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Submitted to obtain an Academic Master's degree in

« Entrepreneurship and Project Management »

Theme:

The Role of Adopting Agile Approach in Enhancing Operational Performance

A case study of: Djen-Djen Port

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ABSTRACT

This research investigates how introducing the adoption Agile approach can enhance operational performance within non-software companies such as port operations, focusing on **Djen-Djen Port** in Algeria. With global logistics growing more unpredictable, ports must become more adaptive and efficient. The study applies a qualitative method, combining interviews, observations, and document analysis to understand how Agile-inspired methods are currently used. The findings reveal that although the port has not formally adopted Agile, several departments use tools such as task boards, daily team check-ins, and short planning cycles. These informal strategies have helped improve communication, responsiveness, and task coordination. However, broader Agile adoption faces hurdles such as traditional management structures, limited digital access, and a lack of specialized training.

This study suggests a gradual implementation plan, backed by leadership and ongoing performance monitoring. The findings offer insight into how ports and similar logistics settings can pursue organizational improvement by adapting Agile principles to suit their operational realities.

Key Words: Agile Approach, Operational Performance, Port Operations, Organizational Improvement, Agile Adoption.

RESUME

Cette recherche examine comment l'adoption de l'approche Agile peut améliorer la performance opérationnelle au sein des entreprises non liées aux logiciels, comme les opérations portuaires, en se concentrant sur le **port de Djen-Djen** en Algérie. Alors que la logistique mondiale devient de plus en plus imprévisible, les ports doivent devenir plus adaptatifs et efficaces. L'étude applique une méthode qualitative, combinant des entretiens, des observations et une analyse documentaire pour comprendre comment les méthodes inspirées de l'Agile sont actuellement utilisées en pratique.

Les résultats révèlent que bien que bien que le port n'ait pas formellement adopté Agile, plusieurs départements utilisent des outils comme les tableaux de tâches, les points quotidiens d'équipe et les cycles de planification courts. Ces stratégies informelles ont contribué à améliorer la communication, la réactivité et la coordination des tâches. Cependant, une adoption plus large de l'Agile rencontre des obstacles tels que les structures de gestion traditionnelles, un accès numérique limité et un manque de formation spécialisée.

La recherche suggère un plan de mise en œuvre progressif, soutenu par le leadership et un suivi continu des performances. Les résultats offrent un aperçu de la manière dont les ports et les environnements logistiques similaires peuvent poursuivre l'amélioration organisationnelle en adaptant les principes Agile pour les adapter à leurs réalités opérationnelles.

Mots-Clés : **Approche Agile, Performance Opérationnelle, Opérations Portuaires, Amélioration Organisationnelle, Adoption Agile.**

ملخص الدراسة

تبحث هذه الدراسة في كيفية تحسين الأداء التشغيلي من خلال إدخال النهج المرن في الشركات غير البرمجية مثل عمليات الموانئ، مع التركيز على **ميناء جن جن** في الجزائر. مع تزايد عدم القدرة على التنبؤ في سلاسل الإمداد العالمية، يجب أن تصبح الموانئ أكثر تكيفًا وكفاءة. تطبق الدراسة منهجًا نوعيًا، يجمع بين المقابلات، والملاحظات، وتحليل الوثائق لفهم كيفية استخدام الأساليب المستوحاة من المرونة في الممارسة العملية حاليًا.

تظهر النتائج أنه على الرغم من أن الميناء لم يعتمد النهج المرن بشكل رسمي، إلا أن العديد من الأقسام تستخدم أدوات مثل لوحات المهام، والتفقدات اليومية للفريق، ودورات التخطيط القصيرة. هذه الاستراتيجيات غير الرسمية ساعدت في تحسين التواصل والاستجابة وتنسيق المهام. ومع ذلك، تواجه تبني منهجية مرنة بشكل أوسع عقبات مثل الهياكل الإدارية التقليدية، والوصول المحدود إلى التكنولوجيا الرقمية، ونقص التدريب المتخصص.

تشير الأبحاث إلى خطة تنفيذ تدريجية، مدعومة بالقيادة ومراقبة الأداء المستمرة. تقدم النتائج رؤى حول كيفية أن تسعى الموانئ والبيئات اللوجستية المماثلة إلى تحسين الأداء التنظيمي من خلال تكييف مبادئ المرونة لتناسب واقعها التشغيلي.

الكلمات المفتاحية: النهج المرن، الأداء التشغيلي، عمليات الموانئ، التحسين التنظيمي، تبني النهج المرن.

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LIST OF ABBREVIATIONS AND ACRONYMS

AM: Agile Manufacturing
CFA: Confirmatory Factor Analysis
CoE: Center of Excellence.
DEA: Data Envelopment Analysis
DGA: Directorate-General Assistant
DIFOT: Delivery In Full On Time
DSDM: Dynamic System Development Method
ERP : Enterprise Resource Planning
EV: Ethylene-vinyl acetate
ICT: Information and Communication Technology
IID: Iterative and Incremental Development
IR: Information Retrieval
IT : Information Technology
JIT: Just-In-Time
KPI : Key Performance Indicators
MOE: Manufacturing Operational Effectiveness
NPS: Net Promoter Score
OKR: Objectives and Key Results
PDCA: Plan-Do-Check-Act
QFD: Quality Function Deployment
RAD: Rapid Application Development
RO/RO: Roll On/Roll Off
ROI: Return on Investment
SAFe: Scaled Agile Framework
SCM: Supply Chain Management
SEM: Structural Equation Modeling.
SFA: Stochastic Frontier Analysis
SMI: Integrated Management System
TFP: Total Factor Productivity
TQM: Total Quality Management
VUCA: Volatile, Uncertain, Complex, Ambiguous
WIP: Work In Progress.

GENERAL INTRODUCTION

GENERAL INTRODUCTION

1. Context and theme interest

To keep the long-term advantage in today's highly competitive and dynamic business environment, companies are expected to continuously enhance their operational efficiency, flexibility and competitiveness. The over direction and rigidness in terms of planning and hierarchical tendency of decision-making and long-term forecast has highlighted the shortcoming of traditional management styles to adjust quickly to constant changes of costumer expectations or market dynamics or new technology (Highsmith, 2009). "As industries increase in complexity and become more integrated, businesses must know how to respond quickly to changing conditions, streamline processes, and make decisions in real time in order to remain agile, responsive, and competitive." The Agile philosophy facilitates flexibility, iterative development, and continuous collaboration and, as such, has gained widespread acceptance as a new management paradigm in reaction to these problems (Beck, 2001). Agile concepts were developed first in the software development industry, and subsequently extended to supply chain, manufacturing and logistics too, where efficiency, sensitivity and flexibility are core requirements (Conforto, 2014). Compared to traditional project management methods, the Agile methodology is based on the principles of cooperation across multidisciplinary teams, on-going feedback, and iterative processing. These are the drivers that help companies increase productivity and optimize processes, in a way that makes them resilient to change. Popular Agile methodologies such as Scrum, Kanban, and Lean present structured approaches that help companies reduce waste, improve decision making, and boost overall output. Companies can innovate, improve service delivery and meet the evolving needs of the market, because they help to foster a culture of flexibility and band aid-free growth.

Shipping and logistics are a cornerstone of international trade as they help move goods critically and contribute significantly to economic growth. Ports are critical links in the global supply chains, and to meet the demands of a rapidly moving and ever more complex world, these different elements need to be managed efficiently. Port facilities are crucial to the Algerian marine and logistics industry, which serve as key gateways for the import and export trade and that play a significant role in both international trade and economic growth. But, with port operations so complex by nature, different stakeholders, including shipping companies, customs authorities, logistics companies, freight forwarders and terminal operators, must play their part effectively in the chain. Conventional port management methods suffer due to the unreliable and stochastic

nature of shipping which leads to fluctuating demand, supply chain disruptions and unpredictable schedules. The agility, agility and reactivity required to deal effectively with such challenges sometimes missing in traditional way of working.

There is an opportunity for the use of Agile methodology in port operations to enhance decision making, resource utilization and the overall efficiency. By embracing Agile such as ongoing planning, continuous feedback and real-time-vision are realized and with that ports and logistics companies can achieve greater work flow efficiencies, reduced traffic and a better quality of service over all. Agile also promotes cooperation and cross-functional teamwork that helps ensure several stakeholders work together more effectively to resolve operational issues.

Agile methodologies are frequented researched and utilized in IT and software development; however, little is found in the literature that generalizes its use application to port logistics and marine operations (Dikert, 2016). We need to consider how Agile ideas could improve the functioning of port operations in view of the ever increasing complexity of global commerce and supply chain management. The aim of this study is to narrow the gap between best practice, blockers and enablers for Agile adoption, as well as theoretical Agile framework and real-world application within the port sector.

2. The purpose of the study

The objective of this research is to study how agile practices can assist in improving operational performance, specifically in port and logistics operations and to see the extent of adoptability among those industries.

Conceptually and operationally integrating Agile into port logistics is worth studying, given the complexity of current global trade, the occurrence of supply chain disruptions and the demands for a more efficient port.

As a result, the aim of this paper is fill this void of the academia to benefit from to be in line with the gap between theory and practice and give insight into the benefits of implementation, challenges and strategic enablers in adopting Agile in the Port Logistics. The objective of this research is to provide a complete framework when utilising Agile methods in structured high regulated environments such as ports by investigating its effect on productivity, flexibility and decision making process.

To achieve this aim, the investigation will focus on:

- Understanding the value Agile adds in enhancing organizational productivity, agility and decision making around top level operational metrics.
- Identifying possible barriers for implementing Agile under a formal context of port logistics.
- Discovering the key requirements for traditional management processes to adapt in the new world of Agile.
- some guidance for logistics managers and decision makers that want to apply Agile in their routine operations.

3. Research problem

Although Agile methods have become exceedingly popular across organizations in the last two decades, organizations still face some major challenges in successfully adopting and implementing them. However, the transform from traditional hierarchal structures to a more Agile, team-based path, is not direct since continuous process of cultural transformation, leadership support and structural changes are required to be created in an organization (Gandomani & Nafchi, 2016).

The basic principles underpinning Agile; constant feedback towards incremental improvement, maintaining cross functional collaboration for team work; have been applied successfully for software development process but the extent of the same can be observed in logistics, supply chain management and even manufacturing is still subject to research (Rigby, Sutherland & Takeuchi 2016).

Although Agile has driven substantial improvements in many industries, the extent of such improvements especially operational processes, resource optimizations, and troubleshooting approaches, are untested in environments such as port logistics, where efficiency and coordination play critical roles.

Thus, the primary research issue that this study aims to address is:

How does the adoption of Agile methodologies contribute to the enhancement of operational performance?

Sub-questions

- What operational challenges at Port Djen Djen have led to the informal or formal adoption of Agile practices?
- How have Agile methodologies -formally or informally applied- improved operational performances across departments?
- What barriers hinder full-scale Agile adoption, and what strategies are proposed to overcome them?

4. Research field

And for our hosting, here comes **Djen Djen Port** "Djen Djen Port Company". The objective of this research is to develop an understanding of how the adoption of agile approach helps in enhancing operational performance. Participants in the research will mostly consist of logistics and operations managers, supply chain professionals, and employees working in port operations, where experience in decision-making, coordination, and workflow optimization can be extracted.

5. Method

Because of the significance and vast adaptability of the Agile phenomenon or a rather more complex dynamics like in logistics, as well as in other operation and quality related fields, a qualitative research design has been chosen to capture the big picture. While quantitative research involves the manipulation and statistical analysis of numerical data, a qualitative approach is better placed to provide a detailed understanding of the experiences with and challenges of, not to mention opportunities presented by, the use of Agile in pragmatic settings.

The investigation will be conducted by:

Semi-structured interviews with professionals in logistics and operations at Port Djen Djen, including managers, team leaders, and first-line workers involved in decision making and job management at the frontline.

It is clear that qualitative method is quite suitable for this study due to the following reasons:

- It provides an explorative research on Agile in enhancing operational performance of port operations.
- It enables you to understand organizational and team dynamics, the complexities of change management, and the effect of Agile on workflow efficiency.
- In a complex operating environment such as a port, it gives you deep contextual understanding that quantitative tools might miss.

6. Plan announcement

This research is structurally organized as follows, it opens with an introductory part that explains why the topic was chosen and how it is relevant. The book is subsequently organized into three major chapters:

The theoretical basis is built in the first chapter "Operational Performance in the context of Agile Approach". The chapter is organized in to the following two sections: literature view that discusses the position of previous literature on the subject matter, and theoretical framework that attempts to define and explain the most central concepts of the study.

The second chapter of this one" Methodological Framework and Organizational Context" is dedicated to the methodology. Section we describes the methodology used for conducting the research, the methods used in data collection, the tools used in data analysis, the techniques used to analyze the data. The second section provides a general background on the host organization, describing history, vision, mission and activities.

"Results Analysis and Discussion" This third chapter is divided into two sections, there is the results analysis, secondly the discussion.

In the end, the conclusion puts forward the conclusions drawn from the study, discusses theoretical and managerial implications, admits limitations of this study, and presents recommendations.

CHAPTER I:
OPERATIONAL PERFORMANCE IN THE CONTEXT OF AGILE APPROACH.

Introduction

This chapter lays the foundational groundwork for understanding the theoretical and empirical intersections between Agile methodologies and operational performance. Beginning with a comprehensive literature review, it explores the evolution, principles, frameworks, and strategic relevance of Agile approaches beyond their software roots, particularly in contexts marked by volatility and complexity. By further detailing the constructs and evaluation mechanisms of operational performance, the chapter establishes a conceptual bridge that justifies the integration of Agile in port logistics. The discussion is positioned to help clarify how iterative methods, flexibility, and stakeholder collaboration can drive productivity and responsiveness in rigid, high-stakes environments.

Section 01: Literature review

Agile approaches have become essential for accelerating operational performance and enabling organizations to act adaptively, responsively, and efficiently. Although Agile originated in software development, industries such as manufacturing, supply chain management, and port operations have adopted it to balance agility with effective decision-making. This literature review explores Agile approaches, operational performance, and the relationship between them, emphasizing empirical studies that illustrate how Agile improves productivity and competitiveness in volatile contexts.

1. Agile Approach

In a volatile, uncertain, complex, and ambiguous (VUCA) world, organizations rely on an Agile mindset to stay competitive. Eilers, Peters, and Leimeister (2022) showed that a learning-oriented mindset, collaborative engagement, and customer value creation drive strategic agility, which positively influences organizational performance. They used a mixed-method study with 15 interviews and a survey of 499 participants in Switzerland to identify these drivers.

Al-Saqqa, Sawalha, and AbdelNabi (2020) reported that several Agile practices, such as Scrum and Kanban, align with Agile values and principles. According to the 2022 State of Agile Report, 87% of practitioners use Scrum, and 56% use Kanban. SAFe remains the most popular approach for scaling Agile, with a 53% adoption rate.

Tena Žužek (2020) conducted a case study on a medium-sized Slovenian manufacturing company and found that adopting selected Agile Project Management (APM) practices, such as project

teams, stand-up meetings, customer collaboration, and iterative planning, significantly improves stakeholder satisfaction, communication, and flexibility.

Lun, Lai, Cheng, and Yang (2023) argued that agile ports enhance the adaptability and efficiency of global supply chains. They proposed a ten-step implementation approach to reduce delays, optimize logistics, and improve service reliability. Their research shows that maritime stakeholders prefer agile ports for their ability to respond quickly, leading to higher customer satisfaction. (Lun, Lai, Cheng & Yang,2023).

In the first ward, for a case study of the Dynamic Systems Development Method (DSDM) being used in an online computer library center, Tudor and Walter explored the way that this model of agile methods might enhance productivity and enhance team cohesion in an environment typically not very flexible or responsive. Key agile practices like timeboxing, iteration, and MoSCoW prioritization were implemented against various sections of the process. Without stating the specific sample size, this study comprised of all stakeholders as well as development teams (Tudor & Walter, 2006).

I found that agile reduced project cycles from 18–24 months to 2–3 months, improved team collaboration, and speeded delivery, the study says. Opposition was guaranteed at first, but support from the leadership delivered the win. These findings suggest that there is improvement in port operations through agility in a more effective and efficient way.

Alaidaros, Omar, and Romli (2019) conducted a comprehensive systematic literature review and identified applicability, effectiveness, and efficiency as the top criteria for evaluating Agile methodologies. They also noted that surveys and case studies are the most common research techniques, supporting the qualitative design of studies exploring Agile's impact on operational performance. Their findings emphasized the growing acceptance of Agile frameworks like Scrum, Kanban, and DSDM in industries requiring adaptability and iterative processes.

Scrum is evaluated as a development method superior to traditional models as Waterfall and Spiral, reinforcing its ability to handle unpredictable and complex system development higher. The paper on Business Object Design and Implementation It combines conceptual and empirical work, integrating principles from complexity theory and concepts from industrial process control to juxtapose Scum with existing approaches of scientific problem-solving and to study its practical relevance. While the report doesn't offer specific sample size, it references firms using Agile-type techniques such as Fuji-Xerox, Canon, Honda, NEC, 3M, Hewlett-Packard and Borland. These

results prove the flexibility of Scrum – an increase in overall flexibility ultimately increases success rate of projects in unpredictable situations, cross-functional collaboration enhances productivity and creativity, and cyclical development methodology (Sprints) increases responsiveness to market shifts (Schwaber, 1996).

1. Operational Performance

Operational performance refers to an organization's ability to transform resources into products or services effectively and efficiently while achieving strategic objectives. Researchers found that improving operational excellence, knowledge management practices, and process optimization increases efficiency, customer satisfaction, and competitiveness. Their research demonstrated that organizations maintaining long-term sustainability optimize resource use, minimize waste, and innovate continuously. (Trattner et al., 2019).

In this study, we have investigated the impact of operational performance on information technology usage and firm performance with a focus on its role in strengthening competitiveness and customer service. The goal was to provide insights into how companies can enhance competitive positioning, customer service, market responsiveness, and bottom line results by optimizing efficiencies across operations.

Quantitative analysis of corporate data to assess operational performance parameters and its contribution to business outcomes. Over a number of pages, it shared reflections from different businesses - the specific type of sample size industry was identified earlier in the study talk about how they leverage operational efficiency to drive their success.

Results indicate that improved customer service can lead to increased customer loyalty and customer satisfaction. Furthermore, the long-lasting nature of a company is also due to its responsive skills towards the market changes. Strategic operational performance is also directly associated with market share gain and return on assets (scorecard items).

From cargo handling rates to dwell time and vessel dispatch speed, these are some of the components of port operational performance. A port's effectiveness is largely determined by its geographical location, area of expertise, port size, shipping services offered, and infrastructure. Approaches such as Data Envelopment Analysis (DEA) and fuzzy DEMATEL-TOPSIS are employed to evaluate and benchmark port efficiency, offering insights into operational inefficiencies and potential areas for improvement (Tan, Kannan, & Narasimhan,2007)

The total stay time of cargo is considered a metric critical for efficiency analysis of ports in the context of importer and exporters and as such the study focused on this motion of cargo. Its analysis of dwell times, which are a key indicator of port efficiency, found that long dwell periods could indicate inefficiencies in the underlying operations. The study did, however, underline the harmful impact of protracted periods of cargo stay in the country and did not point out the particular areas of improvements needed. The summary does not include extensive information about the sample in the study (Chung,1993).

Felício et al. (2013) analyzed 54 European ports and found that factors like port size, specialization, location, and infrastructure significantly influence operational performance. They concluded that strategic port management must consider these elements to enhance competitiveness.

The study aimed to apply Data Envelopment Analysis (DEA) to gather data in order to analyze and benchmark port efficiency in a bid to find operational inefficiencies and possible areas for improvement. A benchmarking framework to identify best practices was the use of DEA to assess the relative efficiency of ports. While the report does not detail sample specifics, the findings provided useful guidance into operational inefficiencies and suggested potential areas for ports to enhance efficiency (Lin & Tseng,2007).

Gayathri et al. (2021) used a fuzzy DEMATEL-TOPSIS method to evaluate ports' operational and financial performance. Their approach identified key performance drivers, enabling ports to allocate resources effectively and develop competitive strategies.

2. The relation between Agile Approach and Operational Performance

Samson and Terziovski studied 1,200 manufacturing companies in Australia and New Zealand. They found that leadership, people management, and customer focus positively affect operational performance, while rigid process management can hinder it. Their research demonstrated that Agile practices emphasizing flexibility and collaboration align with these success factors, making them suitable for dynamic environments like ports. (Samson and Terziovski,1999).

Purpose The purpose of the paper is to examine the impact that Agile Manufacturing (AM) practices have on operational and business performance within the context of manufacturing organizations. The aim was to assess the influence of AM on key performance attributes: quality, delivery, flexibility, and cost performance. This research utilized survey data from 282 manufacturing firms in Jordan which covered a cross-section of industries. The study hypotheses

used structural equation modeling (SEM) which was achieved by using SPSS and Amos for both validity and reliability.

The results showed a direct positive impact of Agile Manufacturing on business and operational performance relating to quality, delivery and flexibility. However, no definite relationship was observed between AM and cost performance. In addition to this, quality and flexibility performance exhibited complete mediation in the association between AM and business performance, while no mediating effects for cost and delivery performance were found. These findings highlight the importance fully of Agile Manufacturing for enhancing operational efficiency, which is essential in areas that demand flexibility and response (Nabass & Abdallah,2019).

Inman et al. (2011) examined major U.S. manufacturers and found that Agile Manufacturing increases responsiveness, efficiency, and flexibility, though its impact on cost efficiency was limited. Their research confirmed that operational performance mediates the relationship between agility and organizational success.

The influence of agility on operational performance in the U.S. automotive sector: Quality, delivery speed, and flexibility versus cost efficiency. The study purpose was to analyze agility towards performance and sustainability (Assarood, 2021). Data Analysis and Measurement: The researchers employed Partial Least Square (PLS) and SEM for analysis, used survey data at a sample of 212 top managers at 152 facilities, with CFA to ensure data quality According to mediation analysis, sustainability reinforces the effect of agility on efficiency. By confirming agility as a source of competitiveness and sustainability, the results indicated that process planning, workplace organization, and responsiveness three agility basics, led to customer satisfaction, staff morale, and productivity(Moriguchi & Saito,2020).

As per Stormi, Laine , and Korhonen (2019), Agile approaches increase the flexibility, iterative nature, and responsiveness of performance evaluation systems, which enhances operational performance. This study seeks to investigate the impact of Agile, namely Scrum, on management accounting and key performance indicators (KPIs). KPI flexibility was studied in iterative cycles, stakeholder involvement, and ongoing feedback.

Although the specifics of the sample were not disclosed, the study found that indeed Agile encourages participation and rapid prototyping while also eliminating needless tasks that foster the improvements, better decision making, and efficiency that operational agility brings to the table.

Such results underscore the role of Agile in enhancing an organization's ability to get attuned to changing business conditions.

Specifically, the study examined the impact of Agile skills and their impact on operational performance in terms of productivity, agility, and adaptability. The study had the objective of assessing how agility impacts resource utilization, market-proximity, and organizational success. It involved looking at how rapid decision making and continuous learning enable operational adaptability. While example details are limited, the findings showed that Agile skills allow rapid change adaptation, optimization of resources utilization, and overall better business outcomes. Well, these results show the adaptability required to maintain operational efficiency and competitiveness (Nathania,2022).

Rauniar and Cao (2025) surveyed 212 senior managers in the U.S. automotive sector and revealed that Strategic Agile Operations (SAO) significantly enhance speed, responsiveness, and flexibility. Their research highlighted leadership as an essential factor in embedding Agile practices within organizational processes. They also found that combining agility with sustainability initiatives creates a lasting competitive advantage by enabling organizations to anticipate and adapt to changing market conditions effectively.

The present cross-sectional study adopted the concept of strategic agility, which enables businesses to rapidly adapt to change, to examine the role of agility-oriented approaches to operational performance. The study focused on analyzing how an agile mindset where teams work together and strive to embrace change keeps them more responsive and effective in an environment filled with uncertainty. A mixed-method approach, including 15 interviews with industry professionals and a survey of 499 respondents from Switzerland was used to define agility and identify how it could potentially enhance performance.

The results showed that strategic agility is a mediating mode, which ensures that agile concepts are successfully converted into enhanced operational performance, and pointed to the importance of flexibility in rapidly evolving market environments. Both researchers (Eilers, Peters, & Leimeister,2022).

The PMP Agile Study Guide (2020) highlighted how Scrum and Kanban frameworks, through sprints, work-in-progress (WIP) limits, and stakeholder collaboration, enable faster decision-making, better resource allocation, and optimized logistics, benefiting structured industries like ports.

Section 2: Conceptual Framework

This section builds the theoretical foundation to understand the Agile approach and its association with the performance of operations. An overview of Agile principles, history, and practices. In this blog, we will discuss the Agile frameworks such as Scrum, Kanban, Lean, and SAFe, and how each of these frameworks applies in improving efficiency, flexibility, and collaboration in a uniquely different way. Lastly, it defines what operational performance is, its significance, key metrics, and means of measurement.

This framework is a basis for exploring how Agile adoption drives increases in productivity, adaptability, and decision making in ever-evolving business environments by linking Agile methodologies to operational performance.

1. Agile approach: (overview of Agile approach)

1.1.Origins: (history & evolution of Agile approach)

Beginning with manufacturing and quality control in the 1930s, agile approaches later spread to software development and project management. Stewart's Plan-Do-Check-Act (PDCA) cycle, lean manufacturing concepts, and total quality management (TQM) all had an impact on their development. Agile was first used in the manufacturing and aerospace industries, as seen by the Toyota Production System, military initiatives, and NASA missions. It then gained popularity in software development and, ultimately, in general project management (Pollack, Whiteley, & Matous,2021).

Winston W. Royce attacked the Waterfall model in 1970, claiming that its strict, step-by-step methodology was inappropriate for software development. He promoted continuous testing, iterative feedback, early prototyping, and customer involvement, all of which Agile subsequently adopted. Waterfall became the industry norm despite his cautions, but his concepts were eventually incorporated into other models such as Spiral (1988), Rapid Application Development (1991), and Iterative and Incremental Development (IID). The Agile Manifesto (2001), which focused on flexibility, rapid iterations, and customer collaboration, was the result of these ideas and

immediately addressed the issues that Royce had pointed out decades before (Abbas, Gravell, & Wills, 2008)

The Agile Alliance, founded by the 17 signatories of the Agile Manifesto, describes Agile as "the capability to adapt and respond to change effectively to achieve success in unpredictable and dynamic environments".

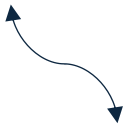
These experts observed that conventional waterfall development models were no longer sufficient to meet the evolving needs of fast-paced organizations. Although Agile principles were in practice before the manifesto, the document provided a structured foundation that formalized these concepts and solidified the use of the term" agile" (LeMay, 2019).

1.2.The Four Fundamental Values and The Twelve Principles of Agile

The manifesto defines four fundamental values and twelve key principles, as depicted in Figure 01 and Table 1.

Figure 01: The four Values of the Agile Manifesto.

The Four Values of the Agile Manifesto:



- 1. Individuals and Interactions Over Process and Tools
- 2. Working Software Over Comprehensive Documentation
- 3. Customer Collaboration Over Contract Negotiation
- 4 Responding to Change Over Following a Plan

Source: (Agile Manifesto, 2001)

In addition to its core values, the Agile Manifesto introduces twelve guiding principles that underpin Agile project management. These principles, collectively referred to as the "Agile Movement," emphasize adaptability, customer satisfaction, and iterative development. They were designed to ensure that development processes align closely with business needs, a perspective reinforced by Alistair Cockburn, one of the manifesto's original contributors (Cockburn, 2001).

Table 1: The Twelve Agile Principles

1. Delivering valuable software on time and consistently is our top focus to satisfy the customer.
2. Accept requirements that change, even at the end of development. Agile methods leverage change to provide the client a competitive edge.
3. Provide functional software regularly, ideally within a few weeks rather than several months.
4. Throughout the project, developers and businesspeople must collaborate every day.
5. Center initiatives around driven people. Give them the space and assistance they require and have faith in their ability to do the task.
6. Face-to-face communication is the most effective and efficient way to share information with and among a development team.
7. Working software is the primary measure of progress.
8. Sustainable growth is facilitated by agile methods. It should be possible for the developers, sponsors, and users to keep up a steady pace indefinitely.
9. Constant focus on quality design and technical proficiency improves agility.
10. It is crucial to practice simplicity, which is the skill of minimizing the amount of labor that is not done.
11. Self-organizing teams produce the best requirements, designs, and architectures.
12. The team evaluates how it may improve its effectiveness regularly and then modifies its behavior accordingly.

Source: (Agile Manifesto, 2001)

The Twelve Principles of the Agile Manifesto are presented crisply in a tabular format. It explains the foundation of the Agile methodology in a very granular manner, focusing on: collaboration, adaptability, customer satisfaction, and continuous improvement.

However, maybe the table needs a short preamble so that those unfamiliar with Agile may get some clarity on what the table is representing. For better readability, other key phrases as mentioned earlier (such as continuous improvement, customer satisfaction, and self-organizing teams) could have been underlined.

The Agile Manifesto was designed for constructing software, but within a few years, experts were calling for wider cross-domain principles. Janelle: This was a wake-up call, and in response, some leading practitioners of Agile put forth the Interdependence Manifesto in 2005 that sought to extend the traditional Agile paradigm to a more general project and management framework of thought, and it was presented with these six guiding principles where the intention was to promote Agile beyond software. It encourages ongoing delivery of value for a high return on investment, regular customer involvement, and joint ownership to assure reliable output, and anticipation and iteration to embrace uncertainty. It also highlights the need to empower people to lead creativity and innovation, advocate for shared ownership and collective responsibility to enhance team performance, and utilize context-relevant practices to increase reliability and outcomes (Cockburn et al., 2005).

1.3.Definitions of Agile

The term "Agile" is commonly associated with a set of flexible project management methodologies, particularly suited for environments characterized by high product complexity and uncertainty. These approaches are defined by iterative product development, evolving requirements, rapid customer feedback, and continuous adaptation to change (Gemino, Reich, & Serrador, 2020).

The primary objective of the Agile methodology is to accelerate development while efficiently incorporating necessary modifications (Al-Saqqa, Sawalha, & AbdelNabi, 2020).

The agile methods can be seen as "lightweight processes that employ short iterative cycles; actively involve users to establish, prioritize, and verify requirements; and rely on tacit knowledge within a team as opposed to documentation" (Buresh, 2008)

The Agile approach has attracted significant attention due to its ability to adapt to change. Consequently, it has expanded beyond the software industry into fields such as project management, marketing, and engineering, where it supports fast development and enhances stakeholder satisfaction (Noteboom et al., 2021).

Agile project management can be defined as" an approach based on a set of principles, whose goal is to simplify, make more flexible, and iteratively manage projects to achieve better performance in terms of (cost, time, and quality) with less management effort and higher levels of innovation and added value for the customer" (Tena Žužek, 2020).

Organizational agility refers to an organization's ability to detect unexpected changes in its environment and respond swiftly, appropriately, and efficiently by restructuring its internal resources to maintain a competitive edge (Missoum, 2022).

Agile is a flexible project management mindset that values stakeholder engagement, responsiveness, and continuous development. Few industries are shunning this intention that shortens development cycles, accommodates rapid feedback, and minimizes documentation, through innovation, effectiveness, and responsiveness, while improving cost, time, and quality performance.

1.4.Agile Frameworks

The Agile methodology serves as a broad concept that includes multiple frameworks designed for flexible and adaptive project management (Project Management Institute, 2017).

These frameworks offer organized methods for applying Agile concepts to various project kinds and sectors. Each framework has its distinct structure, methods, and application areas, even if they all adhere to the same Agile principles, which include responsiveness to change, iterative progress, and customer participation. And they are:

1.4.1. Scrum

In 1995, Jeff Sutherland and Ken Schwaber introduced Scrum as an iterative approach to project management. Since then, it has become the most commonly used Agile framework, largely due to its flexibility and ease of implementation (Akhtar, Bakhtawar, & Akhtar, 2022)

Scrum can be defined as "a lightweight framework that helps people, teams, and organizations generate value through adaptive solutions for complex problems" (Scrum Alliance, 2023).

Scrum helps teams structure their workflow by focusing on task prioritization, ensuring that the most critical work is completed first. It also facilitates incremental progress, as each sprint results in a tangible deliverable that can be reviewed and improved upon. By fostering clear communication and collaboration among team members, Scrum ensures alignment with project

objectives. Furthermore, it supports continuous refinement of the final product, making it a valuable method for managing complex and evolving projects (Mireca, 2019).

Through regular retrospectives, Scrum promotes continuous improvement, allowing teams to make ongoing adjustments and optimizations throughout the project lifecycle. Unlike traditional project management approaches, this iterative process ensures that lessons learned from previous sprints are actively applied, leading to enhanced efficiency and adaptability.

The primary objective is to boost overall productivity, foster a culture of continuous feedback, and create an environment where teams can quickly respond to changes and evolving requirements. Additionally, this approach helps reduce time to market by streamlining workflows and eliminating inefficiencies, ultimately enabling organizations to deliver higher-quality products at a faster pace. By embracing change rather than resisting it, teams can remain agile and responsive to shifting market demands and customer expectations, ensuring long-term success (Schwaber &Sutherland, 2020).

1.4.2. Kanban

The word 'Kanban' itself comes from the Japanese: 看板, which translates to billboard or signboard. The Kanban method needs to originate from the lean manufacturing methodology introduced by the Toyota Company Automotive Production System in the late 1940s, when the company implemented the only production system that had the only objective of producing according to the customer demand identifying each and every possible raw and semi raw material shortages in the production lines of the respective business units (Hamdulay,2023).

As a widely used and essential tool in Agile and Develops-practicing companies, this framework has made the workflow highly visible. The same structured model provides a way for teams to create, manage, and iterate on their processes while maintaining transparency throughout. This method leaves no ambiguity separation between what is still in the queue and what all the team members are actively working on, leading to a continuous flow of the process and ensuring all efforts are coordinated (Kumkale, 2022).

Kanban is a visual system for managing work as it moves through a process, in Kanban for the Supply Chain: Fundamental Practices for Manufacturing Management). The word Kanban is derived from the Japanese word meaning signboard (or billboard), and it uses visual signals, often in the form of cards or bins, to prompt the movement of units through a manufacturing system, or

the production or supply of units. The aim here is to balance the inventory levels with their real consumption and work only with the materials that are supplied as needed to increase efficiencies and reduce waste (Cimorelli, 2013).

This method, which is practical and effective, has become the most adopted strategy in manufacturing, assembly, and supply chain systems. It is a production management method developed to maximize team efficiency by reducing idle time. These types of inefficiencies can occur at any point in a process, workflow, or procedure and tend to play a role in weaknesses in the system. One of the most important steps within the Kanban system is eliminating waste of all forms; Overproduction, unnecessary movements somewhere else or with more than required, defects, excessive processing, and waiting/ delays (Wakode et al, 2015).

A visual method for controlling production and resource usage in businesses is kanban. Production and planning are managed through the use of a Service Plan, database, application server, Active Directory (AD), user interface, and business logic. The application server oversees web pages, the database server keeps track of production data, and the user interface shows user interactions (Sugimori et al.,1977).

1.4.3. Lean

The foundations for Lean were set in some of the earliest research by dissecting the Toyota Production System (TPS) and then developing core Lean Management principles. In the book, Taiichi Ohno explains about TPS, which is well known as Lean Manufacturing in providing a way to make it smoother and productive. His approach focuses on reducing waste and optimizing production processes to increase the overall level of operational performance (Ohno, 1988).

Christian Hohmann defines Lean as a comprehensive methodology focused on structuring and enhancing processes to reach an optimal state that prioritizes customer satisfaction. This approach engages all employees, ensuring their efforts align with Lean principles. Additionally, he describes Lean as a system designed to increase value while reducing expenses and production time, utilizing only the essential resources needed to fulfill customer demands (Hohman,2012).

The Lean framework is a structured methodology designed to enhance value while minimizing inefficiencies in processes. It aims to improve operational efficiency by eliminating unnecessary steps and fostering continuous refinement. This approach prioritizes customer-centric value, optimized workflows, and flexibility, incorporating key principles such as ongoing improvement

(Kaizen), Just-in-Time (JIT) production, and a strong emphasis on workforce engagement (Soltan & Mostafa,2015).

Lean concepts emphasize efficient team dynamics and product development, focusing on quick product creation, continuous improvement, and a culture of responsibility. These elements work together to maximize the effectiveness and quality of product development in lean settings, satisfying market demands and consumer wants (Asma Akhtar, 2022),(altexsoft, 2016),(Al-Saqqa, Sawalha, & AbdelNabi, 2020), and (Almeida & Espinheira, 2021).

According to Lyonnet, the companies that use the Lean approach want to optimize their operations and be more competitive by reducing stock, increasing productivity, improving working conditions, reducing cost, and eliminating waste (Lyonnet, 2015).

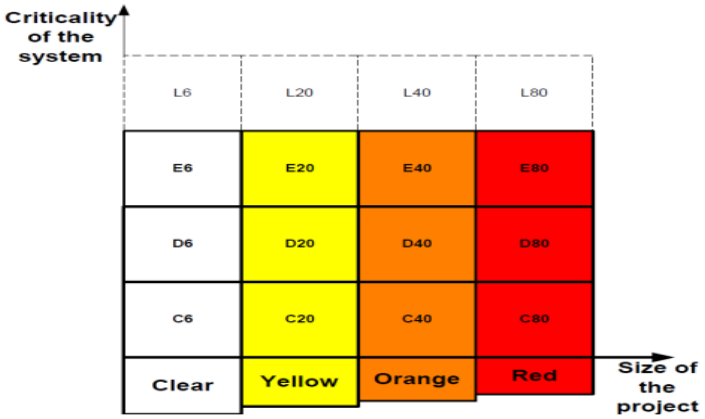
1.4.4. Crystal

The Crystal method is the umbrella of techniques; methodology is selected according to characteristics of project (Abrahamsson et al, 2002; Cockburn, 2005). Although there are distinct variations among the Crystal methods, all share the same foundational principles, including an incremental development process, active user involvement, and a significant focus on human interaction and collaboration (Tripp & Armstrong, 2018).

The Crystal family comprises agile methods (suitable for different projects based on size, complexity, criticality, and number of people involved). In early 1990, Alistair Cockburn developed it while at IBM. He interviewed teams working on different projects to determine best practices founded by the teams. He discovered that these teams were operating outside of the formal methodologies. But whenever they used to talk to communicate regarding the project. In contrast, a few teams with delayed or failed projects attempted to follow formal methods with little interaction between team members (Cohen, Lindvall, Costa, 2004).

Characterized by unique possibilities in choosing how project management works, the family of Agile methodologies known as Crystal is named after Alistair Cockburn. These methodologies include Crystal Clear for small projects, Crystal Yellow for medium-sized projects, and Crystal Orange for large-scale projects. This Crystal approach makes adjustments possible and guarantees efficiency along the evolution of the project (Abrahamsson et al., 2002).

Figure 2: The family of Crystal Methods.



Source: (Abrahamsson et al.,2002)

As illustrated in Figure 3, C, D, E, and L symbolize comfort, discretionary money, essential money, and life, respectively, as potential losses deriving from system failures. The graph displays project size on the X axis and project criticality on the Y axis.

Crystal Methods focus on team communication and collaboration, not on processes. They encourage incremental system development with iteration cycles not to be wider than 4 months. Though multiple methodologies belong to the Crystal family, only Crystal Clear and Crystal Orange are defined in practical terms (Abrahamsson et al.,2002).

1.4.5. Dynamic System Development Method

Dynamic Systems Development Method (DSDM) is an agile framework based on best practices for project-based development. It is simple, adaptable, and has a proven track record of previous implementations. Making the use of DSDM involves high adoption barriers in terms of licensing and organizational changes. Culture change to DSDM is not cheap or fast, but it is here to stay. Making DSDM one of the more mature applications of Agile development processes (Voigt,2004).

DSDM (Dynamic Systems Development Method) imposes a boundary on time and resources devoted to a project, while the feature set will remain flexible within this boundary to deliver project objectives (Kaushik,2016). Developed by a consortium of practitioners in the UK to improve the quality of rapid application development (RAD) processes in 1994 (Stapleton,1997).

Before long, however, DSDM had matured into a full-fledged set of guidelines for rapid application development. The DSDM consortium was at first limited to member organizations. Nevertheless, in 2007, it became available as a free-to-use model, allowing for more widespread adoption across industries. Eight Principles of DSDM: Finding the best business solution through its founding principles: focus on the business need, deliver on time, collaborate, never compromise on quality, build incrementally from firm foundations, develop iteratively from requirements, and communicate its success (Anwer et al., 2017)

1.4.6. SAFe

Scaled Agile Framework (SAFe) is a framework that provides a structure for enterprise-level Agile practice implementations. Realizing that, it provides the foundations, the underlying processes, and best practices to support collaboration of multiple Agile teams while ensuring a certain alignment with business strategy.

SAFe is a framework that builds upon Lean, Agile, and develops principles to streamline collaboration, product development, and never-ending improvement. It works on different levels of collaboration, cross-team working, and customer-driven development (Pries-Heje & Krohn,2017).

The Scaled Agile Framework (SAFe) provides a more formalized route for enterprise-scale implementations of Agile across multiple teams and departments. It provides transparency of team roles, planning, and flow management for team collaboration and value delivery to high-quality results in every project. SAFe applies Agile development, Lean thinking, and systems thinking to the problem of scaling Agile in large enterprises. Companies implement it to increase employee engagement, increase the speed of delivery, the speed of teamwork, and product quality (Hussain et al.,2021).

SAFe is a framework that supports extending agile practices to a large enterprise. SAFe helps multiple agile teams work together to deliver complex solutions in a coordinated and aligned manner. SAFe provides a structured approach that enables organizational Agility for team, program, and portfolio working in harmony for successful Agility rollout (Putta, Paasivaara, & Lassenius,2018).

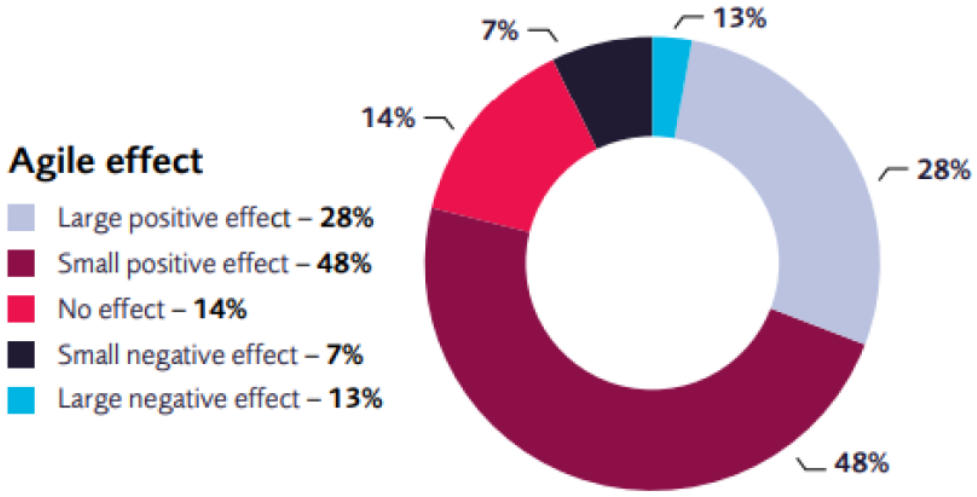
1.5.Agile Advantages and Enablers

1.5.1. Agile Advantages

Key benefits of agile development include enhanced teamwork, quicker feedback, and better communication through techniques like pair programming and short, iterative projects. Prioritizing consumer feedback early and often improves transparency, decreases wasted work, and boosts customer satisfaction. While preserving good code quality, agile also increases developer motivation and output. Agile promotes better requirements management and incremental value delivery (Petersen, & Wohlin,2009).

The following figure illustrates the impact of Agile on change.

Figure 3: Agile Effect.



Source: (Dong et al., 2022)

The chart illustrates the impact of Agile (both positive, negative, and neutral), revealing that Agile generally benefits organizations, with 76% of the effects being positive.

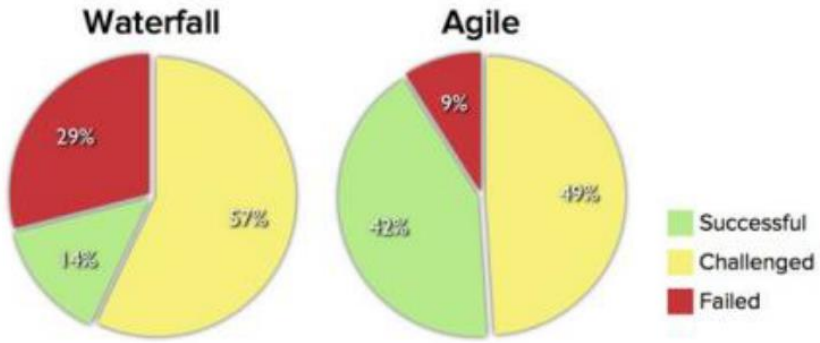
One thing that the chart also shows is the result of Agile (Positive, negative, neutral), which suggests overall, Agile helps the organization, and 76% is a positive result.

A pie chart that compares the proportion of projects that succeed with Agile methodology and Waterfall methodology.

Waterfall project management methods emphasize control, documentation, and long-term planning, while agile methods emphasize leadership and responsiveness. Traditional approaches

emphasize balancing delivering a project to meet project requirements under cost, quality, and time constraints , while Agile methods focus on delivering solutions that provide continued satisfaction as the needs of customers evolve (Noteboom et a., 2021).

Figure 4: Project success rate.



Source: (Cartaxo et al. , 2013)

Agile projects are 3 times more likely to be successful (42%) than Waterfall projects (14%), which indicates that Agile is more malleable, creates greater communication, and overall gives a higher degree of project value. What is interesting to note is that the percentage of those projects that are "challenged," or are struggling but aren't considered a failure, is about the same (57% for Waterfall, 49% for Agile) each methodology seems to be getting tripped up on some very real elements of project management, but Agile seems to have a slight edge in how to avoid this. Agile has a significantly lower failure rate (9%) than Waterfall (29%), which identifies the iterative process of Agile as reducing total project failure risk.

Together, the graphs reinforce the notion that more agile approaches increase project success rates and decrease project failure rates by focusing on flexibility, continuous feedback, and iterative development.

Instead, adopting Agile implies making value-based, rather than cost-based decisions. Everyone knows it's good for visibility and transparency. The discipline and productivity of the team and the mutual accountability of the members are complemented by the involvement of stakeholders and an open line of communication (Dong et al., 2022).

Researches point out several advantages of an agile supply chain, especially in terms of keeping companies competitive. Flexibility is a major benefit that enables businesses to swiftly adapt to changes in consumer expectations and market conditions. patterns. Additionally, agility fosters better teamwork by guaranteeing seamless coordination and communication between partners and suppliers, which raises total productivity. Additionally, it keeps companies customer-focused by better meeting their needs, which increases customer satisfaction and loyalty. The capacity to innovate is another significant advantage, as agile systems facilitate the adoption of novel concepts and technology, enabling businesses to stay ahead of a rapidly evolving market (Yusuf et al., 2004).

1.5.2. Agile enablers

Agile Enablers refers to the functionality, processes, or elements that facilitate an organization's effective use of Agile methods. These enablers support the operational benefits and facilitate seamless transformation to Agile methodologies by enabling iterative, adaptive, and collaborative work processes (Soni, & Kodali, 2010).

According to Baramichai, Zimmer, and Marangos (2007), the enablers of Agile are:

Table 2: The Agile enablers.

Agile enablers	Description
Leadership	Fosters innovation, flexibility, and cultural change while fostering and maintaining agility.
Organizational Culture	Promotes communication, teamwork, education, and quick decision-making.
People and Skills	Emphasizes talented, flexible workers and encourages ongoing education and growth.
Processes and Structures	Needs adaptable procedures and dispersed flexible structures to react quickly.
Technology	Offers resources for adaptability, instantaneous data transfer, and effective communication.
Customer Focus	Puts a high priority on closely aligning with and responding to client demands through feedback.

Source : Self elaborated based on the study of (Baramichai, Zimmers, & Marangos, 2007)

The enablers outlined in the table illustrate that agility is a mindset to be cultivated throughout the enterprise, not simply about tools or techniques. Another aspect that stands out is how the three enablers are interdependent, as change happens through people, is driven by culture, and tone is set by leadership. Not even the best intentions can sustain themselves if you do not have the right

framework or technology around them. But perhaps more importantly, a focus on customer needs reminds us that, in a world that is ever-changing, agility should always strive to deliver value as fast and reliably as possible.

2. Operational Performance

Operational performance is one of the most important factors for businesses to optimize processes and achieve their full potential.

2.1.Definitions of Operational Performance

Operational performance measures an organization's ability to deliver on its service or product promises, effectively and efficiently. It is a detailed evaluation of the systems and processes that enable the production and delivery of products and services. Customer experience, profitability, product/service quality, and efficiency define operational performance (Oxmaint,2024).

Operational performance refers to the monitoring and measurement of how effectively an organization’s plan is delivering results and achieving the required outcomes. Instead, this means looking ahead to predict and understand how to optimize the various aspects of management (Oliveira,2023).

Operational performance can be measured by the effectiveness and productivity of your team. It comes down to the outcomes, in short, how well is your team performing what each individual is required to do on their part? Companies rely on operational performance to determine whether a given team is performing properly and is beneficial to the firm. Or, if the group requires additional support or restructuring, or development before it begins to make an impact on the overall objectives of the company as a whole (Hewko, 2023).

Operational performance is how well the manufacturing processes convert resources to a final product that meets the needs of the customer. This apart comprises a plethora of KPIs, including cost effectiveness, flexibility, delivery reliability, product quality, and efficiency of manufacturing, among others (Battesini, Caten, & Pacheco,2021).

As Miguel and Brito (2011) argue, operational performance is an indication of an organization’s ability to use its resources in conjunction with other processes as a means to increase efficiency, productivity, and competitiveness. It is assessed based on four key dimensions:

- **Cost efficiency:** is vital for a business to reduce wastages, reduce operational cost and increase the profit margin by reducing the cost of manufacturing, enhance the inventory turnover, and improve capacity utilization.
- **Quality:** lowest error margins, avoidance of complaints based on high, strict standards an effective quality management system not only improves customer satisfaction but also boosts your brand value and drives reliability.
- **Flexibility:** the ability of a company to respond quickly to demand changes, carry new products most effectively, and tailor offerings to a variety of customer requirements. This flexibility allows companies to respond quickly to changes in the market and disruptions without losing efficiency.
- **Delivery Performance:** Meeting order deadlines, short lead times, and fast production cycles. Timely delivery enables continual customer happiness, optimal supply chain performance, and a leading edge over the competition.

Operational performance is the ability of a company to efficiently convert resources into products or services, ensuring customer satisfaction, minimizing cost, and being flexible in the market. Thus, leads to increased customer satisfaction, employee productivity, and breadth.

2.2.Operational Performance Criteria

Operational performance criteria can be described as the standards or measurements for assessing how effectively and efficiently a company does its core business activities. These criteria are measured in terms of Key Performance Indicators (KPIs) that typically relate to aspects such as quality, efficiency, and reliability.

2.2.1. Quality

Quality is a crucial operational performance factor that affects productivity, efficiency, and defect reduction, and enhancing quality performance, guaranteeing consistency, and reducing mistakes are all made possible by supplier quality management and process management (Baird, Hu, & Reeve, 2011).

Quality operational performance can be determined by determining how far the organization's operations meet client needs, maintain efficiency, and produce top-quality output.

There are indicators to measure the quality of performance, these are,

- **Customer Satisfaction**

- **Employee Morale**
- **Productivity**
- **Defect Percentages (Quality Performance)**
- **Total Sales Cost of Warranty Claims %**
- **Errors, Scrap, Rework & Inspection — Cost of Quality**
- **Delivery Performance (On-Time, In-Full — DIFOT)**

Quality operational performance is the effectiveness with which a company meets its quality-related operational goals or operational excellence and quality cost at optimal expense, for example, process improvement, customer satisfaction, productivity, cost effectiveness, defect reduction, etc.

Quality management is one of the biggest contributors to operational success by ensuring efficiency, reducing mistakes, and increasing overall productivity. It is closely associated with optimum cost, effectiveness of production, and customer satisfaction. Research shows that how effectiveness of quality management is the most important determinant of operational performance, which improves customer value and productivity. Better quality management processes allow companies to manufacture fewer defective products and reduce operational costs, which establishes sustainability and long-term competitiveness (Shaheen, 2022).

2.2.2. Efficiency

Efficiency consists of an organization having the ability to increase output and minimize input by converting input to output in the most efficient way possible. It measures how effectively a company uses its assets to generate revenue and earnings. It has many types, such as:

- **Technical Efficiency:** A company can use fewer inputs (like labor, capital, and materials) to produce an equivalent level of output.
- **Technical efficiency** is when a business (firm) is creating the highest amount of output possible from a given set of inputs.
- **Allocative Efficiency:** This is whether a company is using inputs in its production process in the least costly way, given the cost of the inputs. Allocative efficiency occurs where a company creates at the cheapest level.

- **Economic Efficiency:** a combination of allocative and technological efficiency. A firm is said to be economically efficient if it produces outputs using the lowest cost combination of inputs and maximizes output using available inputs.
- **Productivity Efficiency:** a measure of the ability of a company to increase internal efficiencies or to adopt new technology to improve its operational efficiency (Baik et al., 2012).
- **Efficient Administration:** Efficacy of administration is vital to success in business and government alike and requires the optimization of management, leadership, and operations. It impacts the performance of processes, the satisfaction of employees, the growth of the organization, and ultimately the profitability (Omar, 2023)

Asset owners can benefit from simplifying portfolio management, enhancing data management, getting better data, avoiding costs, and improving operational efficiency through complex investments and Data processing management (J.P. Morgan,2024).

To evaluate the effectiveness of a given company, the following formula is used: (Heizer, Render, & Munson, 2020)

Efficiency (%) = Output ÷ Input × 100

2.2.3. Effectiveness

Effectiveness is the ability to apply existing resources to achieve predetermined aims and objectives in a specified time frame. It stresses doing the right stuff, ensuring that organizational activities and tactics align with company goals. Effectiveness, a cousin of success, validation, and the attainment of wishes, focuses on impact and outcome at the expense of means and effort expended to achieve it (Alkaf et al., 2021).

According to the research of Santa, Hyland, and Ferrer (2014), five main performance objectives serve as the main indicators of operational performance:

- **Cost:** identifying waste in production and procurement, waste management, and reducing waste.
- **Quality:** Ensuring that amounts and services fall short of specifications and client expectations.
- **Reliability:** Lasting, stable execution over time that continues to fulfill customer expectations.

- **Flexibility:** The ability to adapt the processes as per changing customer requirements.
- **Speed:** Reducing the time it takes to deliver a product or service in response to a service request.

The Manufacturing Operational Effectiveness (MOE) Indicator computes three sub-indicators (for the effectiveness): efficiency (E), quality (Q), and availability (A). Quality measures the percentage of products that are within specified rules, while availability gives a big-picture overview of the total time available for production. Efficiency, on the other hand, compares the number of products delivered to the manufacturing schedule. A low efficiency score indicates that production has not met targets due to scheduling errors, delays, or resource shortages, after applying the formula, the MOE may result in values like the following:

MOE=A × Q ×E (Gomes, Yasin, & Lisboa, 2007).

2.2.4. Flexibility

Flexibility means the organization's ability to cope with uncertainties and changes in the environment, which, accordingly, creates an opportunity for them to gain sustained competitive advantage and to react faster to new, different, or changing needs (Yousuf et al., 2019).

Flexibility is the capability a business has to adjust its production, inputs, and strategy promptly and economically in response to external changes and can be classified into two main types (Silva & Ferreira, 2017).

A. **Flexibility in defense:** Assists organizations in employing risk management techniques such as labour scalability, secondary suppliers, and inventory buffers to cope with the demand, supply chain interruptions, and market volatility.
B. **Proactive flexibility:** (which often requires investments in cross-training the workforce, digital transformation, and agile supply chains) enables organizations to predict changes in the market, adapt their operations, and deliver a competitive advantage.

Kalchschmidt, Nieto, and Reiner (2010) suggest multiple aspects that establish the company in a more adaptable nature. This includes reducing lead times and responding faster to market changes, optimizing flow to prevent bottlenecking and mishaps, and configuring factory layouts that can be reconfigured quickly to accommodate changes in production needs. Also mentioned is the importance of Just-In-Time practices that minimize excess inventory and waste, and cross-trainable personnel who can seamlessly fill in for each other when staffing issues crop up.

2.2.5. Objectives

A customizable, measurable, and factual target that an individual or organization sets to achieve in a specific time. Objectives not only describe what an individual or organization aims to achieve, but also provide a framework for decision-making and resource allocation (Qandle, n.d.).

Operational objectives are the specific goals that an organization intends to achieve within its operations. Some of these objectives include: (Khaki & Rashidi, 2012)

- **Cost reduction:** Outsourcing to reduce production and operational costs
- **Enhanced Quality:** Improving the quality of products and services through specialized vendors.
- **Flexibility:** The ability to adapt even faster to changes in demand and the marketplace.
- **Improved Service:** Happier customers & service efficiency.

SMART is a well-known framework for objective-setting (Day & Tosey, n.d.).

- **Specific (S) :** Objectives should be Clear & Focused on the result
- **Measurable (M)**: All objectives should have standards set to make it possible to track and calculate progress (or lack thereof).
- **Attainable (A):** Goals have to be feasible, achievable, and manageable to the person.
- **Realistic(R):** Goals must be practical and appropriate to the individual and the resources available.
- **Time-based (T):** Goals are required to be achieved within a specified duration.

Objectives perform different functions for businesses, including resource allocation, focus, and guidance toward achieving long-term goals. They help in making solutions, enhancing productivity, and easing job management. Well-crafted objectives ensure strategy alignment and better performance, and therefore help your business by reinvigorating your employees, making you ready for potential blockers, and putting in place proactive solutions, strengthening your win (Singh & Singh, 2021).

2.2.6. Customer Satisfaction

Customer satisfaction is a measure of the degree to which a product or service feature, or a product or service itself, meets customer needs and thus how well customers are satisfied, but this is only a wide definition.

Satisfaction is relative, depending on customer expectations and the performance of the product or service provided. It can be driven by how well the product/service meets/exceeds/falls short of expectations (Ngo, 2015).

Customer satisfaction is the gap between pre-purchase expectations and post-purchase experience. It is influenced by quality and non-quality factors like cost, perceived justice, and customer satisfaction (Sao et al., 2017).

There are several factors which is used to quantify customer satisfaction (Abdallah, Phan, & Matsui, 2016):

- **General happiness:** Clients are satisfied with the goods and services they received.
- **Responsiveness:** Customers value the speed with which their issues are resolved.
- **Customer retention**: A key indicator of a satisfied customer is the percentage of your customers who return.
- **Perception of quality:** customers are satisfied with the quality of the commodities in the long term.
- **Industry comparison:** Comparison to how well the business is doing compared to its competitors.

There are various methods to measure customer satisfaction, which highlights the importance of measuring the quality of services and the success of a business. These include, and are not limited to: (Yüksel & Rimmington, 1998)

- **Forms and surveys.**
- **Assessments of Quality of Service.**
- **Customer Complaints Analysis.**
- **Analytics and performance metrics.**
- **Productivity.**

Productivity is the relationship between output and what goes into it: the inputs that are required to produce it. It is an important economic measure used to assess productivity, technological advancement, and economic development (Schreyer & Pilat, 2001).

Productivity is the output-input ratio for a particular production circumstance. It measures the efficiency of production by which human and monetary resources and other inputs are turned into outputs or products. Productivity increases when more is produced with the same amount of input

or when the same output is achieved with lower input. Productivity growth is a key driver of economic prosperity, business competitiveness, and overall improvements in living standards. It reflects both the efficiency improvement in the economy and the business, and the technological progress (Rogers, 1998).

These are the most common approaches to productivity measurement: (Del Gatto, Di Liberto & Petraglia, 2008).

- **TFP or total factor productivity:** TFP is the output-output ratio (Gross value added (GVA)) to a weighted sum of variable inputs (material, labor, and capital). It is an important measure of technological progress because it captures efficiency improvements net of increases in inputs.
- **Method of Growth Accounting:** This approach decomposes economic growth into factors for labor, capital, and technology. Commonly used in macro studies of productivity.
- **Methodology for Index Numbers (Törnqvist & Malmquist Indices):** A widely-used technique that is non-parametric (accommodates varied returns to scale) in nature is the Törnqvist Index. The Malmquist Productivity Index, the one that distinguishes efficiency gains from technological improvements and provides a measure of the change in productivity over time.

2.2.7. Relevance

Relevance is the quality that causes inputs to cognitive processes to become valuable for processing. It relies on two dissociable components (Wilson & Sperber, 2002)

A. **Cognitive effects:** If input has a larger positive cognitive impact, such as more knowledge or understanding added, it is more effective.
B. **Effort to process:** If processing an input requires a large amount of work, then the input is a more significant consideration.

As Cosijn and Ingwersen (2000) highlight, relevance is a major concept in information retrieval and use. It allows individuals to discover their requirements more quickly, make better-informed decisions, and enjoy more targeted experiences. It is also fundamental to learning and knowledge engineering, and it aids scientific discovery and communication, as well as the betterment of information systems and AI technologies.

Relevance is defined as:

R = E / C

Where:

E (contextual effects): the degree to which the new knowledge facilitates understanding.

C (processing effort): The amount of cognitive effort required to process the information.

The relevance principle suggests that each act of communication is expected to carry an ideal relevance value (Levinson, 1989).

2.3.Operational performance measurement methods

Operational performance measurement encompasses efficiency, effectiveness, and productivity across the organization. Below are the key approaches that measures operational performance:

2.3.1. Key Performance Indicators (KPIs)

KPIs are metrics that evaluate aspects of organizational performance that are critical to the success of strategic objectives. They provide organizations with reliable information to use for decision-making and employee evaluation purposes. KPIs help companies understand if they are executing successfully and can drive ongoing behavior that ultimately enhances productivity, profitability, and efficiency (Domínguez et al., 2018)

Key Performance Indicators (KPIs) are an indispensable instrument for companies to interpret their performance against long-term objectives, as they enable them to continuously derive insights into their strengths and weaknesses, aid decision making, and facilitate progress in corporate growth. Proven planning services provide measurable outcomes and assist with process management and competition monitoring (Velimirovic, Velimirovic, & Stankovic, 2011).

What are Key Performance Indicators, or in other words, the KPIs that support monitoring a company's performance, spotting inefficiencies, and streamlining processes? They help with benchmarking, waste detection, decision making, as well as planning and maintenance. By keeping a close eye on KPIs, many industries can improve productivity, reduce costs, and optimize resources (Lindberg et al., 2015).

Major categories of KPIs: (Bhatti, Awan & Razaq, 2014)

- **Quality:** Measures customer satisfaction, conformance, and product reliability.
- **Flexibility:** Measures the ability to adapt to changes in manufacturing, goods changes, and process efficiency.

- **Time:** Includes Lead time in Delivery, Cycle time, Response Time, and Order Processing Time.
- **Safety:** Does the safety assessment of the worksite include indicators like employee safety perception, risk rating, and accident incidence?
- **Financial Performance:** Financial measures include sales growth rate, cash flows, return on equity, and net income.
- **Cost:** They monitor all production, labor, overhead, and quality costs.
- **Employee satisfaction**, such as absenteeism, turnover rates, and how well complaints are resolved.
- **Learning and Growth:** Assesses the level of education among employees, costs related to training, and innovation capabilities, such as: environment/social performance, waste management, environmental compliance, and corporate social responsibility
- **Customer satisfaction:** quantification of orders, customer complaints, retention rates, and promises of service quality, etc.
- **Delivery Reliability:** Tracks mistaken orders share, schedule compliance, and on-time deliveries.

2.3.2. Benchmarking

Benchmarking is an organizational teleological process that purposefully moves an existing operational scenario to a better one through the use of an exemplar. Companies use this technique to set their performance against the best in the sector, to identify gaps and improve operations.

If benchmarking is to be effective, firms must first understand their own processes before looking outside (Moriarty, 2011).

Benchmarking is an important quality improvement method enabling businesses to assess their performance against industry best practices and identify opportunities for improvement. It is more than duplication; it is a trigger for innovation, enabling organizations to assess, compare, and adopt best practices to improve productivity and competitiveness (Dattakumar & Jagadeesh, 2003).

Some authors and institutions have proposed benchmarking models :(Anand & Kodali, 2008)

- **Xerox 10-Step Benchmarking Process (Camp, 1989)** is one of the most common models in use.
- **IBM: 5-Phase Benchmarking Model**: Data-Driven Benchmarking.

- **Alcoa and AT&T types:** suitable for predetermined industrial needs.
- **Academic and consultant models** developed by experts & researchers to improve benchmarking methods.

According to Lankford (2002), benchmarking can be grouped into the following types:

- **Process benchmarking:** targets improvements in internal processes like order fulfillment, billing, and customer service.
- **Performance Benchmarking:** The comparison of products and services based on reliability, performance, and quality.
- **Strategic benchmarking:** investigates and focuses on the practices of the best players in a sector to achieve a long-term differential advantage.
- Analyzing only directly competing rivals, **competitive benchmarking** focuses on rivals that are completely secretive about their data, making the activity very difficult.
- **Collaborative and cooperative benchmarking**: involves the direct exchange of information between non-competing companies.
- **Internal benchmarking:** the identification and sharing of best practices across a business.

2.3.3. Performance dashboards

Performance Dashboards help an organization track, analyze, and manage performance with real-time insights, efficiency improvements, and alignment of actions with strategic goals. They make the best decisions, reduce costs, and enhance the overall success of the organization if applied properly. They increase motivation by setting specific performance targets, enhance coordination by aligning departments towards common objectives, improve visibility by providing real-time visibility to stakeholders about key metrics, and reduce costs & redundancy by merging multiple sources of data into a single system (Eckerson, 2005).

Performance dashboards provide several important features to improve data analysis and decision making (Velcu-Laitinen & Yigitbasioglu, 2012).

A. **Drill-down function:** Allows users to analyze data in greater detail. Scenario analysis allows managers to model different business scenarios.
B. **Flexible presentational formats:** Different formats or alternatives for displaying the data, i.e., representation of data in a tabular or graphical manner

According to Kerzner (2017), performance dashboards are implementation tools that help track progress and manage performance more effectively in organizations. These systems combine data and business intelligence, and provide a clear visual display of the relevant information through graphs and colored indicators, effectively keeping management in the loop.

There is a variety, operational dashboards that help to manage daily activities, and tactical dashboards enable mid-level management to monitor short-term goals, while strategic dashboards provide executives with an overview of the progress of long-term goals and results.

2.3.4. Enterprise Resource Planning (ERP) Systems

ERP systems provide tangible benefits (e.g., cost reduction, order management improvement, and productivity gains) and intangible benefits (e.g., better decision making, flexibility, and integration of business processes). Enterprise resource planning is an integrated software solution designed to optimize business processes and increase data transparency, efficiency, and standardization. Moreover, while an ERP may not earn revenue right away, it does help maintain a competitive edge (O'Leary, 2004).

ERP systems are a type of business management software that integrates all facets of an operation, including development, manufacturing, sales, and marketing in a single system. It enables you to view key business operations in real time, from finance to manufacturing, inventory control, and human resources. Through the automation of processes and seamless information exchange, ERP systems enhance productivity, assist with decision making, and help with numerous dimensions of overall corporate performance (Bahssas, AlBar, & Hoque, 2015).

ERP systems are generally built around four main sections. The first concerns commercial management, the second is related to financial management, the third refers to human resource management, and the fourth refers to production management (M'hamed, 2022).

2.4.How to Evaluate Operational Performance

Four steps to do operational performance assessment: (Schwarz, n.d)

- Choose meaningful operational KPIs. Simply put, you can combine them as part of a dashboard for an operational measure to show it all quickly.
- Understand your current performance.
- Compare them with the problems you want to solve. Does this performance meet your goal?

- If the answer is no, move on. Identify the slack areas of the business.

When done using a four-step evaluation process, which gives you a straightforward process to evaluate operational performance, you can ensure your evaluations are not only objective but also pragmatic. These sounds deceptively simple as an initial step, they only need to measure KPIs relevant to their business context, but it is critical: this ensures that the assessment focuses on metrics directly correlated with operational effectiveness and strategic objectives. You establish a baseline when you measure current performance, and you identify a performance gap when you compare actual performance to established goals. The last phase is the process of digging deeper into areas that have not been successful and finding the root cause so that companies can implement targeted solutions to continuously improve. Not only does it promote accountability and transparency, but it also enables data-driven decision making and thereby, better operational performance.

Evaluating how effectively an organization is utilizing its resources to deliver goods or services is called operational performance. This process requires the establishment of specific goals and the selection of relevant KPIs. Among these are productivity, efficiency, cycle time quality, utilization, on-time delivery, cost performance, and customer satisfaction (Slack et al, 2022; Heizer et al, 2020).

Once KPIs have been established, data should be collected and analyzed over time to identify trends, variances, and performance gaps. Further details can be found by benchmarking against industry standards (Oakland, 2014). Analytical techniques such as dashboards, Pareto analysis, process mapping, and root cause analysis (Fishbone diagram, 5 Whys) help identify inefficiencies and bottlenecks (Oakland, 2014; Womack & Jones, 2003).

By comparing current performance with predetermined targets, organizations can determine if they are achieving objectives and whether corrective actions need to be taken (Kaplan & Norton, 1996). Moreover, qualitative methods such as customer feedback, employee interviews, and direct process observations (e.g., Gemba walks) generally provide critical context to the data (Womack & Jones, 2003).

Finally, organizations should use continuous improvement methods such as Lean, Six Sigma, and Agile methodologies (Slack et al., 2022; Womack & Jones, 2003) to address weaknesses and enhance operational performance. This ongoing cycle drives the agility and competitiveness of the organization.

Conclusion

In conclusion, the chapter demonstrates that Agile methodologies possess the conceptual and practical flexibility to be applied across diverse operational settings. The review affirms that Agile fosters measurable gains in responsiveness, resource optimization, and stakeholder engagement. Moreover, the examination of operational performance metrics supports the notion that agility, when methodically deployed, can serve as a performance enabler.

CHAPTER II:

METHODOLOGICAL FRAMEWORK AND ORGANIZATION PRESENTATION

Introduction

This chapter outlines the methodological design and contextual framework of the study. It articulates the qualitative, interpretivist stance employed to explore Agile adoption in a real-world port setting. Through triangulation of data from semi-structured interviews, observations, and document analysis, the chapter ensures a robust investigative approach. In parallel, the section introduces the host organization—**Djen-Djen Port**—providing insights into its operational structure, strategic goals, and logistical complexity. This contextual grounding is essential to understanding the dynamics in which Agile practices are explored.

Section 01: METHODOLOGICAL FRAMEWORK

This section discusses the philosophical, methodological, and practical foundations of Agile methods in port operations. It compares paradigms of interpretivism and explains the qualitative research as a framework, the instruments used to get the data, the sampling and analytic methods that can be used.

1. Research Methodology

I chose a qualitative research design for this study. Qualitative research is appropriate for exploring complex social phenomena and understanding how participants experience and interpret the adoption of Agile practices. This design allowed me to investigate not only observable processes but also perceptions, attitudes, and organizational culture — factors essential to assessing operational performance. A quantitative approach would not have captured the nuanced, context-dependent insights required to answer the research questions.

Moreover, qualitative research offered flexibility to adapt interview questions and observation focus based on emerging findings, enabling a deeper and iterative exploration of Agile practices across different departments within the port.

2. Epistemological stance

This study is based on an interpretivist epistemological paradigm, which attempts to understand social phenomena through the subjective frame of reference (Saunders, Lewis &Thornhill, 2019). Which assumes that reality is socially constructed and that researchers must understand participants' perspectives in their specific contexts. This stance recognizes that organizational practices are shaped by shared meanings, historical routines, and individual experiences. By

adopting interpretivism, I aimed to explore how port employees understand and implement Agile-inspired practices and how these interpretations affect operational performance.

3. Data collection methods and instruments

3.1.Documentary study

Documentary research or secondary data analysis provides the researcher with primary facts necessary for describing or understanding a phenomenon (N'DA, 2015).

A documentary study was conducted by synthesizing both academic and organizational sources. SNDL, Google Scholar, Emerald Insight, PDFDrive, Z-Library, and Connected Papers. Many sites, such as the aforementioned, were used to purchase books, scientific papers, and relevant literature to provide the theoretical and methodological basis of Agile methodology and operational performance. The understanding of the host organization was also gained from the internal papers and departmental materials, like presentations and data shared during the internship period. These were extremely useful to land the findings back into scholarly and professional contexts.

3.2.Interview

The interview is an accessible data collection technique that primarily consists of verbal interaction between the subject and the researcher. Interviews are commonly used in exploratory and descriptive research and survey approaches. Interviews can vary massively from almost entirely unstructured, where a participant can ramble on about whatever comes to mind, to highly regimented, in which the participant answers questions that directly address the points of interest (Banister, Hayes, & King, 2000).

In general, interviews can be divided into the following key types (Alsaawi, 2014):

3.2.1. Structured interviews

A controlled form of data collection in which the interviewer asks the same questions to each participant in the same order and using the same wording. This structure ensures uniformity, making it easier to compare and analyze responses. This is less suitable for capturing more complex, individual experiences, however, as it limits flexibility and can lead to participants not revealing richer stories or exploring topics outside of the predefined questions.

3.2.2. Unstructured interviews

Are more conversational and do not follow a pre-conceived list of questions. Instead, the interviewer follows the flow of life or the natural course of conversations based on what the participants say and what their life experiences are. This type of interview fosters frank communication and might lead to rich, in-depth insights that would never arise in more formal formats. Whereas unstructured interview tends to be flexible and realistic, they are also hard to assess, due to the distinction between respondents, making the comparison more limited.

3.2.3. Semi-structured interviews

Combine the guidance of having prepared questions with the option to dive deeper into topics based on responses from participants. The interviewer typically uses an open-ended interview guide or key themes, but they can change the order, ask follow-up questions, or dive deeper into topics that arise during the discussion. It does so by collecting thick, elaborative details, but is consistent across interviews. Semi-structured interviews are often used in qualitative research because they allow a combination of focus with the ability to explore complex meanings and experiences.

3.2.4. In-Depth Interviews (also known as Intensive Interviews)

A qualitative research method and process for exploring a subject's personal experiences, thoughts, and feelings in-depth. The interviews consist mostly of open-ended questions and extended conversations that allow participants to tell their own story in their own words. The goal is to gain an understanding of how people make sense of their experiences. In-depth Interviews often happen over many sessions to encourage confidence and reflection. This does serve to highlight levels of meaning that may not emerge in just one interview. The above technique works best when you are studying social phenomena or complex human behaviors.

3.2.5. Phenomenological Interviews

Are used in qualitative research to understand how people experience and make sense of various life events. The main aim is to understand the meaning of these lived events from the perspective of the person. Open-ended questions do not limit the interviewee on their experiences but very often allow them to reflect on their feelings, thoughts, and position. The interviewer listens carefully to dig deeper into the essence of the incident rather than just factual information. This approach is based on phenomenology, the philosophical discipline focusing on human awareness and human subjective meaning.

Methodology In our study, due to the structure between concentration and flexibility, a semi-structured interview was used. This approach allows for specific questions to be asked that facilitate discussion directed toward the goals of my thesis, while also permitting room for participants to provide a more thorough analysis and fresh perspective. This interview is divided into a five dimensions :

- **Background Information:** Questions about the participant's position and issues in port management and operations.
- **Agile Adoption in Port Operations:** Exploring past experiences with Agile and practice inclusion in port operations.
- **Impact on Operational Performance:** How Agile has effectively improved decision making, efficiency, and overall performance includes requests for concrete examples and measurable results.
- **Challenges in Agile Implementation:** New obstacles about impediments to Agile practice/implementation, such as cultural, structural resistance, and employees' mindset.
- **Future Perspectives:** In this section, respondents are asked for suggestions for broader Agile utilization in port operations and counsel for others thinking about implementing Agile.

3.3.Observation

The observation was conducted in the form of a structured non-participant observation, which meant that while we were observing operations, we did not participate in the actual processes. This approach focused on watching the details of how tasks were performed, what the interdepartmental communication and coordination looked like, and how daily routines played out. The method above, when combined with other methods of data collection, assisted with the triangulation of the results to further enrich and substantiate the overall results.

4. Data sampling and analysis

4.1.Data sampling

In qualitative methods, the sampling process is based on the choice of specific groups of representative vague related to the research aims, which ensures that relevant and credible responses are obtained.

We used a purposeful sampling because in our study, it is important to select people with direct contact with port operations, who have the necessary skills to use or understand the Agile

concepts. This methodology allowed us to explore how Agile attributes influence operational performance in a port context in depth. The table below contains details :

Table 3: List of Interviewees

N:	Interviewee	Duration of the Interview	Number of meetings:
1	Logistics Supervisor	45mins	4
2	Cargo Handling Supervisor	30min	3
3	Stevedoring Supervisor	30min	3
4	Customer Service Manager	45mins	4
5	Integrated Management System (IMS) Manager	45mins	5
6	Informatic responsible	30mins	2
7	Dockside Supervisor	30mins	2

Source: elaborated by our care.

4.2.Data analysis and interpretation

We used thematic analysis to identify patterns, themes, and key relationships in the data, and we carried out all data analysis manually. It made possible the in-depth appreciation of participant experiences and dynamics within the organization. This process consisted of an in-depth reading through the interview transcripts, observation notes, and documents, and then a systematic coding of relevant pieces of text.

Reflective comparison was used to review and group codes into themes, paying attention to both explicit and latent content. Manual analysis resulted in a deeper inspection of the data, which was transparent with clear documentation. This promoted a systematic and credible understanding of the results by the study aims.

5. Validity, Reliability, and Limitations

To enhance validity, we used methodological triangulation by combining interviews, observations, and document analysis. we also performed member checking by summarizing key points from interviews at the end of each conversation to confirm participants' intended meanings. This helped reduce the risk of misinterpretation.

To ensure reliability, we maintained detailed records of the research process, including interview protocols, field notes, coding schemes, and data analysis procedures. By documenting every step, we made the research process transparent and replicable, allowing others to understand how conclusions were reached.

6. Ethical considerations

W adhered to ethical research standards throughout the study. Before conducting interviews, we explained the research purpose to all participants and obtained their informed consent. We guaranteed the confidentiality and anonymity of participants by removing personal identifiers from transcripts and reporting aggregated findings. We securely stored all data and restricted access to the research team.

Additionally, we respected the host organization's internal policies on data sharing and confidentiality, and we made sure that the research process complied with ethical guidelines from my university's research ethics committee.

Section 02: Organizational context

This section attempts to give a broad overview of the host company, including the goals, missions, activities, and other details.

1. General presentation of Djen-Djen Port Company

The Djen-Djen Port is the harbor of the Algerian Wilaya of Jijel. Opened in 1981, it is considered one of the most important ports with freight traffic.

The Port of Djen-Djen is a multi-purpose port for multipurpose cargo (construction materials, automobiles, grain, chemicals, petroleum products, and containers). Commodities are stored in a multitude of warehouses, and six ports are located within its walls.

Djen-Djen Port is also fitted with a high-performance environmental quality control system to mitigate the negative impacts of port traffic on the surrounding ecosystem. It has received a recent boost due to extension projects to increase its capacity and infrastructure upgrades. In terms of the

figures, nevertheless, the port of Djen-Djen is a single of the most active ports of the nation with a yearly conveying functionality of nearly 10 million tons of cargo. Already, thanks to the marine trade and promoting international trade, it plays an important role in the economy of Algeria.

2. History

East of Algeria, near the city of Jijel, about 25 kilometers away, is the port of Djen-Djen,

To facilitate the loading and unloading of cargo into the bay, the Ottomans built a small pier during the Regency of Algiers, thus marking the commencement of the port's history. But it quickly became abandoned due to a lack of infrastructure and storm protection.

At the beginning of the 20th century, French colonial authorities decided to build a new port, larger and more appropriate to the needs of the region. Construction began in 1905 and was completed in 1905.

Djen-Djen Port has since grown into an important transit point for imported consumer goods as well as for area exports, especially phosphates, iron, and steel. The port is currently receiving an upgrade in its capabilities and facilities while still serving as a driver of local regional economic activity.

3. Geographic location

Djen-Djen Port occupies 210 hectares and is located in a prime geographic location. It does, however, enjoy an enviable position as a transcontinental center of trade, located less than 50 miles off the open seas leading from the Suez Canal to the Strait of Gibraltar. It is likely the nearest port to Hassi Messaoud (900km) and the oil zones. 10 km from the head of the wilaya of Jijel, 40 km from the industrial zone of BELLARA, 350 km from the capital Algiers, and 2 km from the Jijel-Ferhat Abbas airport.

4. Company ID Card

Figure 5: logo of the Djen-Djen port company.

Source: the company's official Facebook page.

Table 4: Djen-Djen identification card.

Corporate name	Djen-Djen Pot Company
Trade name	Djen-Djen Port
Status	Autonomous port
Port type	Commercial port
Construction	1984 _ 1992
Social siege	Achouat , BP 87 , EL taher , JIJEL
Area of activity	Passengers, goods
Area	Port: 300 ha
Traffic	45 million EVA (2021)
Turnover	Confidential
Director General	Kidri Mahmoud
Email	contact@djendjen-port.dz
Telephone number	+213 34 54 21 64
Website	https://djendjen-port.dz/le-port/
Facebook page	https://www.facebook.com/DjenDjenPortOfficial

Source: based on data collected at the host organization level.

5. The missions, objectives, and vision of Djen-Djen Port

The company has several missions and objectives, including: (internal document)

5.1.Missions

Port activities include a range of field services like care of critical ship upon arrival and request when the ship is entering and leaving the harbor. Essentially, this includes the following components:

- Give the ship's crew the green light to come into port.
- Help is readily available for all weather advice prior to port entry. The port command informs the ship of incidents to ensure a smooth process, and repeats when the ship is leaving the port.
- Protection against damage and theft is another benefit of keeping things in safe facilities.
- Make sure they comply with safety standards.
- Provide 24-hour security for the goods until delivered.

–Provide Options To Rent Dedicated Warehouse And Storage Space

–Assistance with different services like vessels and tugs to facilitate the ingress and out of vessels in ports.

5.2.Objectives

Every institution was founded with certain goals in mind, and the "**Djen-Djen Port**" institution has both internal and external goals. These are:

5.2.1. Internal objectives

- To increase the profit, all measures possible should be taken.
- Funds must be obtained and the establishment set up in other locales.
- The number of transactions must be increased.
- The company maintains its operations by improving the services it provides, conforming to accepted norms.
- Reduce customs delays and quay waiting times.

5.2.2. External objectives

- The national income is growing.
- It is therefore necessary to provide foreign currency for use in world trade, especially as regards the forecast export of certain products. An industry with good prospects for development.

5.3.Vision

- Promote Djen Djen Port to international standards.
- Strengthen its position without port activities by primarily participating in the national sector development program.
- Port par excellence in exports.
- The first national transshipment port.

6. Activities of Djen-Djen Port

High standards of service quality are guaranteed by the Djen-Djen Port Company (ship services, water treatment, handling, and logistics).

6.1.Ship services

The Port of Djen-Djen's navigation aid services are ISO 9001 certified, ensuring the greatest level of quality and dependability.

6.1.1. Pilotage

Pilotage is from when the pilot boards until the vessel is safely at its destination, at anchor, at dock, or at the edge of the pier.

Pilots assist masters in bringing their ships to and from the entrance of inland waterways, harbors, and anchorages. He adds his expertise in the maneuver as well as in the nautical area (currents, tides).

While performing pilotage movements, the pilot is under the command of the captain of the vessel being piloted.

The pilots can also interact with port professionals, such as tug masters and authorities, and crew, who help with ship berthing as well.

6.1.2. Towing

The purpose of towing is to help any kind of vessel navigate the port in any situation:

- Incorporate pushing or tugging the container,
- The process of docking, transferring, or starting a ship
- Escort and support the ship throughout its other maneuvers.

When the tug gets close to the vessel, the towing contract starts, and it ends when the final tugging operation is finished.

6.1.3. Moorage

When the ship is in a port, all mooring, unloading, and moving tasks are in the hands of boatmen. All the moorings of the boats are locked on the bollards at the jetty. The moorings navigate on the "stars" of settlement. These sailors are aboard the ship every day of the year thanks to their training. With tugs and pilots, the harbor master always checks anchorage personally, and all share the same goal to ensure the best conditions for berthing.

6.2.Handling services

As the handling part is often considered the most significant part of port operation, since it entails the main responsibility of processing goods, primarily loading and unloading of such goods.

The hierarchical system governing the Port of Djen-Djen consists of several trades of equal significance. In these specialized roles, awareness needs to be higher for multiple factors, including safety and strict adherence to procedures to protect both employees and the products themselves.

6.2.1. Vertical handling

Vertical loading and unloading are technically referred to when a crane is applied to land activity or vice versa. Such works permit to perform of loading and unloading of freight in vessels of different tonnage.

6.2.2. Horizontal handling

These major features at the dock or some professionals who carry and secure the goods, he localizes and loads them on the ship. Djen-Djen port (RO/RO — Roll On/Roll Off) has three ramps for rolling stock.

6.3.Lighterage

Lighterage largely assembles the removal and storage processes. This includes things like receiving products, labeling for outgoing or incoming transport, tagging them on shore, holding them, and keeping them safe until delivery or embarkation. Longshoremen, Chief Storekeepers, and Pointers are part of the storage organization wheel and one of its constituent elements, communications. These professionals play a crucial role in determining the functionality of the material handling service and work very closely with it. Agents are trained to address customer orders with utmost care and expertise.

6.4.Logistic

Besides managing normal unloading, what makes the port of Djen-Djen special is also the fact that they have their truck fleet, which substantially boosts their logistical knowledge. Besides moving cargo from the pier to storage sites on port-owned land, the port is a one-stop "Port-to-Door" service. This adds a value proposition that ensures customers that the items will be delivered straight to the destination. By internalizing both inland and maritime logistics, the port assured an end-to-end, secure, and efficient delivery process. The result is an extraordinary service experience customized to multiple business needs where customers benefit from highly optimized supply chain processes, reduced handling time, and incredibly low costs.

Port of Djen-Djen is a maritime hub for the 21st century, positioning Algeria for economic competitiveness through a strategic location, mature logistics, and safety, quality & modernity concepts. There are methods of managing it, especially using agile methods, which are important for operations.

Conclusion

To summarize, the methodological choices and contextual analysis provide a strong foundation for conducting an in-depth exploration of Agile adoption at Djen-Djen Port. The interpretive paradigm enables rich insights into human behavior, organizational culture, and procedural fluidity—elements crucial for understanding Agile in action. Moreover, the detailed organizational profile reinforces the study's relevance and frames the operational nuances that influence the success or failure of Agile initiatives. The stage is now set for analyzing the real-world application and impact of Agile within the port environment.

CHAPTER III:

RESULTS ANALYSIS, AND DISCUSSION

Introduction

This chapter presents the findings of the empirical study conducted at Djen-Djen Port. It analyzes the data collected through semi-structured interviews, direct observation, and document analysis, and organizes the results around key themes derived from the research objectives.

Section 1 : Results Presentation and Analysis

This section presents the empirical results obtained through qualitative data collection methods, primarily semi-structured interviews and a gap analysis. The goal is to assess the current state of Agile adoption within the Port of Djen-Djen as well as to identify the operational inefficiencies that can be addressed through Agile methodologies. Core dimensions include: organizational background, Agile practices, operational performance, implementation challenges and future perspectives are the foci of the analysis.

1. Research Objective Reminder

This study primarily aims to identify how the adoption of Agile methodologies can help enhance operational performance at the Port of Djen-Djen, a multi-facility logistical environment that is constantly changing, difficult to coordinate, and characterized by an ever-increasing demand for greater responsiveness and improved service quality.

2. Gap Analysis Table: Current Practices vs. Structured Agile Approach

The gap analysis below provides a comparison between the Djen-Djen port's current way of working and an Agile framework, through interviews, observations, and theoretical benchmarks. The analysis reveals major gaps in planning, implementation, performance monitoring, and strategic alignment:

Table 5: Gap Analysis

Dimension	Current Practices (Initial State)	Structured Agile Approach (Target State)	Identified Gaps
Background Information	-Siloed, stacked structures -Operational inflexibility, characterized by long-term and top-down planning (annual cycles).	-Flexibility, cross-functional teams -Short iterative planning cycles (sprints or PDCA) -Decentralized decision making.	-Not responsive -Poor cross departmental silos -No iterative culture.
Agile Adoption in Port Operations	-Adopted informally in most departments (Kanban boards, stand-ups, task reassignment) -Formally only in IT & Customer Service.	-Organization-level adoption of frameworks around Scrum/Kanban -Definition of several roles (Product Owner, Scrum Master); ceremonies (sprint planning, reviews, retros).	-Disjointed execution -No centralized governance -Unclear scopes for Agile roles -Nonstandard maturity among departments.
Impact on Operational Performance	-Improvements in lead time, cycle time, and work in progress where Agile-like approaches were applied -Few KPI tracking.	-Real Define Agile KPIs: velocity, WIP, lead time, resolution rate -Visual dashboards - Sprints, retrospectives & performance management.	-Lack of metrics: No metrics system -No benchmarking of performance -Agile results are not measured systematically.
Challenges in Agile Implementation	-Brutal cultural pushback from senior staff -No Agile training -Inflexible policies and approval bureaucracies.	-Change management to promote an Agile mindset -Formalized training -Agile Champions in each unit and governance that enables team autonomy.	-Structural rigidity -Lack of training -Confusion on the relevance of Agile to physical ops, and Uneven access to digital.

Future Perspectives	-Ambition to grow, but not clear how -Adoption is bottom-up (locally driven).	-Phased deployment approach advocated by leadership, scaling through pilot(s) and Agile Center of Excellence (CoE) -Adapting hybrid frameworks based on port context.	-Stagnation risk -A narrow definition of strategic thinking -Siloing of best practices -No Agile maturity path.

Source: elaborated by our car.

The gap analysis reveals distinct opportunities for improvement. Djen-Djen Port already has a solid foundation, as it has existing Agile practices. The port will eventually be able to successfully scale Agile with improvement in the operational landscape by addressing the gaps thoughtfully.

3. Action Plan to Address Gaps and Implement Agile Roles

This Action Plan offers tailored solutions for the specific gaps identified in Agile adoption at Djen-Djen Port, based on the gaps analysis we did before. All are rooted in Agile principles and contribute to making Djen-Djen Port more responsive, collaborative, and performance-oriented.

Table 6: Action plan

Dimension	Identified Gap	Action	Expected Result	Agile Function to Implement
Background Information	-Not responsive -Poor cross departmental silos -No iterative culture.	-Implement short planning cycles (Sprints or PDCA), cross-functional coordination rituals (daily stand-ups, planning boards) -Apply team-oriented visual workflows (Kanban).	-Quick decision-making -Enhanced agility -Seamless collaboration between logistics, customs, IT, and ops.	-Master Change Agents
Agile Adoption in Port Operations	-Disjointed execution -No centralized governance -Unclear scopes for Agile roles -Nonstandard maturity among departments.	-Create a port-wide Agile playbook and standardized frameworks (Scrum and Kanban). -Distribute the Agile Governance Team.	-Unified Agile adoption across departments through role clarity and alignment.	-Scrum Masters -Agile Coach

Impact on Operational Performance	-Lack of metrics: no metrics system, and no benchmarking of performance -Agile results are not measured systematically.	-Set Agile KPIs (velocity, cycle time, WIP, and resolution time) -Utilize digital performance dashboards. -Schedule retrospectives to reflect on results.	-Tracking performance with data -Agile progress transparent and accountable.	-Agile performance analyst -Sprint facilitator
Challenges in Agile Implementation	-Structural rigidity, Lack of training, Confusion on the relevance of Agile to physical ops, and Uneven access to digital.	-Conduct Agile literacy programs tailored to operational teams (not just IT) -Train staff on using Scrum/Kanban for port activities. -Invest in better digital tools for everyone.	-Achieve wider Agile understanding across port teams -Willingness to use Agile in cargo/logistics settings.	- Retrospective moderator
Future Perspectives	-Stagnation risk -A narrow definition of strategic thinking -Siloing of best practices -No Agile maturity path.	-Deploy a 2-year Agile roadmap comprising phases, goals, and KPIs. -Establishing the Agile Center of Excellence to capture, scale and share successful practices.	-Agility transformation that can be sustained over the long haul; strategic roof alignment -Institutional memory and models of success that are shared across the organization.	-Agile portfolio manager.

Source: elaborated by our care.

This plan takes clear steps towards institutionalizing Agile across the port by addressing each gap with structured, role-driven interventions. It fosters consistency in practices, cultural alignment with strategy, and ensures continuous performance improvement over time.

4. Results of the semi-structured interview analysis

This part aims to report exploratory study findings to sharpen the research target and acknowledge the complexity of the studied phenomenon. The findings will be presented by dimension to guide the subsequent analysis.

4.1.Background Information

4.1.1. Integrated Analysis of Interviews

A coherent portrait emerges of Djen-Djen Port as an organization facing shared challenges across departments despite varied functional responsibilities:

a) Coordination and Communication Gaps

Supervisors from Stevedoring, Logistics, Dockside, and Customer Service consistently cited miscommunication between departments such as logistics, customs, operations, and IT as a major issue. This fragmentation causes delays in vessel turnaround, inefficient resource use, and customer dissatisfaction.

b) Unpredictable Scheduling and External Disruptions

Every interview highlighted the impact of unforeseen factors like adverse weather, equipment failures, and sudden vessel schedule changes. These realities make it difficult to rely on rigid, linear processes in a dynamic port environment.

c) Organic Emergence of Agile-Like Practices

No department has implemented a formal, port-wide Agile framework. However, many teams independently adopted practices such as iterative planning, daily stand-ups, and Kanban boards, often introduced in response to high-pressure periods like peak congestion or major software updates.

d) Observable Performance Improvements

Where Agile-inspired practices were applied, participants reported clear reductions in turnaround, idle, deployment, and issue resolution times, along with better outcomes on customer-focused indicators such as first-contact resolution and response to complaints.

e) Cultural and Structural Barriers

Rigid hierarchies, fixed role definitions, and inconsistent levels of digital literacy hinder widespread and consistent Agile adoption. Experienced staff members often resist the informality of iterative methods, and departments outside IT struggle with adapting long planning horizons and formal approval processes to more flexible workflows.

f) Technology and Data Synchronization Challenges

The Informatics Responsible pointed out that limited real-time data synchronization and resistance to digital transformation continue to slow broader Agile adoption. Although Agile practices in IT have improved system deployments, data exchange between departments remains slow, constraining operational agility across the port.

The most recurring words in the background discussions:

Table 7: Frequent terms in background information discussions.

Terms	Frequency	Interpretation
Djen	10	Reflects the repeated emphasis on location and institutional context, underscoring that all insights are specific to Djen Djen Pot's operational landscape
Port	9	Reflects the repeated emphasis on location and institutional context, underscoring that all insights are specific to Djen Djen Port's operational landscape
years	6	Highlights the participants' tenure, reinforcing the depth of frontline experience informing their perspectives.
operations	6	Signals that day-to-day operational processes are central to every role and pain point.
logistics	6	Indicates the overarching theme of cargo movement and coordination as the core business of the port.

Source: elaborated by our care

This table consists of three columns. The first column, Term, lists the most commonly used words by participants when describing their job roles, work environment, and experience (e.g., "*port*," "*operations*," "*logistics*"). The second column, Frequency, shows how many times each term appeared across all interview transcripts, indicating the term's relevance and importance. The third column, Interpretation, provides the contextual meaning of each term, explaining what it reveals about the participants' perspectives and the operational reality at Port Djen Djen.

4.1.2. Analysis of Frequent Terms

These recurring terms underscore two academic observations:

- The shared context of a single port shapes all responses
- Operational coordination and logistical throughput are the overarching lenses through which challenges and solutions are viewed.

Collectively, the interviews paint Djen-Djen Pot as an ecosystem ripe for a structured Agile transformation. Organic, bottom-up adaptations have yielded measurable benefits, yet cultural inertia and siloed data flows remain significant challenges

4.2.Agile Adoption in Port Operations

4.2.1. Integrated Analysis of Interviews

Interviews revealed several consistent themes regarding the ways Agile principles have been adopted—or not adopted—at Djen-Djen Port:

a) Lack of Formal Rollout, but Widespread Informal Practices

Aside from Customer Service and IT, no department has experienced a formal, port-wide Agile implementation. However, many teams have organically incorporated Agile-inspired techniques such as daily briefings (stand-ups), visual task boards, iterative planning, and informal retrospectives adapted to their specific operational contexts

b) Drivers of Agile Emergence

Operational pressures such as peak congestion, sudden schedule changes, equipment failures, and data synchronization issues have often prompted supervisors to experiment with rapid feedback loops and flexible resource allocation. These adaptations reflect elements of Scrum's sprint cycles and Kanban's flow management and have enabled teams to address unpredictable challenges more effectively.

c) Varying Levels of Methodological Maturity

- **Stevedoring & Logistics:** Use of basic Kanban-like whiteboards and daily check-ins.
- **Integrated Management Systems (SMI):** Application of iterative PDCA cycles supported by visual boards for planning and audits.
- **Cargo Handling & Dockside:** Hybrid use of Scrum stand-ups and Kanban dashboards, formalized during the past year.
- **IT (Informatics):** Highest maturity in Agile adoption, including six years of Scrum sprints, backlog grooming, and Kanban queues for issue tracking..
- **Customer Service:** First department to receive formal Agile training; currently operates with two-week sprints and complete Scrum ceremonies.

d) Positive Impact on Cooperation and Communication

Informal Agile routines have led to clear improvements in key areas:

- **Visibility:** Shared boards and dashboards provide transparent overviews of workloads.
- **Responsiveness:** Daily stand-ups enable early identification and resolution of issues.
- **Empowerment:** Team members feel greater ownership of tasks, reducing dependence on hierarchical approvals.
- **Cross-functionality:** Collaborative retrospectives and feedback loops have improved alignment between IT and other operational departments.

e) Persistent Barriers

- **Cultural Resistance:** Long-tenured employees often perceive Agile practices as overly informal or incompatible with established ways of working.
- **Structural Inertia:** Rigid hierarchies and siloed approval processes slow decision-making and hinder iterative cycles.
- **Digital Literacy Gaps:** Uneven access to and familiarity with digital tools limit Kanban dashboard effectiveness.
- **Lack of Formal Training:** With the exception of IT and Customer Service, most teams have not received structured education on Agile methods, leaving implementation uneven and dependent on individual initiative.

There are some frequent terms in this dimension:

Table 8: Frequent terms in Agile adoption discussions.

Word	Frequency	Interpretation
Agile	7	Principal focus of the study: Signals the methodological shift being investigated.
kanban	6	In addition, Insight was used as the most commonly used visual aid in informal Agile use at the port.
scrum	5	Another mainstream Agile framework that has been formalized in IT and Customer Service.
visual	5	Highlights the importance of visibility and transparency in task management.
boards	5	Talking about physical and digital Kanban boards used for work scheduling.
practices	4	Represents the operational practices that characterize practices as 'agile' (such as stand-ups, iterations).
daily	4	Shows how often Agile ceremonies, like stand-ups, are used to organize day-to-day work.
informal	4	Indicates the bottom-up, non-institutionalized process for the adoption of Agile at Djen-Djen Port.
implemented	3	Reflects the gradual and uneven process of Agile application across departments
iteractive	3	Emphasizes the incremental, cyclical approach inherent to Agile methodologies.

Source: elaborated by our care.

The Term column lists Agile-related concepts and tools mentioned by interviewees, such as "*Kanban*," "*Scrum*," and "*visual*." The Frequency column records how many times each term was mentioned during the discussions on Agile adoption, showing which practices are most familiar or commonly applied. The Interpretation column explains how each term is used within the port context, clarifying whether these practices are formally implemented or applied informally through team experimentation.

4.2.2. Analysis of Terms

"*Agile***"** tops the list, reflecting its centrality in the interviews.

"*Kanban***"** and "*Scrum*" appear frequently, indicating that these two frameworks are the primary reference points even if applied informally.

The recurrence of **"***visual***"** and **"***boards***"** underscores the emphasis on transparent task tracking.

Terms like **"***daily***", "***iterative***"**, and **"***informal***"** highlight both the cadence of Agile rituals and their grassroots, experimental nature.

Djen-Djen Port stands at an inflection point: despite no formal, port-wide Agile implementation, the organic adoption of Agile practices has delivered measurable benefits in visibility, coordination, and responsiveness. Departments such as IT and Customer Service demonstrate how structured training and leadership endorsement can institutionalize these gains. To progress toward a truly Agile port, Port Djen Djen should:

- **Launch a Phased, Cross-Functional Pilot:** Select high-impact operations (e.g., dockside scheduling) to introduce full Scrum and Kanban with dedicated coaching.
- **Invest in Agile Training & Change Management:** Provide formal certification for key personnel and cultivate "Agile champions" across departments.
- **Standardize Digital Tooling:** Roll out unified Kanban dashboards and communication platforms to bridge digital literacy gaps.
- **Secure Leadership Sponsorship:** Ensure executive buy-in to adapt policies, revise approval workflows, and celebrate early successes.

By synthesizing bottom-up experimentation with top-down support, Port Djen Djen can evolve from fragmented Agile experiments into a cohesive, resilient Agile transformation, unlocking sustained performance improvements and elevating customer satisfaction.

4.3.Impact on Operational Performance

4.3.1. Integrated Analysis of Interviews

The introduction of Agile-inspired practices, whether formal or informal, has consistently driven improvements in decision-making speed, responsiveness to disruptions, and overall operational efficiency:

a) Faster, Collaborative Decision-Making

Interviewees reported that daily briefings and stand-up meetings empowered frontline staff to participate directly in operational decisions. This approach replaced traditional top-down decision-making, reducing bottlenecks and delays. Supervisors emphasized that real-time feedback loops allowed decisions to reflect current conditions on the ground rather than outdated reports.

b) Enhanced Responsiveness to Disruptions

Participants described multiple examples of handling crises — including crane malfunctions, container yard congestion, and overlapping vessel arrivals — where rapid task reassignment, iterative feedback, and cross-functional coordination minimized downtime and avoided demurrage costs.

c) Observed Efficiency Improvements

- **Vessel Turnaround Time:** Reduction of 12–15% in Logistics, Cargo Handling, and Dockside contexts.
- **Idle Time:** Crane idle hours fell by 20%, and IT support resolution improved by 35%.
- **Problem-Resolution Metrics:** Customer complaint resolution times dropped by 30–40%, and error rates were reduced by 40% in documentation and tracking interfaces, and corrective-action closures sped up by 25%.

d) Workflow Optimization & Resource Allocation

Interviewees highlighted that visual task boards, iterative work cycles, and ongoing yard layout adjustments improved work visibility and coordination. These practices allowed teams to reassign labor and equipment dynamically, reduce idle periods, and optimize yard utilization during fluctuating workloads

There are some repeated words in this dimension:

Table 9: Frequent terms in performance impact discussions.

Terms	Frequency	Insight

time	12	Central to performance metrics—turnaround, response, and resolution cycles.
more	10	Indicates comparative improvements ("more responsive," "more collaborative").
agile	8	Highlights the methodological lens for change.
improved	7	Reflects the consistent reporting of positive outcomes.
decisions	7	Underscores the shift toward faster, team-based decision processes.
feedback	5	Emphasizes iterative loops and real-time adjustments.
reduced	5	Quantifies efficiency gains (turnaround, idle time, error rates).
teams	5	Points to cross-functional collaboration as a key enabler.
example	4	Interviewees rely on concrete anecdotes to illustrate gains.
turnaroud	4	A primary KPI improved via Agile routines.

Source: elaborated by our care.

In this table, the first column, Term, includes performance-related words that participants linked to the use of Agile (e.g., "*time*," "*improved*," "*decisions*"). The second column, Frequency, quantifies how often each performance concept was brought up, showing which benefits of Agile are most recognized. The third column, Interpretation, analyzes what each term means in context, such as how "time" refers to reduced turnaround or idle time, or how "feedback" reflects faster team communication and issue resolution.

4.3.2. Analysis of Terms

The prevalence of "*time*," "*decisions*," and "*turnaround*" underscores that operational performance is measured primarily by speed and throughput. Frequent use of "*feedback*," "*teams*," and "*improved*" reflects how iterative collaboration drives those time-based gains.

The cumulative evidence indicates that even lightweight Agile adaptations from daily stand-ups to Kanban boards can deliver measurable performance benefits in a high-stakes port environment.

To transition from ad hoc experiments to a systematic transformation, Djen Djen Port should:

- **Formalize Agile Routines:** Institute standard stand-up cadences, sprint cycles, and Kanban dashboards across critical functions.

- **Measure and Monitor KPIs:** Track turnaround, idle, and resolution times before and after Agile rollouts to validate ROI.
- **Scale through Pilots:** Begin with high-impact areas (e.g., Dockside scheduling) to demonstrate quick wins and build momentum.
- **Invest in Change Management:** Provide Agile training, appoint champions, and secure leadership buy-in to overcome cultural resistance.

By embedding Agile practices into the port's operational DNA, Djen Djen Port can achieve sustained improvements in decision-making speed, resource utilization, and customer satisfaction, ultimately enhancing its competitive standing in maritime logistics.

4.4.Challenges in Agile Implementation

4.4.1. Integrated Analysis of Interviews

Supervisors and managers at Djen-Djen Port consistently identified a set of barriers that hinder formal Agile adoption. These obstacles fall into three main categories:

a) Cultural Barriers

- **Hierarchical Mindsets:** Participants explained that rigid, top-down command structures limit the ability of teams to self-organize. Many tenured employees view Agile as too informal or mistakenly believe it applies only to software, which reduces frontline autonomy and openness to change.
- **Resistance to Change:** Senior personnel accustomed to long-standing procedures often express skepticism toward Agile practices. In contrast, younger employees and field-level supervisors tend to show greater receptiveness. However, shifting entrenched attitudes requires clear communication and demonstration of Agile's practical benefits.

b) Structural Barriers

- **Inflexible Policies & Workflows:** Existing regulations and multi-level approval processes slow decision-making and iterative cycles. Organizational silos continue to limit opportunities for cross-functional collaboration and shared problem-solving.
- **Digital Infrastructure Gaps:** While some departments use visual task boards effectively, inconsistent access to and varying familiarity with digital dashboards hinder real-time coordination and limit the scalability of Kanban-style tools.

c) Capability Barriers

- **Lack of Formal Training:** Except for IT and Customer Service, most employees have acquired Agile practices informally, without structured education on concepts such as Scrum ceremonies, backlog management, or retrospectives. This lack of systematic training prevents consistent and disciplined application of Agile principles.
- **Misconceptions About Agile:** Several interviewees equated Agile solely with software development, resulting in hesitation or reluctance to apply its principles to physical port operations and logistics processes.

These cultural, structural, and capability-related challenges reinforce each other: resistance to change and rigid structures discourage investment in training, which perpetuates misunderstandings and continues to limit broader adoption of Agile practices across the organization.

The most repeated terms in this dimension are:

Table 10: Frequent terms in challenge discussions.

Terms	Frequency	Interpretation
Agile	7	Central focus, but perceived unevenly across departments.
Hierarchical	6	Barrier of top-down decision models
resistance	5	Skepticism among staff and managers
stuctural	5	Inflexible policies and siloed workflows
training	5	Need for formal Agile education
cultural	4	Organizational mindset and norms
policies	3	Regulatory frameworks are slowing iteration
siloed	3	Limited cross-department collaboration
digital	3	Infrastructure gaps for Agile tooling
infomal	2	Reliance on ad hoc rather than structured practices

Source: elaborated by our care.

This table follows the same three-column format. The Term column identifies the most common words used when discussing barriers to Agile implementation, such as "*hierarchical*," "*resistance*," and "*training*." The Frequency column indicates how often each challenge was mentioned, highlighting its severity or prevalence. The Interpretation column provides an

explanation of what each term reveals—for example, that "*hierarchical*" reflects rigid management structures that limit team autonomy, and "*training*" shows a lack of Agile knowledge among staff.

4.4.2. Analysis of Terms

"*hierarchical***"** and **"***structural***"** dominate, revealing that power dynamics and policy constraints are the strongest inhibitors.

"*Resistance***"** and **"***cultural***"** emphasize that mindsets, not just processes, must shift.

"*Training***"** underscores widespread demand for formal learning to bridge knowledge gaps.

The recurrence of **"***siloed***"** and **"***digital***"** highlights both organizational fragmentation and technical barriers to full Agile enablement.

Djen Djen Port's organic experiments with Agile have demonstrated clear operational benefits, but scaling beyond pilot teams demands a concerted change-management effort. An academic approach to overcoming these challenges should include:

- **Leadership Alignment:** Reframe policies and reporting structures to empower decentralized decision-making.
- **Structured Education:** Roll out certified Agile training (Scrum Master, Kanban courses) and practical workshops for all functions.
- **Policy and Process Revision:** Simplify approval workflows, embed iterative checkpoints into governance, and incentivize cross-functional squads.
- **Digital Enablement:** Standardize on user-friendly Kanban dashboards and ensure equitable tool access and support.

By systematically targeting the intertwined cultural, structural, and capability barriers, Djen Djen Pot can transition from isolated Agile experiments to an institutionalized, resilient Agile framework, thereby maximizing responsiveness, collaboration, and operational excellence.

4.5.Future Perspectives

4.5.1. Integrated Analysis of Interviews

Interviews revealed a clear consensus that Agile methodologies, when adapted to the specific demands of port operations, hold significant potential to improve flexibility, coordination, and overall operational resilience. Key cross-cutting themes include:

a) Broad Applicability with Contextual Adaptation

Supervisors consistently expressed that Agile principles should extend beyond IT and Customer Service into core operational areas such as stevedoring, logistics, dockside, and cargo handling. However, they emphasized the importance of adapting frameworks like Scrum and Kanban to the unique realities of port operations, including dynamic vessel schedules and weather-related disruptions, rather than applying them without modification.

b) Pilot-First, Phased Rollout

Participants recommended starting Agile implementation with small, targeted pilot projects—such as container scheduling or maintenance planning—that can generate quick, visible improvements. Building on these early successes, Agile practices can then gradually expand across departments in a phased, bottom-up approach.

c) Core Practices to Start With

Interviewees universally supported beginning with straightforward, low-barrier practices, including:

- Daily stand-up meetings for quick, focused coordination.
- Visual planning tools like Kanban boards or digital dashboards to increase work visibility.
- Regular retrospectives to identify lessons learned and inform continuous improvement.

d) Enablers: Training and Leadership Support

Participants highlighted the critical role of:

- Formal training programs such as workshops or certification courses to make Agile concepts accessible and relevant beyond IT contexts.
- Executive sponsorship to revise rigid policies, streamline approval workflows, and promote a culture open to iterative improvement.
- Ongoing feedback loops and the appointment of "Agile champions" among frontline staff to maintain engagement and drive sustained change.

e) Mindset over Mechanics

Across interviews, participants stressed that fostering a collaborative, transparent, and improvement-oriented mindset is more important than strictly following any specific Agile methodology. They advised that keeping practices simple and directly relevant to daily operational challenges is essential for effective and lasting adoption.

There are some repeated words in this dimension:

Table 11: Frequent terms in future perspectives discussions

Term	Frequency	Significance
Agile	7	Central methodology; unanimously endorsed for broader port use.
kanban	6	Favored visual tool for workflow transparency.
Stand-ups	6	Core ritual for daily alignment and rapid issue detection.
pilots	5	Indicates preference for small-scale experimentation before full rollout.
training	5	Highlights the need for structured education to build Agile literacy.
leadership	4	Critical enabler through executive buy-in and policy support.
small	4	Emphasizes starting with a limited scope to manage risk and demonstrate value.
adapted	4	Stresses tailoring Agile frameworks to port-specific contexts.
retrospectives	4	Underscores the importance of reflecting on past cycles to drive continuous improvement.
feedback	3	Reflects iterative loops for learning and course-correction.

Source: elaborated by our care.

The columns in this table also include Term, Frequency, and Interpretation. The Term column lists keywords mentioned by interviewees when envisioning how Agile should be expanded at the port—terms like "*small*," "*pilots*," "*leadership*," and "*training*." The Frequency column shows how often each future-oriented concept appeared, indicating common agreement or strategic focus. The Interpretation column explains what each term suggests about preferred implementation strategies—such as "*small*" referring to phased, low-risk pilot projects, and "*leadership*" emphasizing the need for top-down support.

4.5.2. Analysis of terms

The prominence of terms like "*pilot*," "*small*," and "*adapt*" underscores a cautious, experimental approach, while "*training*" and "*leadership*" signal the capability and sponsor investments required. "*Kanban*," "*stand-ups*," and "*retrospectives*" identify the specific Agile ceremonies deemed most accessible and impactful in a port setting.

Djen Djen Port stands poised to transform its operational paradigm by institutionalizing Agile practices. An academic, evidence-based roadmap would involve:

- **Designing Pilot Projects** focused on discrete pain points (e.g., berth scheduling, cargo tracking) to validate Agile's impact.
- **Investing in Training & Change Management** to equip teams with practical skills and dispel software-only misconceptions.
- **Securing Leadership Sponsorship** to adjust policies, empower self-organizing teams, and allocate resources.
- **Implementing Core Agile Ceremonies**: Daily stand-ups, kanban boards, and retrospectives to build collaborative routines
- **Measuring Performance** against baseline KPIs (turnaround time, idle hours, response rates) to quantify benefits and guide scale-up.

By starting small, learning quickly, and scaling thoughtfully, Djen Djen Port can harness Agile's iterative ethos to achieve greater responsiveness, operational efficiency, and customer satisfaction, positioning itself as a leader in modern maritime logistics.

Section 2: Discussion of the findings

1. Linking findings to the literature review

1.1.Convergence with Literature

The findings across all interviews are significant because they all align with the academic literature on the value of having Agile practices, especially in ports characterized by highly complex and dynamic environments. As in the studies conducted by Tena Žužek (2020) and Nabass & Abdallah (2019), the improvements in communication, geolocation coordination, responsiveness, and resource utilization were highlighted by the respondents. This reaffirms the principles of Agile outlined by Beck (2001) and Eilers et al. (2022).

Supporting this, Al-Saqqa et al (2017) find that most departments employed some informal version of Kanban boards, stand-ups, and task reassignment. This aligns with what Beck et al. (2020) say on Agile practices being more or less modular and ideally taken up organically. These parallels prove that Agile concepts can deliver real value in operational contexts even beyond IT.

1.2.Divergence from Literature

Even so, full Agile rollouts as suggested by frameworks like SAFe or Scrum (Scrum Alliance, 2023; PMP Agile Study Guide, 2020) were not adhered to in Port Djen-Djen, as its execution has been disconnected. Agile utilization is very formalized for IT and Customer Service, while other departments are less structured or functional, at best. Such a gap illustrates the kind of cultural and

structural limitations referenced by Gandomani & Nafchi (2016), specifically, the absence of Agile literacy and the pull of hierarchy.

In addition, although the literature encourages the application of real-time feedback and metrics (Kaplan & Norton, 1996), the port does not have any formalized KPIs and performance dashboards to record the Agile performance, which makes the Agile possible effectiveness not comparable over time. This chasm diminishes the institutionalization of change and the widespread adoption across the organization.

2. Addressing the research sub-questions

What operational challenges at Djen Djen Port have led to the informal or formal adoption of Agile practices?

All respondents cited similar challenges:

- Weak cooperation between different departments (customs, logistics…)
- Move the schedule on vessels.
- Repetitive manual tasks leading to bottlenecks in data processing.
- Equipment breakdowns.

These elements are in harmony with the actualization of Agile in the VUCA (volatile, uncertain, complex, ambiguous) environments, which is expressed by Stormi et al. (2019). Having a practical need for speed and adaptability in this context naturally lent itself to the attractiveness of Agile principles, even absent an edict to adopt them.

How have Agile methodologies, formally or informally applied, improved operational performance across departments?

Actions inspired by Agile, like short coordination meetings and Kanban boards, produced:

- Increase in vessel turnaround time reductions of 15–20%
- Quicker decisions in case of equipment malfunction or scheduling conflicts.
- Frontline feedback was integrated better into planning.
- Higher employee morale and engagement.

Such improvements are referred to as incremental learning and continuous improvement in the literature (Scrum Guide, 2020; Conforto et al., 2014). Teams became more empowered and responsive, often solving issues proactively and collaboratively.

What barriers hinder full-scale Agile adoption, and what strategies are proposed to overcome them?

Despite the visible gains, key obstacles persist:

- Cultural resistance from senior staff accustomed to traditional methods.
- Lack of formal training in Agile concepts across non-IT teams.
- Hierarchical decision structures that slow responsiveness.
- Unequal access to digital tools, especially for Kanban-style monitoring.

These findings echo the work of Rauniar & Cao (2025), who stress that leadership mindset and organizational culture are critical enablers of Agile transformation. Without these, adoption remains fragmented and inconsistent.

The study confirms that Agile practices, even when informally introduced, contribute to operational improvements in the port setting. While literature supports the transformative potential of Agile across industries, this case illustrates that success hinges on contextual adaptation, gradual rollout, and leadership support.

Agile in port logistics isn't about mimicking software teams, it's about building the capacity to respond faster, coordinate better, and continuously learn. Djen-Djen Port has laid a solid foundation through grassroots experimentation. The next step is to consolidate these gains with structured training, cross-functional pilot projects, and digital enablement.

The findings of this research effectively address the main question about how does the adoption of Agile methodologies contribute to the enhancement of operational performance. Evidence from interviews and observations at Djen-Djen Port reveals that informal use of Agile-inspired practices—such as visual planning tools and daily coordination—has led to clear improvements in efficiency, decision-making, and interdepartmental collaboration. These results demonstrate that, when adapted to the operational context, Agile can be a practical tool for performance improvement beyond software environments. Thus, a gradual, context-aware adoption of Agile provides a sound answer to the research problem.

Conclusion

The findings reveal a compelling narrative: while Agile has not been uniformly adopted at Djen-Djen Port, informal practices have delivered notable improvements in responsiveness, collaboration, and workflow efficiency. Yet, systemic barriers as cultural resistance, digital inequality, and lack of training hinder broader transformation.

The discussion confirms literature-supported benefits of Agile in complex environments but stresses the need for contextual tailoring. The chapter concludes by recommending structured pilots, leadership support, and phased rollouts as pivotal to achieving full-scale Agile transformation within the port.

General Conclusion

GENERAL CONCLUSION

1. Summary of Findings

This study examined how the adoption of the Agile approach can enhance operational performance within port operations, focusing on the case of Djen-Djen Port. The analysis revealed that although Agile was not formally adopted, several departments had implemented Agile-inspired practices informally, such as daily team meetings, task boards, and iterative planning cycles. These informal initiatives contributed to improved communication, responsiveness, and task coordination across departments.

2. Theoretical and Managerial Implications

The results of this research contribute to bridging the gap between theoretical frameworks on Agile and their practical application in port operations. From a theoretical perspective, the findings confirm that Agile principles can be adapted beyond software development to improve performance in complex logistical environments. For managers, the study highlights the necessity of fostering a culture of collaboration, iterative planning, and continuous improvement to achieve greater operational agility. Moreover, leadership commitment emerged as a decisive factor for successful Agile adoption.

3. Identified Barriers to Agile Adoption

Despite the observed benefits, the research identified several obstacles that impede full-scale Agile implementation at Djen-Djen Port. These barriers include rigid hierarchical structures, limited technological infrastructure, resistance to cultural change, and a lack of training programs dedicated to Agile methodologies. Overcoming these challenges requires targeted strategies such as staff training, leadership endorsement, and gradual cultural transformation**.**

4. Recommendations for Future Implementation

To enable effective Agile adoption, it is recommended that Djen-Djen Port pursue a phased implementation plan. This plan should include leadership-led initiatives, formal training on Agile frameworks, investment in digital tools, and continuous performance monitoring through relevant key performance indicators (KPIs). Engaging employees from all levels in the adoption process is essential to build acceptance and facilitate the transition from traditional to Agile ways of working.

5. Research Limitations and Future Research Directions

This study was limited by its qualitative nature and single case study design, which may affect the generalizability of the findings. Future research should consider comparative analyses involving multiple ports or logistical organizations to validate and expand on these findings. Additionally, a mixed-method approach combining quantitative performance data with qualitative insights could provide a more comprehensive understanding of Agile's impact on operational performance.

6. Concluding Remarks

In conclusion, this research demonstrates that Agile methodoogies, even when adopted informally, have the potential to significantly enhance operational performance in port environments. By embracing Agile principles and addressing the barriers to adoption, ports like Djen-Djen can improve efficiency, flexibility, and responsiveness, thereby strengthening their competitiveness in an increasingly dynamic and unpredictable global logistics landscape.

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APPENDIX

APPENDIX A: SEMI-DIRECTIVE INTERVIEW GUIDE

Study Title: The Role of Adopting Agile Approach in Enhancing Operational Performance.

Target Participants: Port Employees, SMI Expert, Logistics and Operations Managers.

Approach: Virtual or in-person interviews.

Introduction

Good morning. I'm FENIER Hadil, a second-year Master's student at the Higher National School of Management. I'm doing my graduation study on the role of the Agile approach in enhancing operating performance. Thank you for taking the time to discuss your thoughts with me.

Background Information

1. Can you generally describe the role you have in port management and the experience you have in this field?

2. What are the largest problems you have in your daily operations, and how do these challenges impact performance, efficiency, or customer satisfaction?

3. Has Agile methodology ever been encountered or utilized before?

Agile Adoption in Port Operations

1. Has Agile been implemented in your department?

2. Which Agile methodologies are applied in your work?

3. What effects does Agile have on cooperation and communication in your department?

Impact on Operational Performance

1. In what ways has Agile enhanced decision-making, responsiveness, and efficiency?

2. Could you give an instance when Agile assisted in resolving an operational issue?

3. Since Agile was adopted, have you noticed any appreciable gains in problem-solving, workflow optimization, or resource allocation?

Challenges in Agile Implementation

1. What are the main barriers preventing your department from using Agile?

2. How do workers see Agile? How has management supported or challenged this shift?

3. Does the implementation of Agile face any organizational or structural obstacles?

APPENDIX

Future Perspectives

1. Do you believe that Agile should be used in port operations more broadly? Why or why not ?

2. If you had to recommend Agile practices for your department or similar ones, what would they be and why?

3. What advice would you give to other ports or logistics operations looking to adopt Agile for the first time?

Conclusion

Thank you so much for your time. I appreciate your help and your opinion about the subject. Feel free to contact me wherever you want to talk more about it.

APPENDIX B: THE ORGANIZATIONAL CHART

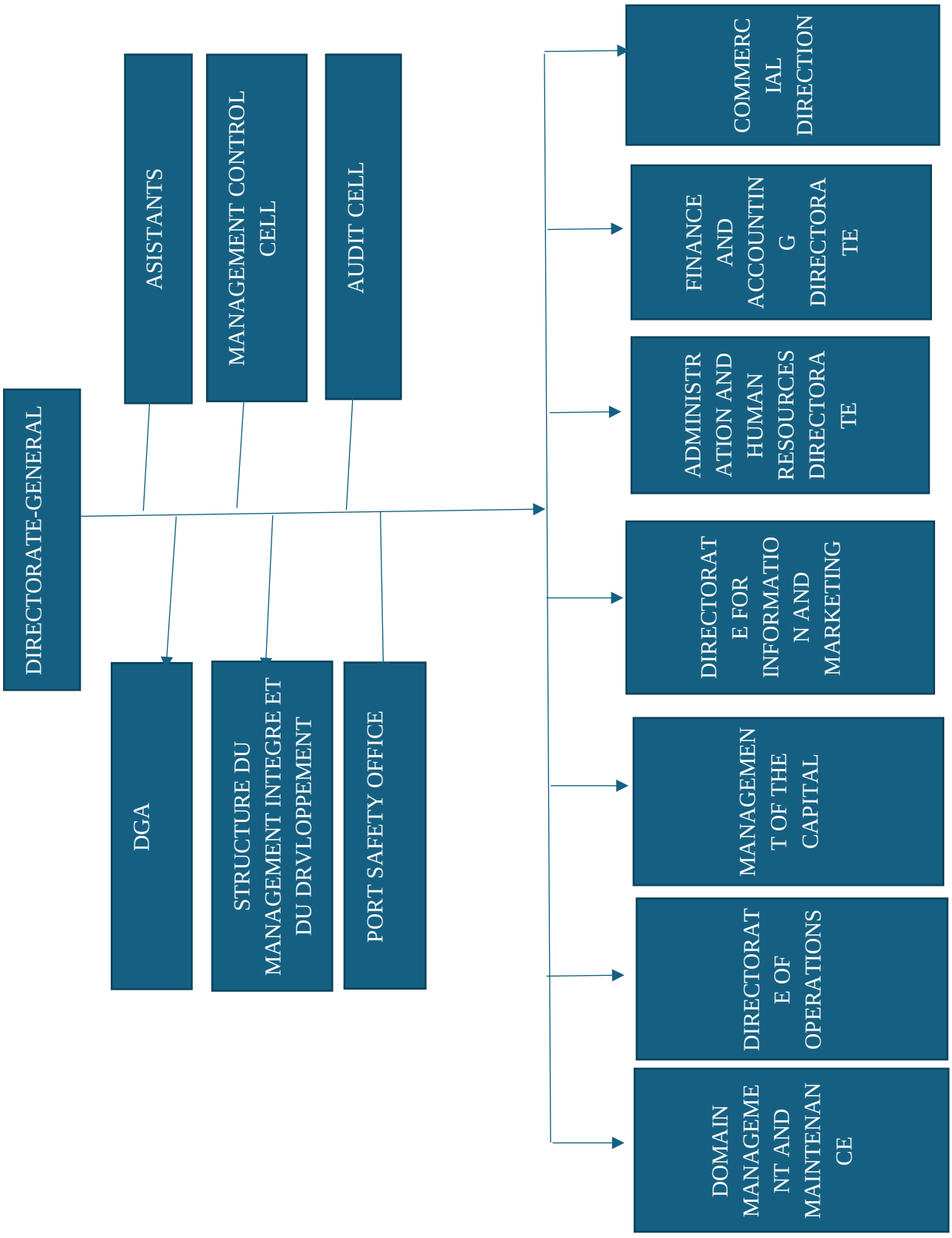

Figure 02: the organizational chart.

Source: Document at the organization level host.

APPENDIX C: CUSTOMER SATISFACTION SUVEY QUESTIONNAIRE MADE BY HOST COMPANY

الجمهورية الجزائرية الديمقراطية الشعبية
REPUBLIQUE ALGERIENNE DEMOCRATIQUE ET POPULAIRE

MINISTERE DES TRANSPORTS
GROUPE SERVICES PORTUAIRES «SERPORT - spa»
ENTREPRISE PORTUAIRE DE DJEN DJEN - spa

وزارة النقل
مجمع الخدمات المينائية ش.ذ.ا
المؤسسة المينائية جن جن - ش.ذ.ا

DJEN DJEN

Questionnaire de l'enquête de satisfaction clients Septembre 2023

Dans le but d'améliorer nos prestations et notre qualité de service, nous vous remercions de bien vouloir consacrer quelques instants à compter et nous faire retourner ce formulaire.

Consignataires

Votre avis nous intéresse

Votre nom : ..... **votre fonction**.....

Votre entreprise.....

	S	AS	PS	NS	TI
Votre relation avec notre entreprise.					
➢ La qualité de l'accueil dans notre entreprise	☐	☐	☐	☐	☐
➢ Le respect du délai d'établissement des factures	☐	☐	☐	☐	☐
➢ La disponibilité et la fiabilité de l'information	☐	☐	☐	☐	☐
➢ Les procédures de sécurité dans l'enceinte portuaire	☐	☐	☐	☐	☐
➢ Les procédures et formalités d'entrée et sortie du port ?	☐	☐	☐	☐	☐
Votre opinion concernant la qualité de nos prestations de services (Consignataires).					
➢ Etes-vous satisfaits de la méthode et respect du programme de la CPN ?	☐	☐	☐	☐	☐
➢ Etes- vous satisfaits de l'accostage des navires ?	☐	☐	☐	☐	☐
➢ Etes- vous satisfaits de la prestation pilotage des navires ?	☐	☐	☐	☐	☐
➢ Etes- vous satisfaits de la prestation remorquage des navires ?	☐	☐	☐	☐	☐
➢ Etes- vous satisfaits par l'avitaillement des navires ?	☐	☐	☐	☐	☐
➢ Etes- vous satisfaits de l'affectation des postes à quai selon vos demandes ?	☐	☐	☐	☐	☐
➢ Etes- vous satisfaits des moyens humains et matériels affectés aux navires ?	☐	☐	☐	☐	☐
➢ Etes- vous satisfaits du délai de traitement de vos requêtes ou réclamations ?	☐	☐	☐	☐	☐
➢ Etes- vous satisfaits des rendements réalisés par nos services par rapport À vos exigences	☐	☐	☐	☐	☐
➢ Etes- vous satisfaits de nos tarifs appliqués ?	☐	☐	☐	☐	☐

Autres commentaires

.....
.....
.....
.....
.....

S : satisfait **AS: assez satisfait** **PS: peu satisfait** **NS: non satisfait** **TI : très insatisfait**

APPENDIX D: QHSE POLICY OF THE COMPANY