.1.1.3 Axis 3: Digitalization Needs and Implementation Readiness

The third axis focused on identifying the operational need for a centralized digital platform and evaluating the organizational readiness for its implementation.

Theme 1: Perceived Need for Digital Integration

Reformulation of the Obtained Responses

All interviewed actors expressed a strong need for operational digital integration.

The Regional Director explained:

> "We need integration between production, warehouse, transport, and Shefteo in order to improve real-time coordination."

The Logistics Responsible similarly stated that current operational tools are insufficient to ensure effective synchronization between frozen inventory management and fresh product flow execution.

The Logistics Coordinator also emphasized that Shefteo alone cannot reflect operational execution reality, especially for fresh product dispatch flows and customer collection operations.

The interviews reveal that the operational need for digitalization is primarily driven by:

- The lack of real-time operational visibility
- Excessive manual coordination workload
- Delays caused by fragmented information systems
- The difficulty of synchronizing multiple operational actors
- The complexity generated by managing both direct deliveries and warehouse pickups

Theme 2: Organizational Constraints and Implementation Challenges

Reformulation of the Obtained Responses

Although the interviewed actors expressed strong support for digital transformation, several implementation challenges were identified.

The principal challenge concerns the design of a system capable of simultaneously supporting:

- Inventory-based logistics for frozen products
- Flow-based logistics for fresh products
- Direct customer deliveries
- Warehouse customer pickup operations

The Regional Director emphasized that the future system must respect the operational realities of all logistics flows.

The interviews also identified several organizational adjustments required before implementation:

- Standardized warehouse stock update procedures
- Clearer production reporting mechanisms
- Structured dispatch protocols for fresh products
- Formalized coordination procedures between warehouse and transport
- Better synchronization between production arrivals and customer collection scheduling

Despite these constraints, all interviewed actors expressed a high level of organizational openness toward digital transformation.

The Logistics Coordinator explained:

"Teams are ready for digital change if it helps reduce operational workload."

The interviews therefore indicate that Bibars Group demonstrates strong organizational readiness for digitalization, although successful implementation will require process formalization and progressive operational integration.

4.1.1.4 Synthesis of the Qualitative Study

This qualitative study made it possible to better understand the operational functioning of logistics activities within Bibars Group and to identify the principal coordination and information management challenges affecting supply chain performance.

The interviews reveal that Bibars Group operates within a hybrid logistics environment combining multiple operational logics:

- Frozen product logistics based on inventory management
- Fresh product logistics based on continuous operational flow
- Direct delivery operations
- Customer warehouse pickup operations

This operational structure creates significant coordination complexity between production, warehouse, transport, and customer management activities.

Several major findings emerge from the study:

Operational Fragmentation

The interviews reveal a fragmented logistics organization characterized by disconnected operational functions and limited real-time synchronization between actors.

Coordination remains highly dependent on manual communication, informal practices, and employee experience.

Limited Information Visibility

The absence of an integrated operational system creates major visibility gaps regarding:

- Stock availability
- Production readiness
- Transport planning

- Customer pickup scheduling

This fragmented information environment reduces operational responsiveness and increases coordination workload.

Reactive Operational Management

Operational decision-making is largely reactive rather than proactive.

Most interventions occur after disruptions appear, particularly in situations involving production delays, urgent fresh dispatches, transport conflicts, or warehouse congestion.

Strong Dependence on Informal Coordination

The interviews demonstrate that operational continuity relies heavily on informal mechanisms such as:

- WhatsApp communication
- Phone coordination
- Manual Excel tracking
- Employee experience and operational improvisation

While these practices allow operational flexibility, they also create organizational vulnerability and limit process standardization.

Strong Need for Digital Integration

All interviewed actors expressed a clear operational need for a centralized digital platform capable of integrating:

- Production activities
- Warehouse management
- Transport coordination
- Commercial order systems
- Customer pickup management

The objective of this integration would be to improve real-time visibility, reduce manual coordination, and strengthen operational synchronization.

Organizational Readiness for Digital Transformation

Despite current operational limitations, the interviews reveal a strong organizational openness toward digital transformation. Employees perceive digital integration as a necessary operational evolution capable of reducing workload, improving coordination efficiency, and enhancing logistics visibility. However, successful implementation will require:

- Process formalization,
- Standardized operational procedures,
- Progressive integration between logistics functions,
- Alignment between operational realities and technological design.

The findings of this qualitative study therefore confirm the existence of operational fragmentation and information visibility limitations within **Bibars Group**, while simultaneously highlighting the organizational conditions supporting the future implementation of an integrated digital logistics platform.

4.1.2 Observational Analysis of the Collaboration Between Bibars Group and platform providers

In order to support the pre-implementation phase of the proposed digital framework, Bibars Group engaged with Freightmee, an Algerian logistics technology company specialized in Freight Management Systems (FMS) and Transportation Management Systems (TMS). Founded in 2023, Freightmee develops collaborative digital solutions designed to improve transport planning, operational traceability, shipment monitoring, and logistics coordination for shippers and carriers.

Initially focused on transportation management functionalities, the collaboration progressively evolved toward the integration of warehouse coordination and operational synchronization functionalities in order to better reflect the operational realities of Bibars Group. Throughout this phase, several operational meetings, workflow discussions, demonstrations, and follow-up exchanges were conducted between both parties to align the platform with the company's logistics processes.



Figure 4.1: Freightmee logo (Source: internal document)

This phase of the study was based on the observation of operational meetings, collaborative discussions, workflow demonstrations, and email exchanges conducted during the platform adaptation process. Unlike the semi-structured interviews presented previously, these exchanges were open and dynamic, evolving according to operational discussions, implementation constraints, and system adaptation requirements identified throughout the collaboration process.

The objective of this observational analysis was to understand how the operational constraints identified during the first qualitative phase were progressively translated into digital functionalities within the Freightmee platform, while also evaluating the organizational conditions necessary for successful implementation.

4.1.2.1 Evolution of the Freightmee Solution Scope

The observed exchanges revealed that the Freightmee platform was initially designed mainly as a transportation management solution focused on operational transport activities such as:

- Transport planning
- Shipment monitoring
- Delivery traceability
- Transport execution follow-up

However, during discussions with **Bibars Group** operational teams, it became evident that transportation activities could not be managed independently from warehouse operations and production coordination.

The meetings highlighted that logistics operations at **Bibars Group** rely on the interaction between several interconnected operational flows, including:

- Frozen products managed through warehouse inventory

- Fresh products managed through immediate dispatch flows
- Direct customer deliveries
- Customer warehouse pickups after product arrivals from production sites in Poland

As a result, the initial transportation-oriented scope of Freightmee progressively evolved toward a broader logistics coordination platform integrating warehouse management and operational synchronization functionalities.

This evolution reflects the necessity of adapting the digital solution to the real operational environment rather than limiting the implementation to standard transportation functionalities only.

4.1.2.2 Observation of Operational Alignment and Workflow Adaptation

The collaborative meetings demonstrated that the implementation process followed a progressive operational alignment approach between **Bibars Group** and Freightmee. Several workflows were reviewed and discussed in order to evaluate how **Bibars Group**'s operational practices could be translated into digital processes within the platform. Particular attention was given to operational scenarios involving fresh products due to their high operational sensitivity and strict constraints, where delivery timing, transport coordination, and production synchronization become critical.

The exchanges revealed that the platform adaptation process required Freightmee to better understand several operational realities related to:

- Warehouse preparation activities,
- Frozen stock management,
- Fresh product dispatch coordination,
- Customer pickup scheduling,
- Synchronization between production and transport availability.

The meetings also demonstrated that many operational practices currently rely on informal coordination mechanisms and manual communication processes. Consequently, one of the principal challenges observed during the collaboration concerns the transformation of flexible operational practices into standardized digital workflows.

The observed interactions therefore confirmed that the implementation process extends beyond simple software deployment and involves a broader operational adaptation and workflow restructuring process.

4.1.2.3 Implementation Constraints and Integration Challenges

The observational phase also highlighted several organizational and technical constraints affecting the implementation process. One of the principal integration points discussed during the meetings concerned the management of operational documentation. The discussions also revealed that several operational procedures remain insufficiently formalized, particularly regarding:

- Real-time information sharing,
- Warehouse update procedures,
- Transport coordination mechanisms,
- Operational exception management.

This lack of standardization complicates the digital integration process because workflows must first be clarified and stabilized before being translated into system functionalities.

Additionally, the coexistence of multiple logistics models within the company creates significant implementation complexity. The future system must simultaneously support:

- Inventory-based logistics for frozen products,
- Flow-based logistics for fresh products,
- Direct transport operations,
- Customer pickup activities.

The observations therefore demonstrate that the implementation challenges are not purely technological. They are also strongly linked to organizational coordination, process formalization, and operational alignment.

4.1.2.4 Collaborative Development Logic and Organizational Readiness

The exchanges observed during this phase reveal that the collaboration between **Bibars Group** and Freightmee follows a collaborative and iterative development logic.

The Freightmee team established a development framework based on operational feedback, pending adjustments, and workflow adaptation requirements identified during meetings and discussions.

Throughout the collaboration process, the platform was progressively adjusted according to operational observations and evolving requirements. This iterative approach allowed both parties to continuously refine the alignment between the system functionalities and **Bibars Group**'s operational needs.

The discussions also demonstrated a strong willingness from both parties to ensure successful implementation through:

- Continuous communication,
- Operational feedback sharing,
- Progressive workflow validation,
- Future onboarding and training sessions.

Freightmee additionally emphasized the importance of maintaining flexibility throughout the development process due to the evolving nature of operational requirements and system adjustments. The observations therefore indicate that the implementation process is perceived not only as a technological deployment initiative, but also as a progressive organizational transformation process aimed at improving operational coordination, logistics visibility, and supply chain synchronization.

4.1.2.5 Synthesis of the Observational Analysis

This observational phase provided complementary insights into the operational and organizational challenges associated with the implementation of the Freightmee platform within **Bibars Group.**

Several important findings appear from this analysis. First, the collaboration revealed that the initial transportation oriented scope of the platform was insufficient to address the full complexity of **Bibars Group**'s logistics environment. This led to the progressive integration of warehouse coordination and operational synchronization functionalities.

Second, the observations confirmed the existence of strong interdependencies between production, warehouse management, transport coordination, and customer delivery operations, reinforcing the need for an integrated digital coordination system.

Third, the implementation process highlighted the importance of translating operational realities into digital workflows capable of supporting both frozen inventory management and fresh product flow execution.

Finally, the observed exchanges demonstrated a high level of organizational openness toward digital transformation, while also revealing that successful implementation will require process formalization, operational standardization, and progressive organizational adaptation.

Overall, this observational analysis reinforces the findings obtained during the qualitative interviews and further confirms the operational need for an integrated logistics coordination platform capable of improving visibility, synchronization, and coordination across **Bibars Group**'s supply chain activities.

General Synthesis:

The findings of this qualitative study directly support the three research hypotheses. The structural fragmentation, informal coordination, and lack of standardized procedures confirm that the logistics dysfunctions at Bibars Group go beyond simple operational issues and cannot be fixed through minor adjustments, which validates **H1**. The fact that all actors identified process formalization and operational alignment as necessary steps before any platform deployment demonstrates that organizational preparation matters more than the technology itself, confirming **H2**. Finally, the way the Freightmee platform had to progressively adapt its scope to fit Bibars Group's specific operational reality shows that a contextualized and field-based preparation approach is far more relevant than applying a generic implementation model, which supports **H3**.

4.2 Analysis and Structuring of the Pre-Implementation Foundations

Based on the findings of the qualitative research, this section aims to translate the identified operational constraints into a structured digital transformation approach. Through supply chain process analysis, process standardization, and implementation planning, the objective is to develop a coherent pre-implementation framework capable of supporting the successful integration of a digital logistics platform within Bibars Group.

4.2.1 Analysis and Redesign of the Supply Chain Architecture

The analysis and redesign of the supply chain architecture constitute a fundamental phase in the development of the pre-implementation framework. Based on the findings obtained through the qualitative study, this stage aims to examine the existing logistics configuration, identify operational dysfunctions and coordination gaps, and define the structural requirements necessary for digital integration. To achieve this objective, an AS-IS analysis was conducted to evaluate the current processes and interactions between supply chain actors, followed by the design of a TO-BE configuration representing the targeted digital supply chain model. A gap analysis was then carried out to determine the discrepancies between the current and desired states and to identify the transformation priorities. In parallel, process cartography and BPMN modeling were employed to standardize workflows, clarify operational responsibilities, and establish a structured foundation capable of supporting the successful deployment of a digital logistics platform.

4.2.1.1 Process Cartography of the Existing Supply Chain

The qualitative investigation and observations conducted within **Bibars Group** revealed the absence of a formalized process cartography capable of representing the interactions, operational sequences, and coordination mechanisms structuring the supply chain activities. The lack of standardized process visualization limited operational visibility and contributed to coordination inefficiencies between the different actors involved in logistics operations. In response to this limitation, a process cartography was developed in order to identify and structure the principal logistics activities, information flows, decision points, and stakeholder interactions across the supply chain network. The objective was to obtain a comprehensive understanding of the existing operational configuration before initiating the redesign and digital integration phases. The

complete set of process cartographies and Process Description Sheets we developed within this study is presented in **the appendices**. These documents constitute the foundational output of the process mapping phase and provide a structured visualization of the existing supply chain operations within the organization.

This work was conducted with the objective of formalizing the principal operational flows, identifying interdepartmental interactions, and clarifying the coordination mechanisms governing both logistics and commercial activities. The cartographies focus primarily on the Sales and Logistics processes, as these functions represent the core coordination interface of the entity.

The process mapping exercise provided an end-to-end view of the customer order lifecycle, from order intake to delivery, including CMR recovery and KPI monitoring. This improved the understanding of operational flows, dependencies, and interdepartmental handoffs.

The analysis highlights strong process visibility and a structured organization of activities through Management, Support, and Client categories, ensuring alignment between cartographies and Process Description Sheets. It also shows a relatively mature level of formalization in logistics, with KPIs such as carrier reliability, transport cost, and shipment volumes.

In addition, the integration of risk management within the process documentation strengthens operational resilience and accountability. Finally, the clear coordination interface between Sales and Logistics improves information exchange and reduces ambiguity across the supply chain.

Despite its strengths, the analysis highlights several operational limitations within the current system. The organization relies heavily on fragmented tools such as WhatsApp, Email, and Excel, which limits traceability, real-time visibility, and system integration, increasing the risk of miscommunication and delays. In addition, the concentration of multiple responsibilities within the logistics administrative team creates operational overload and vulnerability during peak periods. The absence of formal Service Level Agreements between Sales and Logistics further weakens coordination, particularly in terms of order transfer timing and escalation rules. Moreover, while logistics performance is relatively well structured through KPIs, the Sales process remains less mature and lacks standardized performance indicators. Overall, these findings underline the need for stronger process standardization and digital integration to improve coordination, visibility, and operational efficiency.

This comprehensive process mapping exercise provides a solid analytical foundation for the subsequent AS-IS to TO-BE comparison, as it allows a clear understanding of the current operational structure and its limitations, thereby enabling the structured design of the future digital supply chain configuration.

4.2.1.2 Mapping of the Existing Supply Chain Configuration (AS-IS)

The AS-IS supply chain process at Bibars Group is characterized by a manual and fragmented operational structure, where coordination relies heavily on human intervention and informal communication rather than system-based integration.

The process begins with the reception of a customer order within the Sales Department. At this stage, orders are handled manually, and validation is performed without any standardized digital system, which already introduces variability in the initial processing phase. Once validated, the order is transferred to the Logistics Department through non-integrated communication channels, reflecting the absence of a unified information system across functions.

A first key decision point concerns stock availability. If stock is available, the process moves forward toward warehouse operations. If not, the order is sent back to the Sales Department, creating a manual feedback loop that requires reprocessing the request and generates avoidable delays. This loop highlights one of the main inefficiencies in the current system: the lack of automated resolution mechanisms for exceptions.

When stock is available, the Warehouse initiates preparation activities such as picking, packaging, and order readiness verification. These activities remain largely manual and depend on coordination between operational staff. A second decision point then evaluates shipment readiness. In cases where issues arise, additional manual coordination is required between departments before the process can continue, reinforcing the fragmented nature of the workflow.

Throughout the entire process, there is no integrated digital platform to ensure real-time synchronization, traceability, or centralized coordination. This structural absence leads to several operational limitations that were confirmed during the qualitative investigation, including fragmented communication, limited stock visibility, redundant validation steps, delayed information exchange, and weak interdepartmental synchronization.

Overall, the AS-IS model reflects a supply chain that functions as a sequence of disconnected actions rather than a coordinated and continuously optimized system.

4.2.1.3 Design of the Target Digital Supply Chain Configuration (TO-BE)

n contrast, the TO-BE model represents a shift from fragmented coordination to structured digital orchestration. Co-designed from the AS-IS diagnosis and validated with stakeholders, this future-state architecture positions the Digital Platform as the central operational backbone of the entire supply chain.

The process is initiated through a centralized order intake system, where customer requests are directly captured and automatically validated within the platform. This removes the am-

biguity and variability associated with manual reception and ensures that all orders enter the system through a unified channel.

From this point, stock availability is no longer an isolated decision but a system-driven validation step. Depending on the outcome, the platform either advances the order or triggers a controlled feedback loop governed by predefined system logic, ensuring that exceptions are managed consistently rather than manually.

When stock is confirmed, the platform activates synchronized workflows across Sales, Logistics, and Warehouse functions simultaneously. Instead of sequential handovers, tasks are distributed in parallel, allowing each function to act in coordination rather than in isolation. This marks a fundamental shift from linear execution to real-time operational alignment.

Downstream, the platform ensures full shipment traceability, coordinates execution, and automatically generates notifications to all relevant stakeholders. The order lifecycle is therefore no longer partially visible or manually tracked, but fully observable from initiation to completion.

The improvements associated with this model—centralized data management, automated validation, synchronized workflows, real-time visibility, and enhanced responsiveness—directly address the operational weaknesses identified in the AS-IS analysis, establishing a clear one-to-one transformation logic.

4.2.1.4 Gap Analysis Between Current and Target Configurations

The gap analysis highlights the structural transformation required to transition from a manual coordination system to a digitally integrated supply chain.

The first transformation concerns the shift from manual coordination to platform-based orchestration, replacing fragmented, actor-dependent communication with structured digital workflow management. The second highlights the move from dispersed information to centralized data integration, enabling a single and reliable source of operational truth across the supply chain.

The third transformation reflects a transition from reactive management to real-time responsiveness, where issues are no longer addressed after disruption occurs but are detected and managed continuously through system visibility. Finally, the fourth transformation illustrates the evolution from isolated functional silos to an interconnected operational ecosystem, where all stakeholders operate within a shared digital environment.

Together, these transformation dimensions define not only the structural gaps between the current and future states, but also the operational logic that justifies the proposed digital redesign of **Bibars Group**'s supply chain.

To better illustrate the structural transformation of the supply chain within Bibars Group, a comparative process flow diagram has been developed. This figure provides a side-by-side representation of the current AS-IS configuration and the proposed TO-BE digital supply chain model. It highlights the transition from a manual, fragmented, and reactive operational system to a digitally integrated and synchronized architecture. The diagram also makes explicit the main operational bottlenecks identified during the qualitative analysis and shows how they are addressed through the redesigned TO-BE configuration. For a clearer and more detailed view of the full diagram, the reader is invited to refer to the appendices.

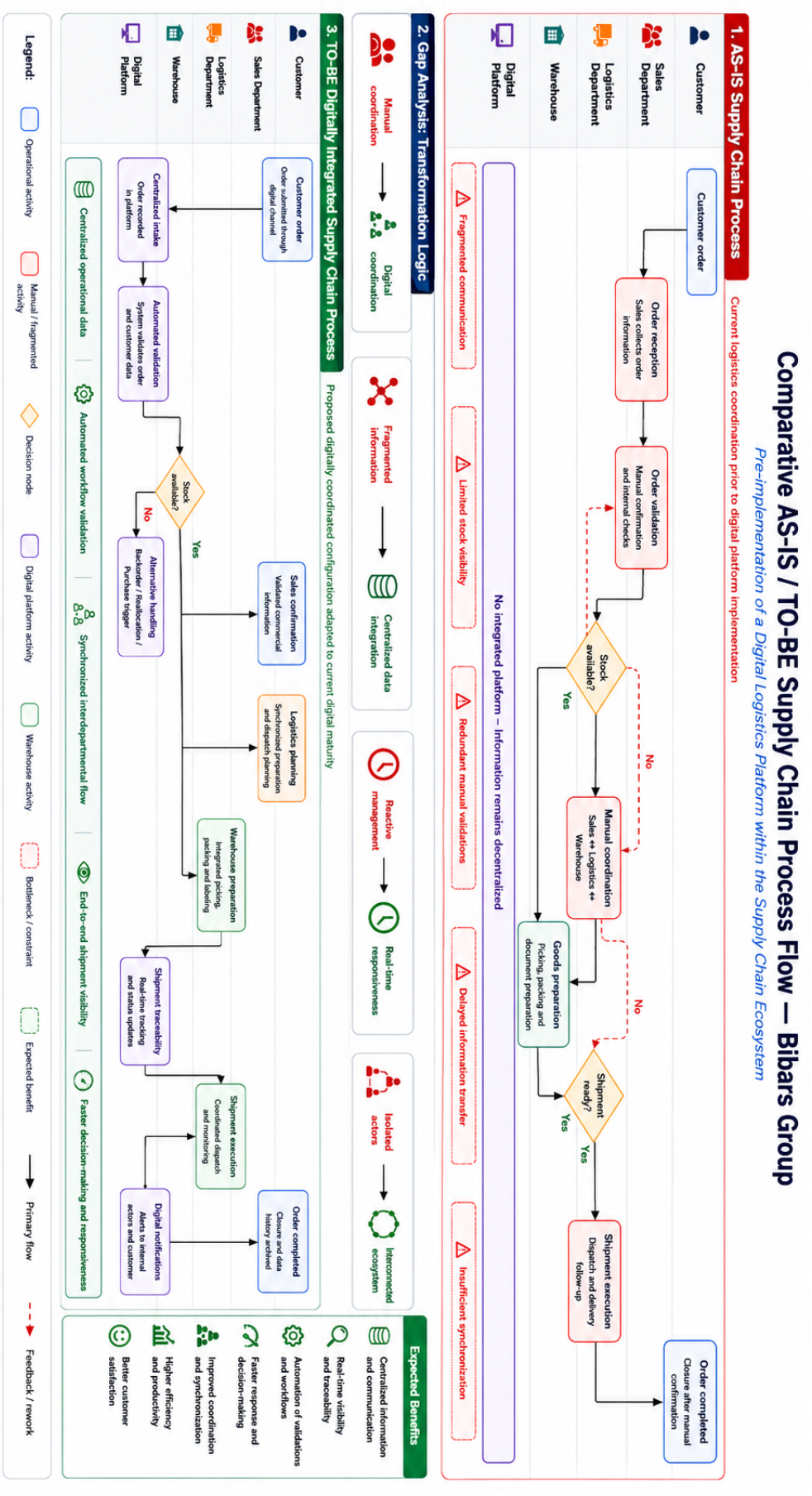

Figure 4.2: AS-IS supply chain analysis (Source: elaborated by the author)

4.2.1.5 BPMN Modeling and Process Standardization

While process cartography provides a global representation of the supply chain architecture and interactions between operational entities, BPMN modeling offers a detailed and standardized representation of workflow execution and process logic. The combination of both approaches allows the transition from organizational diagnosis to operational standardization.

Among the different logistics activities identified during the analysis phase, the transportation coordination process was selected for BPMN modeling due to its strategic importance and its high level of operational control within **SSAJ services**. Unlike other supply chain activities that remain externally dependent, transportation coordination constitutes the only logistics process fully executed and managed internally by the entity where the internship was conducted within.

The process includes both direct deliveries to clients and transportation coordination for products transiting through the company's warehouse before being distributed through third-party logistics partners. In this context, **SSAJ services** collaborates with external transportation providers, notably **Jetfreeze** and **STEF**, particularly for rotational transport operations within the Paris region and for the handling of both fresh and frozen product categories.

The BPMN modeling contributed to improving process clarity by transforming informal coordination practices into a standardized workflow representation. It also enabled a clearer identification of operational dependencies, communication flows, and coordination requirements between internal teams and external logistics partners. As a result, the BPMN model serves as a foundational tool for process standardization and provides a basis for future digital integration and optimization of transportation activities.

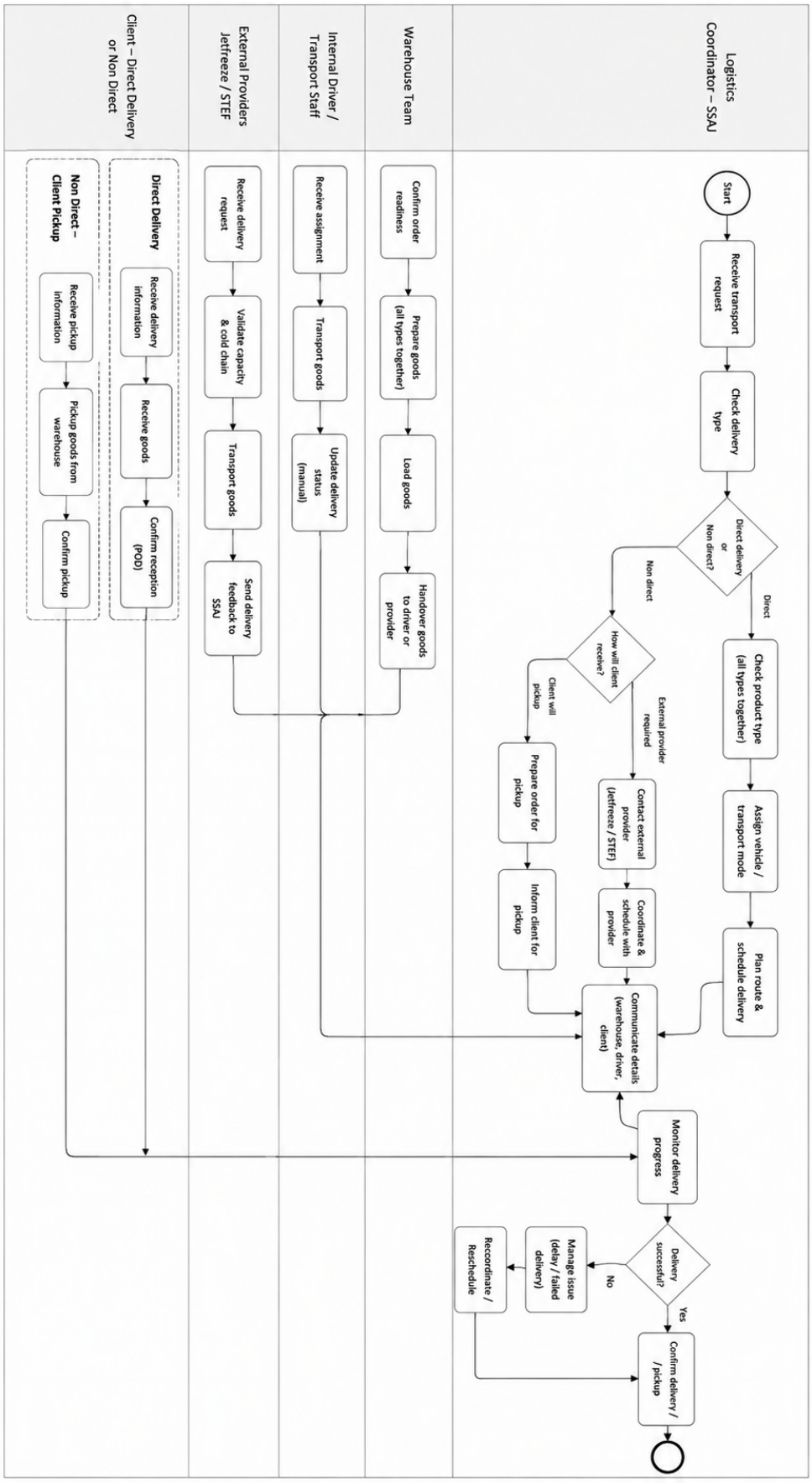

Figure 4.3: BPMN process diagram (Source: elaborated by the author)

4.2.2 Assessment of Organizational Readiness for Digital Deployment

Based on the theoretical framework developed in the previous chapter, particularly the dimensions of supply chain digital maturity, process integration, and inter-organizational coordination, this section evaluates the current state of the organization in terms of its readiness for digital transformation. In line with (Weiner, 2009) conceptualization of organizational readiness for change, readiness is understood here as a dual condition combining the organization's motivation to transform and its actual operational capability to do so, both are examined through the assessment below. The assessment is conducted by observations and answers collected during interviews, diagnosis and process mapping. The assessment is conducted by observations and answers collected during interviews, diagnosis and process mapping.

Table 4.1: Supply Chain Digital Maturity Assessment

Dimension	**Observation**	**Qualitative Analysis**	**Maturity Level**
Process Integration	Order processing, transport execution, and delivery confirmation are handled sequentially with limited coordination between actors	Processes remain functionally siloed, with weak integration across the supply chain network	Low integration (Digitally Immature tendency)
Coordination Mechanisms	Coordination relies mainly on phone calls, messaging apps, and manual follow-ups between stakeholders	Coordination is reactive rather than system-driven, creating dependency on individual actors	Weak structured coordination
Digital Tool Usage	Several digital tools are used (communication platforms), but they are not interconnected	Tools support operations but do not enable integration or end-to-end process automation	Digitally Enabled (non-integrated)

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Dimension	**Observation**	**Qualitative Analysis**	**Maturity Level**
Data Management	Information is dispersed across multiple actors with no centralized database or shared system	Lack of standardization leads to data inconsistency, duplication, and limited decision support	Low data governance maturity
Supply Chain Visibility	No real-time unified tracking of orders across the full logistics chain	Visibility remains fragmented, preventing proactive exception management and performance monitoring	Partial visibility
Organizational Readiness	Organizational structure is operationally stable but lacks formal digital governance or coordination framework	The organization shows willingness and operational capability, but not yet structural readiness for digital transformation	Moderate readiness
Overall Positioning		The supply chain is characterized by initial digital adoption without systemic integration or data-driven orchestration	**Digitally Enabled Supply Chain (early stage)**

Source: Elaborated by the author based on field interviews and process mapping.

The assessment reveals that the organization has already initiated a digital transition through the use of several operational digital tools and communication technologies. However, the qualitative analysis and field observations demonstrate that these tools remain fragmented and insufficiently integrated within the overall supply chain structure. Coordination mechanisms continue to rely heavily on manual interventions and informal exchanges, limiting process syn-

chronization, real-time visibility, and data consistency. Consequently, the organization can be positioned at the stage of a **Digitally Enabled Supply Chain**, where digital adoption exists but has not yet evolved into an integrated and fully coordinated digital ecosystem. This situation highlights the necessity of a structured digital implementation approach capable of improving interoperability, process standardization, and end-to-end supply chain visibility.

4.2.3 Identification of Operational and Coordination Challenges

The analysis conducted across the AS-IS process mapping, TO-BE design, BPMN standardization, and organizational readiness assessment generated a set of qualitative insights into the current functioning of the logistics system. These findings do not describe isolated operational issues, but rather reveal interconnected structural weaknesses affecting information flow, coordination mechanisms, operational execution, and overall performance. Collectively, they reflect the lived operational reality of actors within the organization and highlight the underlying constraints shaping daily logistics activities.

Table 4.2: Operational Diagnostic

Dimension	**Observed Findings**	**Interpretation of Impact**
Information Flow	Information is fragmented across multiple non-integrated channels (spreadsheets, phone calls, messaging apps). Updates are often recorded after task completion rather than in real time.	Lack of real-time visibility prevents accurate monitoring. Decisions are frequently based on incomplete or delayed information.
Coordination Mechanisms	Coordination relies mainly on informal communication. No structured workflow or standardized communication protocol exists.	Coordination depends on individual initiative, creating variability in execution. Lack of traceability limits accountability.
Operational Execution	Delivery tracking, status updates, and disruption handling are performed manually via verbal reporting.	Manual execution creates delays, reinforcing a reactive operational model. Redundancy increases workload and error probability.

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Dimension	**Observed Findings**	**Interpretation of Impact**
Process Standardization	Core logistics processes are not uniformly applied. Each unit follows locally adapted practices rather than standardized procedures.	Inconsistent information transfer weakens coordination. Service quality becomes variable and difficult to evaluate.
Performance Visibility	No centralized system for tracking KPIs. Performance data is collected inconsistently.	Limited real-time monitoring prevents proactive management. Trend detection and continuous improvement are constrained.
Systemic Impact	All inefficiencies are interconnected: fragmented information, informal coordination, manual execution, and lack of standardization reinforce each other.	The organization operates in a reactive, low-visibility environment. This creates strong justification for digital transformation.

Source: Elaborated by the author.

The qualitative analysis of processes has highlighted a set of interdependent operational and coordination challenges affecting information flow, execution practices, and organizational alignment. These findings provide an empirical foundation for understanding the current system's limitations and, more importantly, for identifying the structural gaps that must be addressed through redesign. Building on this diagnostic assessment, the following section will focus on translating these insights into a structured pre-implementation framework, outlining the principles and mechanisms guiding the transition toward the TO-BE digital logistics configuration.

4.3 Development of the Pre-Implementation Framework

Following the analysis of the organization's logistics processes, digitalization challenges, and readiness factors, this section presents the proposed pre-implementation framework. The framework is designed to guide the preparation phase preceding digital platform deployment by addressing the organizational, process, and technological conditions required for successful implementation. It synthesizes the findings of the literature review and the case study analysis to provide a structured approach for supporting digital transformation in a multi-site logistics environment.

4.3.1 Proposed Digital Platform Deployment Framework

The deployment of a digital logistics platform within the **Bibars Group** cannot be understood as a purely technological implementation. Rather, it must be understood as a structural transformation of logistics execution practices and coordination dynamics. In its current time, logistics operations have fragmented communication channels, partially digitized coordination routines, and limited real-time visibility across the different stages of execution. These conditions do not only slow down operational performance but also create recurring inefficiencies in delivery reliability, coordination continuity, and end-to-end traceability.

Based on the pre-implementation diagnosis and the identification of key operational dysfunctions the proposed framework is positioned as a logistics execution transformation model, rather than a traditional IT deployment roadmap.

From this perspective, the digital platform is not introduced as an external technological tool, but rather as an integrated coordination layer embedded within logistics workflows. Its role extends beyond automation or data collection, aiming instead to strengthen execution control, improve the circulation of operational information, and support more informed and responsive decision-making across all actors involved in the logistics chain. the proposed framework is structured as a sequence of seven interdependent phases; these phases are designed to ensure that digital transformation is not only technically implemented but also operationally absorbed and progressively embedded within the organization's logistics practices.

4.3.1.1 Phase 1: Operational Alignment and Logistics Structuring

The initial phase aims to establish a coherent operational foundation for digital transformation by addressing the fragmentation of roles, responsibilities, and communication flows within **Bibars group** logistics operations.

This phase involves the identification and structuring of key operational actors, including dispatch coordination teams, field operators, customer service units, supervisory functions, and external transport partners. Rather than limiting this step to a conventional stakeholder mapping exercise, the analysis is extended to examine how these actors are operationally interdependent within the logistics process. In this sense, the focus shifts toward understanding how information, decisions, and operational instructions circulate across the entire delivery cycle, from order creation to final confirmation and exception handling. Strategic objectives are translated into operational alignment priorities, notably:

- reduction of coordination delays,
- enhancement of real-time visibility across shipments,
- minimization of manual tracking interventions,
- improvement of delivery status accuracy,
- strengthening of operational responsiveness in disruptions handling.

A governance logic is also introduced to clarify decision rights across sites, validation of operational data, disruptions management, and performance monitoring. This ensures that the platform is positioned not as an external tool, but as a central coordination infrastructure within logistics execution.

4.3.1.2 Phase 2: Standardization of Logistics Processes

The diagnostic phase highlighted a lack of standardized operational procedures as a major source of inefficiency, particularly in communication flows, tracking updates, and exception management.

This phase therefore focuses on translating BPMN modeled processes into standardized execution, covering:

- order assignment and dispatch logic,
- field execution and external transporter notification procedures,

- real-time status update,
- disruptions reporting and escalation,
- proof-of-delivery validation and closure processes.

The purpose is to reduce operational variability resulted from informal communication channels, duplicated data entry, and unclear responsibility allocation.

A unified process logic is established to ensure that each logistics event follows a consistent execution, by improving predictability, traceability, and coordination reliability.

4.3.1.3 Phase 3: System Integration within Logistics Operations

This phase focuses on integrating the digital platform into the operational architecture of **Bibars** logistics activities.

Each functional component of the platform is mapped to a core operational function: And

Table 4.3: Mapping of Platform Modules to Operational Logistics Functions

Platform Module	**Operational Function**
Order Management	Structuring and preparing delivery requests before execution (order validation, grouping, and dispatch readiness)
Tracking Module	Continuous monitoring of delivery progress throughout field execution
Dispatch System	Allocation and coordination of drivers based on workload, routes, and operational priorities
Exception Management	Identification, communication, and resolution of operational disruptions during delivery execution
Reporting Dashboard	Consolidation of operational data into performance indicators for control and decision-making

Source: Elaborated by the author.

information flows are structured according to role based operational interactions:

- external transporters provide real-time execution data,
- logistic coordinator manages coordination and routing adjustments,
- customer service accesses synchronized shipment information,
- management monitors aggregated performance indicators.

The platform thus operates as a centralized logistics visibility and coordination system, replacing fragmented and informal communication channels.

4.3.1.4 Phase 4: Controlled Pilot Deployment

Prior to full implementation, a controlled pilot phase is introduced to validate the platform under real operational conditions.

This phase is designed as a live operational experiment, implemented within a selected delivery zone, involving a defined group of drivers, dispatchers, and operational routes.

The pilot aims to evaluate system performance under realistic logistics constraints such as:

- time sensitive delivery requirements,
- route variability and traffic conditions,
- customer availability fluctuations,
- exception and disruption scenarios.

Evaluation is conducted using a set of operational performance indicators, including:

- **Delivery punctuality rate**: measuring the extent to which deliveries are completed within planned time-frames,
- **Status update latency**: measuring the delay between real-world execution and system updates,
- **Frequency of manual coordination interventions**: measuring how often phone calls or informal communication are used to manage operations,
- **Reduction in external communication dependency**: assessing the shift from informal communication channels to platform based coordination,
- **Accuracy of real-time tracking data**: evaluating how consistent system tracking is with actual delivery progress,

Feedback is collected from all operational actors to ensure iterative refinement based on field-level constraints.

4.3.1.5 Phase 5: Organizational Adoption and Capability Development

Beyond technical deployment, the success of the platform depends on its integration into organizational practices and user adoption dynamics.

Training and capacity-building activities are therefore differentiated by operational role:

- Drivers: mobile execution, status reporting, exception signaling,

- logistic coordinators: coordination, dashboard usage and allocation logic,
- Customer service: tracking interpretation and client communication,
- Supervisors: KPI monitoring and operational control

This phase also addresses behavioral resistance to change, often rooted in established informal coordination practices.

The adoption strategy is reinforced through:

- reduction of coordination workload,
- limitation of phone based communication dependency,
- increased operational transparency,
- internal champion-based adoption mechanisms.

The platform is positioned as a facilitator of operational efficiency rather than a control instrument.

4.3.1.6 Phase 6: Progressive System Deployment

Following validation through the pilot phase, deployment is extended progressively across **Bibars** logistics operations.

The deployment follows the logic of:

- expansion across additional delivery zones,
- integration of all transport operators,
- full integration of all products categories,
- extension to customer service and managerial oversight,

This phased approach ensures operational continuity and minimizes disruption to ongoing logistics activities.

Adoption is assessed through behavioral indicators rather than system usage metrics, including:

- frequency of real-time updates
- reduction in manual coordination interactions
- consistency of execution through the platform

4.3.1.7 Phase 7: Continuous Performance Optimization

Once fully deployed, the platform transitions into a continuous optimization mechanism within **Bibars** logistics operations.

Performance monitoring is structured around key logistics KPIs such as:

- delivery performance rate,
- coordination delay time,
- disruptions resolution speed,
- information flow efficiency,
- operational bottleneck frequency.

Continuous improvement is driven by:

- operational user feedback,
- evolving demand patterns,
- transport and routing constraints,
- service quality expectations.

This phase establishes digital transformation as an ongoing adaptive process, rather than a finished implementation project.

4.3.2 Logistics Monitoring and Implementation Control Tools

The deployment of the digital logistics platform within **Bibars** requires not only technological integration but also the establishment of structured monitoring and control mechanisms capable of supervising both operational performance and future implementation progress. In the operational context of the company, the introduction of monitoring tools becomes essential to ensure better operational control and support the future deployment process in a structured manner.

As part of this project, practical monitoring instruments were developed to support both current logistics performance analysis and future implementation follow-up. These tools include:

- a logistics performance dashboard designed to monitor and visualize current logistics operations and support managerial decision-making;

- an implementation follow-up grid developed in Excel to support the future deployment process by monitoring implementation activities, responsibilities, progress status, and implementation risks.

Together, these tools form a monitoring framework intended to strengthen operational visibility, improve coordination control, and facilitate more structured management throughout the digital transformation process.

4.3.2.1 KPI Monitoring System

As part of the pre-deployment preparation conducted during this internship, a set of key performance indicators was defined in collaboration with the operational team at **Bibars Group**. The selection of these indicators was directly grounded in the dysfunctions identified throughout the diagnostic phase, ensuring that each KPI responds to a specific and documented operational weakness rather than reflecting a generic performance framework.

The principal indicators retained within the monitoring system include:

- **Delivery lead time:** measures the time elapsed between order confirmation and successful delivery completion, addressing the synchronization gaps observed between production, transport, and customer operations;
- **Failed delivery rate:** evaluates the proportion of unsuccessful delivery attempts caused by operational or coordination issues, directly reflecting the consequences of fragmented information flows and manual execution practices;
- **Incident response time:** measures the speed of managerial reaction following operational disruptions or delivery exceptions, capturing the organization's dependence on reactive rather than proactive decision-making.

These indicators were presented to and validated by the operational management team during a working session, and subsequently transmitted to the Freightmee development team for integration into the platform's monitoring module.

4.3.2.2 Logistics Performance Dashboard

Building on the validated KPI framework, a logistics performance dashboard prototype was designed and presented to both **Bibars Group** and the Freightmee team as a concrete monitoring interface. The prototype was developed to provide real-time visibility over the principal logistics

indicators identified during the diagnostic phase, translating fragmented operational data into a centralized and structured visualization environment.

The dashboard was structured around the operational dimensions most affected by the coordination and visibility gaps documented throughout this study, covering delivery performance tracking, delay monitoring, failed delivery analysis, and incident response efficiency. During the presentation session, the operational team confirmed that the proposed structure aligned with their daily monitoring needs and reflected the realities of their logistics activities.

Following this validation, the dashboard structure and its underlying KPI framework were formally transmitted to Freightmee and integrated into the platform's operational monitoring module. This integration represents a direct outcome of the pre-deployment preparation work conducted throughout this internship, translating the diagnostic findings into a functional and operational digital tool. A visual representation of the proposed dashboard is provided in Appendix D.

The integration of this monitoring interface into the Freightmee platform marked a concrete step forward in **Bibars Group's** digital transformation process. For the first time, operational logistics data could be centralized, visualized, and evaluated against defined performance thresholds, replacing the previously fragmented and manual reporting practices with a structured data-driven monitoring system. This outcome directly demonstrates the operational value of the pre-deployment preparation approach developed in this thesis, confirming that structured organizational readiness work generates tangible and measurable improvements in logistics coordination and visibility.

4.3.2.3 Implementation Follow-Up Grid

In addition to operational performance monitoring, a practical implementation follow-up grid was developed as part of this project to support the future deployment process of the digital platform within **Bibars**. The tool was designed using Microsoft Excel in order to provide a flexible, accessible, and easily updateable implementation management instrument.

The follow-up grid constitutes the primary project management tool intended to supervise future implementation activities and ensure structured execution of the deployment process. It allows the implementation team to monitor project progress, track task completion, assign responsibilities, and identify implementation delays or risks throughout the deployment phases.

The structure of the grid is organized around implementation phases, workstreams, and operational tasks. For each activity, the grid includes:

- the task description;

- responsible actor or department;
- planned start and completion dates;
- current implementation status;
- progress percentage;
- observations and corrective actions;
- implementation risks and delay indicators.

The development of this follow-up grid represents a concrete managerial contribution within the framework of this project, as it provides **Bibars** with a structured tool capable of supporting future implementation supervision, improving organizational coordination, and strengthening execution control throughout the digital transformation process.

4.3.3 Recommendations and Limitations

4.3.3.1 Recommendations and Suggestions

The analysis conducted within **Bibars** highlighted several operational and organizational limitations affecting the efficiency of logistics activities. The study revealed that the current logistics environment is characterized by fragmented communication, limited real-time operational visibility, heavy dependence on manual coordination, and insufficient synchronization between operational actors. At the same time, the pre-deployment analysis demonstrated the strong potential of digital transformation to improve logistics performance, operational responsiveness, and coordination efficiency.

In an increasingly digitalized and competitive logistics environment, it becomes essential for companies seeking long-term sustainability to continuously improve their operational processes, strengthen information flow management, and adopt integrated digital solutions capable of supporting operational growth and decision-making efficiency.

Based on the practical study conducted and the opportunities offered by the proposed digital logistics platform, the following recommendations are suggested to improve the efficiency and performance of logistics operations within **Bibars**:

- Implement continuous training programs for logistics coordinators, drivers, and administrative staff in order to improve the use of digital tools and ensure accurate and timely transmission of operational information;

- Standardize logistics procedures and communication flows between operational actors to reduce coordination errors, operational delays, and dependence on informal communication methods;
- Progressively automate logistics operations in order to improve operational traceability, reduce manual interventions, and enhance delivery responsiveness and execution reliability;
- Establish rationalized and structured logistics performance indicators to ensure effective monitoring of operational performance, particularly regarding delivery punctuality, operational responsiveness, processing delays, coordination efficiency, and logistics incident frequency;
- Reduce dependence on phone calls and fragmented communication channels by centralizing operational exchanges and information sharing within the digital platform;
- Adopt a progressive deployment strategy by first implementing the platform within the most critical logistics operations before extending it gradually to the entire operational structure;
- Integrate real-time tracking and traceability functionalities to improve operational transparency, monitoring accuracy, and customer service quality;
- Establish technical support, maintenance, and continuous evaluation mechanisms to ensure the stability, scalability, and long-term adaptability of the digital logistics platform;
- Encourage a culture of continuous operational improvement and digital adaptation in order to facilitate employee acceptance of technological transformation and reduce organizational resistance to change;
- As a future development perspective, **Bibars** should consider extending the digitalization process beyond logistics operations to include production activities within the same integrated platform. Such integration would provide a comprehensive real-time overview of operational activities across the company, allowing better synchronization between production capacity, logistics execution, and customer demand. This would strengthen coordination between departments, improve planning accuracy, reduce operational delays and resource inefficiencies, and contribute to a more responsive and balanced alignment between supply and demand throughout the operational chain.

4.3.3.2 Limitations of the Study

Despite the practical and organizational relevance of the present research, several limitations must be acknowledged in order to appropriately define the boundaries of the study.

The present research adopts a qualitative and pre-deployment orientation focused on organizational diagnosis and framework construction rather than implementation performance measurement. As a result, no quantitative assessment was conducted using measurable operational indicators such as delivery lead times, coordination latency reduction, inventory accuracy improvement, or transport optimization rates, as the digital platform has not yet been fully implemented within the organization. Similarly, no controlled pilot deployment was carried out during the research period. The proposed framework should therefore be understood as a strategic and operational preparation model whose empirical quantitative validation depends on future full-scale implementation and evaluation.

Furthermore, the proposed framework was developed within the specific context of a multi-site agri-food supply chain characterized by cross-border coordination requirements, fresh and frozen product management, halal traceability considerations, the framework may require adaptation before being applied to another industrial organizations, or sectors operating under substantially different operational constraints. The transferability of the framework should therefore be approached cautiously and considered context dependent rather than universally applicable without modification.

Overall, these limitations do not invalidate the relevance of the study, but rather define its exploratory and applied nature. They also provide valuable directions for future research, particularly regarding quantitative validation, comparative platform analysis, and large-scale implementation assessment.

GENERAL CONCLUSION

This thesis aimed to examine how a multi-site logistics organization can be strategically prepared for the deployment of a digital logistics platform, using the case of **Bibars Group**. The research was guided by the objective of understanding whether the success of digital transformation in logistics depends solely on technological adoption or rather on the organizational conditions established before implementation. Through a qualitative case study approach based on interviews, internal documents, and operational observation, the study explored the structural realities of the company's logistics system and proposed a contextualized pre-deployment framework adapted to its needs.

The findings of this research confirm that the logistics difficulties experienced by **Bibars Group** are not temporary operational issues but symptoms of deeper structural weaknesses within the organization. The diagnosis conducted throughout the study revealed fragmented communication channels, the absence of standardized procedures, limited visibility across logistics operations, and strong dependence on informal coordination between actors. Information circulation relies heavily on spreadsheets, phone calls, and messaging applications, creating delays, inconsistencies, and a lack of synchronization between sites. These observations confirm the first hypothesis **(H1):** the coordination dysfunctions observed at **Bibars Group** reflect structural weaknesses that cannot be solved through minor operational adjustments alone. Consequently, the deployment of a digital platform appears not as a simple modernization initiative but as a structural necessity for improving operational integration and supply chain coordination.

The second hypothesis **(H2)** is also confirmed. The research demonstrates that the principal challenge facing digital platform deployment at **Bibars Group** is not technological capability but organizational readiness. Although the selected platform, Freightmee, offers functionalities capable of supporting logistics integration, the organization itself is not yet fully prepared to absorb and operationalize such transformation. The study identified several preparation gaps, including the lack of process standardization between sites, partial strategic alignment among management levels, and limited employee preparation for digital integration. These findings show that technology alone cannot generate transformation if the organizational environment

remains unprepared. In this sense, preparation becomes the determining factor of implementation success.

The third hypothesis **(H3)** is equally validated through the development of the pre-deployment framework proposed in Chapter Four. Unlike generic technology adoption models that often prioritize technical installation, the framework developed in this thesis is grounded directly in the operational realities of **Bibars Group**. It is based on field diagnosis and structured around complementary phases: strategic diagnostic, process standardization, digital readiness assessment, platform-process alignment. This framework provides a contextualized and actionable roadmap adapted to the company's multi-site logistics structure. By focusing on organizational alignment before deployment, it reduces the risks associated with technological implementation and increases the probability of long-term platform adoption and operational coherence.

The main contribution of this research lies in the construction of this pre-deployment framework. The study demonstrates that digital transformation in logistics should not be approached as a purely technological project but rather as an organizational transformation process requiring strategic preparation, operational restructuring, and stakeholder alignment. In doing so, the thesis reinforces the theoretical perspective developed by Bryan J. Weiner concerning organizational readiness for change, while also supporting the critical success factors identified by Terry M. Somers and Klara Nelson regarding information system implementation. The framework therefore bridges theory and practice by translating abstract readiness concepts into concrete managerial actions applicable within a logistics context.

This research also presents certain limitations, some of which stem from practical constraints encountered during the investigation. The multi-site nature of **Bibars Group**, spanning Algeria, France, and Poland, restricted on-site observation to a single location, while the internship timeframe limited the number of accessible respondents. As a result, the study relies on a single case and a bounded set of interviews and internal documents, which limits the statistical generalizability of the findings. A broader sample including additional operational actors and external stakeholders could provide a more comprehensive diagnostic perspective. Finally, the thesis focuses exclusively on the pre-deployment phase and does not evaluate actual post-implementation performance. Future research could extend this work by applying the proposed framework to other multi-site supply chains operating in different sectors or organizational environments. Comparative studies could also evaluate how contextual factors influence readiness for digital transformation. In addition, future researchers may follow the actual deployment of Freightmee at **Bibars Group** in order to assess whether the preparation framework developed in this study effectively translates into measurable improvements in coordination, visibility,

operational efficiency, and overall logistics performance.

In conclusion, this thesis demonstrates that the success of digital platform deployment in logistics depends less on technology itself than on the organization's capacity to prepare structurally, strategically, and operationally for change. Digital transformation is therefore not merely a question of adopting new tools, but of building the organizational conditions necessary for these tools to create sustainable value.

Appendix A: Interview Guide

Introduction

I am GHALMI Wissal, a second-year Master's student at the school of higher commercial studies (EHEC), specializing in Supply chain management. I am currently conducting my Master's thesis entitled:

"Optimizing Logistics Operations in a Multi-Site Supply Chain Through a Pre-Deployment Framework for Digital Platforms."

First, I would like to sincerely thank you for agreeing to participate in this interview.

As part of this research, your contribution will provide valuable insights that directly support the objectives of this study. This interview aims to explore the strategic vision for digital transformation, the current organizational context, and the company's level of readiness prior to the deployment of a digital logistics platform.

Interview Themes

Axis 1 — Current Logistics Operations and Coordination Mechanisms

Objective Understand how logistics operations currently function and how coordination occurs across actors and sites.

Questions

1. Can you describe how logistics operations are currently organized within **Bibars Group**?
2. How are coordination activities managed between production, warehousing, transportation, and distribution functions?
3. How does information circulate between the different actors involved in logistics operations?
4. What tools or systems are currently used to monitor and coordinate logistics activities?
5. How are operational decisions generally made when disruptions or unexpected situations occur?
6. Which activities require the highest level of coordination between departments or sites?

Axis 2 — Operational Dysfunctions and Fragmentation Factors

Objective Identify the mechanisms generating operational fragmentation, visibility gaps, and coordination difficulties.

Questions

1. What are the main operational difficulties encountered in daily logistics activities?
2. Are there situations where coordination between actors or sites becomes difficult? Why?
3. What types of information are the most difficult to access or synchronize?
4. To what extent do manual processes affect operational efficiency?
5. Are some logistics activities highly dependent on informal communication or individual experience?
6. What operational consequences result from delays, missing information, or lack of synchronization?

Axis 3 — Digital Integration Needs and Implementation Constraints

Objective Understand why digital integration became necessary and identify the organizational constraints affecting implementation readiness.

Questions

1. What operational needs have increased the necessity for an integrated digital platform?
2. What improvements would centralized integration bring to logistics operations?
3. What difficulties have slowed down or complicated the implementation process?
4. What organizational changes would be necessary before implementing an integrated platform?
5. How prepared do you think the organization currently is for large-scale digital integration?
6. What factors could facilitate or hinder successful implementation?

Appendix B: Process Cartography

The full process cartography developed during the diagnostic phase of this study is available at the following link:

Access Process Cartography

Appendix C: Proposed Dashboard for the Digital Platform

This appendix presents the dashboard proposed as part of the digital platform deployment framework.

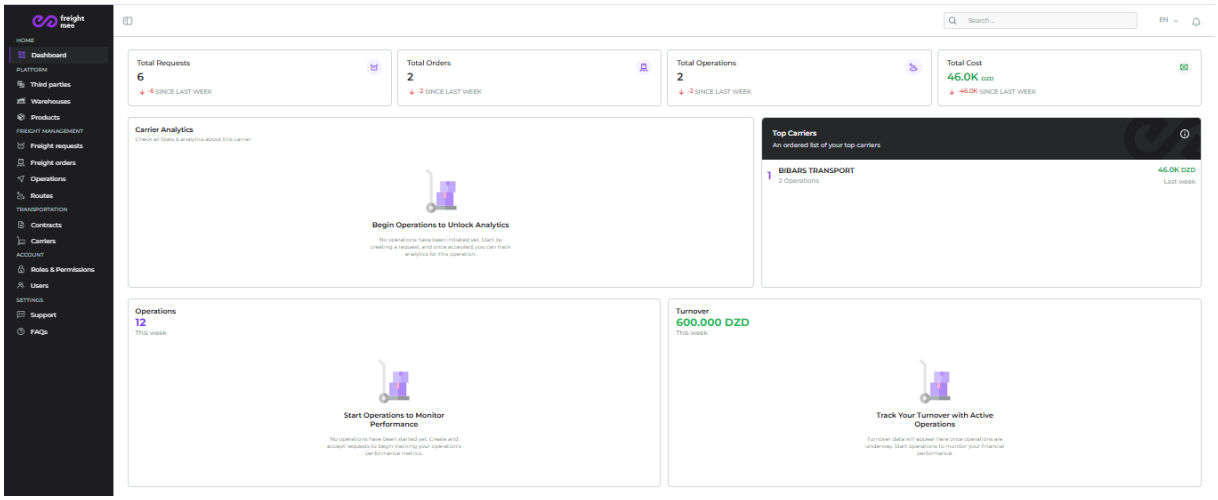

Figure 4: Logistics Dashboard Interface (Source: Freightmee platform)

Appendix D: Implementation Follow-Up Grid

The implementation follow-up grid developed for monitoring the deployment of the digital logistics platform is available at the following link:

Access Implementation Follow-Up Grid

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