

Resilience of supply chain in Albanian construction industry

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ABSTRACT

Resilience of supply chain in Albanian construction industry

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The importance of improving supply chain resilience (SCR) has been underscored by the COVID-19 pandemic and the interconnected nature of global supply chains. This research seeks to explore how companies can implement recovery strategies to tackle significant supply chain disruptions. Using qualitative methodology, particularly focusing on the construction department at a company operating in Albania, as well as “Ministry of Infrastructure and Energy of Albania” (MIE), the study examines challenges faced and strategies implemented by Albanian construction companies. Interviews with supply chain executives/stakeholders within the company and MIE specialists, were concluded to gather data. The results highlight the specific difficulties encountered by Albanian construction companies amid global disruptions and illuminate their responsive approaches. This research aims to identify the major challenges faced by Albanian companies, in terms of resilience of their supply chain, in order to suggest a final framework for companies in the construction industry, offering actionable insights and recommendations for enhancing overall supply chain resilience.

Keywords: *Supply chain resilience, supply chain disruption, construction industry resilience, risk management, resilience strategies, sustainable strategies*

ABSTRAKT

Qëndrueshmëria e zinxhirit të furnizimit në industrinë shqipëtare të ndërtimit

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Rëndësia e përmirësimit të qëndrueshmërisë të zinxhirit të furnizimit (SCR) është theksuar nga pandemia COVID-19 dhe natyra e lidhur e zinxhirit të furnizimit global. Ky kërkim synon të eksplorojë se si kompanitë mund të implementojnë strategji rikuperimi për të trajtuar ndërprerjet e zinxhirit të furnizimit. Duke përdorur metodologjinë cilësore, duke u fokusuar posaçërisht në departamentin e ndërtimit në një kompanie që operon në Shqipëri dhe në Ministrinë e Infrastrukturës së Shqipërisë (MIE), studimi shqyrton sfidat që përballen dhe strategjitë e përdorura nga kompanitë shqipëtare të ndërtimit. Intervista me ekzekutivë / pale të përfshira në zinxhirin e furnizimit brenda kompanisë dhe specialistët e MIE, u kryen me qëllim për të marrë të dhëna. Rezultatet nënvizojnë vështirësitë specifike që hasin kompanitë shqipëtare në departamentin e ndërtimit, mes ndërprerjeve globale dhe nxjerrin në pah strategjitë e tyre reaguese. Ky kërkim synon të identifikojë sfidat kryesore që përballen kompanitë shqiptare, në terma të qëndrueshmërisë së zinxhirit të tyre të furnizimit, për të sugjeruar një skemë përfundimtare për kompanitë në industrinë e ndërtimit, duke ofruar rekomandime për përmirësimin e përgjithshëm të qëndrueshmërisë së zinxhirit të furnizimit.

***Fjalët kyçe:** zinxhiri i furnizimit, ndërprerje të zinxhirit të furnizimit, menaxhim risku, strategji menaxhimi, aftësi ripërteritese e zinxhirit të furnizimit*

TABLE OF CONTENTS

ABSTRACT	iv
ABSTRAKT.....	v
CHAPTER 1	1
INTRODUCTION	1
1.1 Problem statement	1
1.2 Objective of the thesis	2
1.3 Scope of works	4
1.4 Organization of the thesis.....	4
CHAPTER 2	6
LITERATURE REVIEW.....	6
2.1 Introduction	6
2.2 Supply chain management (SCM)	6
2.2.1. Supply chain resilience (SCR)	7
2.2.2 Supply chain resilience strategies.....	8
2.2.3 Supply chain risk management (SCRM).....	10
2.2.4. Supply chain resilience in construction.....	10
2.2.5 Offense versus Defense Resilience	12
2.2.6 Difference between Avoiding and Managing SCD strategies.....	14
CHAPTER 3	15
RESEARCH METHODOLOGY	15
3.1 Chosen research approach.....	15

3.2 Data collection methods	17
3.2.1 Interview guide	17
3.2.2 Documentation Analysis	18
3.3 Method of Analysis	19
3.4 Moral Contemplation	19
3.5 Timeline of research.....	20
CHAPTER 4	22
RESULTS AND DISCUSSION	22
4.1 Framework for Albanian companies.....	22
4.1.1 Avoiding SCD: Scenario planning.....	24
4.1.2 Avoiding SCD: Stock up on inventory	25
4.1.3 Avoiding SCD: Have back-up suppliers	26
4.1.4 Managing SCD: Evaluating supply chain components.....	27
4.1.5 Managing SCD: Relationship with suppliers/Communicating with costumers	28
4.1.6 Managing SCD: Optimizing resources	31
4.2 Results comparison to other studies.....	32
CHAPTER 5	33
CONCLUSIONS.....	33
5.1 Supply chain disruption factors.....	33
5.2.1 Covid 19 impact (SCD events)	33
5.2.2 Russia-Ukraine War (SCD events)	35

5.2.3 High demand in housing/ shortage of workforce (SCD events)	37
5.2.4 Infinite waste, Finite resources (SCD events).....	38
FUTURE RESEARCH SUGGESTIONS	40
REFERENCES.....	41
APPENDIX.....	44

LIST OF FIGURES

Figure 1.Key organisational and Management Processes (Developing resilient and sustainable design chains, March 2023).....	7
Figure 2. Supply chain in construction (Thunberg 2016) ^[12]	11
Figure 3. Supply chain in construction (Thunberg, 2016).....	11
Figure 4. The resilience architecture framework	13
Figure 5. Interview Guide	17
Figure 6. Individuals which are interviewed, position, experience, field of expertise	18
Figure 7. Supply chain disruption framework (Appendix pg.45).....	22
Figure 8. Suggested strategies to make the supply chain in Albania more resilient (Appendix pg.44)	24
Figure 9.Steel price from Q2 2022 to Q1 2024.....	36

CHAPTER 1

INTRODUCTION

1.1 Problem statement

The construction industry stands as a cornerstone of modern infrastructure development, playing a vital role in shaping the built environment. At its heart lies the complex web of activities and processes known as the construction supply chain. The supply chain in construction encompasses the flow of materials, information, and resources from the initial procurement of raw materials to the final delivery of a completed project. It is a dynamic system that involves numerous stakeholders, including suppliers, contractors, subcontractors, designers, clients, and regulatory authorities, collaborating across various stages of project execution.

With Albanian companies dealing with project budgets which can reach up to hundreds of millions, resilience of supply chain has a life-threatening effect for the company, making the need of a rebound framework very necessary for certain scenarios which may affect the global market.

In recent years, the construction industry has witnessed significant shifts in its approach to supply chain management, driven by globalization, technological advancements, sustainability, and evolving market dynamics. These changes have underscored the critical importance of efficient supply chain practices in achieving project success, enhancing competitiveness, and mitigating risks. Such development comes with new challenges, as seen with Covid19, causing a disrupt of the worldwide supply chain, or the Ukrainian war, raising the prices of almost every product in the construction industry.

Albanian economy is known for being dependent on the foreign supply chain, where as reported by INSTAT (INSTAT, Albania in numbers 2021)^[1] only in 2021 Albania imports were standing at 800 billion ALL, while the exports were at 368 billion ALL. The deficit of imports and exports has stood at 2:1 since the declaration of democracy in Albania, 1991, letting us to understand that any disrupt or oscillation of the world market, would only be a matter of time before mirroring in the country's market.

This statement aims to provide a comprehensive overview of the supply chain in the construction industry, exploring its key components, challenges, and opportunities. By examining the interplay between different actors, processes, and factors influencing the construction supply chain, this study seeks to shed light on strategies for optimizing performance, fostering collaboration, and driving innovation within the Albanian sector.

One of the best companies to represent these difficulties in the Albanian construction industry sector is “Gener2”, which from now on will be referred to as “Company X”. This construction company boasts over 900 employees, being the largest in Albania, with projects ranging in the fields of residential complexes, commercial hubs, transportation infrastructure such as roads and highways, water management systems, telecommunications networks, Trans-Atlantic-Pipeline (TAP), industrial facilities, maritime ports, and even an airport control tower (Gener2 website) [2]. Implementing this kind of projects, which have a timeline of up to 7 years, means that their supply chain for given projects is vulnerable to the global market fluctuation for a long period of time.

1.2 Objective of the thesis

This study has three main objectives related to the resilience of supply chain in Albania construction industry:

- Understanding the factors which caused the disruption in Albanian supply chain, as well as the events which manifested them
- Finding out resilience strategies which can be applied to the Albanian construction industry
- Creating a single framework which can be used by Albanian companies to increase the resilience of their supply chain

In order to create this framework, firstly the root causes/main factors that created disruption of the supply chain need to be understood in the first place. This will be achieved by investigating various internal stakeholders' perspectives within “Company X”, identifying their operational challenges in both material and human point of view. Through this investigation, a tailored framework will be proposed to mitigate supply

chain disruptions effectively. Company X, is chosen as a study case, not only as an individual company, but as a representative of companies which are well structured, and share common targets in the constructions industry, including civil and infrastructure works.

In order to get a better insight of the Albanian construction industry supply chain, we need to look at the two main procurement procedures followed in the country.

Direct procurement is the most widely used method in the Albanian construction industry market. This procedure refers to the process of purchasing goods or services directly from a supplier without involving intermediaries or competitive bidding. By applying this method, companies save time, which in the construction world is crucial, as well as working with a contractor that they may find more trustworthy, but sometimes, this comes with the setback of paying a higher price, or receiving works of a lower quality.

The other method is the classic open procurement, a procedure which means allowing a wide range of suppliers to bid on contracts, promoting fairness and competition. The stages of open procurement in the construction industry include needs assessment, tendering, bid evaluation, contract award, contract management, and performance evaluation. This type of procedure usually needs at least 1 to 2 months, and requires a huge effort in terms of documents preparation, not only from the bidder, but from the contracting authority as well. In Albania, this procedure is mostly used by the “Ministry of Infrastructure and Energy of Albania”, being implemented for national projects, ranging from a couple of million euros of cost, to billions, etc.

This research will not be focused on “Company X” exclusively, but as well on the “Ministry of Infrastructure and Energy of Albania”, known as MIE. Their practice and knowledge of the open procurement procedure, and worldwide market oscillations affecting national projects, will be used for the positive purpose that this research has, in order to create a better framework of resilience in supply chain. “Company X” will represent the private entity, while “Ministry of Infrastructure and Energy of Albania” will represent the public entity, making one generalization of Albanian companies, in order to come to the conclusion of the thesis objectives.

1.3 Scope of works

This study will focus on the Albanian construction market, by analyzing two entities, in order to make one generalization of the operating entities in the country. Private entity will be represented by company X, while the public entity will be represented by “Ministry of Infrastructure and Energy of Albania”. This study will focus solely on Albanian sector, as a vacuum of researches focused solely in this country is noted. By focusing solely in Albanian companies, the solution that will be provided to the end of this research, is applicable to the current companies in this sector in Albania, more adaptable than the solutions suggested by international researches and reports.

Through the use of interviews, a deep analysis of individual experiences will allow a better understanding of the dynamics of the Albanian construction companies, as well as their approach to disruptions in their supply chain systems.

1.4 Organization of the thesis

The thesis is organized into five primary sections, aiming to thoroughly explore the research objectives and examine the hurdles encountered by Albanian companies within its construction supply chain, along with the strategies implemented to bolster its supply chain resilience.

Chapter 1: This section offers insight into the research topic, providing background information and context regarding the challenges with Albanian companies supply chain. Problem statement, objective of the thesis and scope of works are clearly outlined, establishing the groundwork.

Chapter 2: The literature review section delves into existing knowledge and theoretical frameworks concerning supply chain management, disruptions, and resilience, examining relevant studies in the construction industry and identifying key findings. This section provides a theoretical foundation for understanding challenges and developing strategies to enhance supply chain resilience.

Chapter 3: The research methodology section outlines the research design, data collection methods, and data analysis techniques utilized in the study. It elaborates on

the case study approach employed to examine private and public entities supply chain disruptions and initiatives aimed at enhancing resilience.

In Chapter 4: These solutions are then finalized in a single framework for companies which need to avoid or manage SCD. The section offers a summary of the study, seeing the solutions proposed divided into two main sectors, which are focused on avoiding SCD, or managing SCD. This framework is accompanied by recommendations of solutions for Albanian companies, as well as suggestions for future directions.

In Chapter 5: The collected data is analyzed and presented, stating the main disruption factors, as well as the events which highlighted them. The factors, as well as the data are explained, having an interconnection between them. Research suggestions are also made.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In today's fiercely competitive business climate, the complications of supply chain management have reached new heights, presenting a formidable challenge. Local supply chains are constantly surrounded by an increasing array of disruptions, further complicating their management. These disruptions, whether from unforeseen events like the COVID-19 pandemic, earthquakes, or even conflicts like the war in Ukraine, can exert a high impact on organizational performance, potentially leading to significant losses. Therefore, the importance of increasing supply chain resilience cannot be emphasized enough. Cultivating and sustaining resilience within the supply chain framework is a crucial asset for any organization navigating through such turbulent times.

2.2 Supply chain management (SCM)

In the past, supply chains focused mainly on ensuring the availability, movement, and cost efficiency of physical assets. But in today's fast-paced world, they've transformed into complex systems that manage data, services, and innovative solutions. Modern supply chain management goes beyond traditional logistics, influencing everything from product quality and timely delivery to customer satisfaction and profitability (Abrahamsson and Rehme, 2010)^[3].

Supply chain management has shifted from being a mere competitive advantage to a vital necessity for business survival. The Covid-19 pandemic emphasized its importance, revealing unprecedented challenges on a global scale. However, despite its critical role, there's no universally agreed definition of supply chain management.



Figure 1. Key organisational and Management Processes
(Developing resilient and sustainable design chains, March 2023)

SCM, at its core, serves as a unification force that connects key business functions and operations both within individual companies and across their networks, creating an efficient business framework. Within this framework, SCM includes the full spectrum of logistics management activities, extending its reach to include manufacturing operations. Additionally, SCM plays a crucial role in directing the synchronization of processes and tasks across diverse departments, spanning marketing, sales, product design, finance, and information technology (Ballou, 2007) [4].

2.2.1. Supply chain resilience (SCR)

In the realm of supply chain management, resilience concerns to a system's capability to revert to its initial state or achieve an improved state following a disruption

(Christopher and Peck, 2004) ^[5]. Resilience is not merely an end result but rather an ongoing process involving the continuous anticipation and response to threats and risks (Weick and Sutcliffe, 2001) ^[6].

(Limnios and Mazzarol, 2011) ^[13] identified two contrasting views of resilience: offense (adaptation) or defense (resistance) against internal or external disruption. A system or supply chain can exhibit adaptability by modifying its structure, processes, and functions to enhance its survival capability in response to disruption. Conversely, resilience can manifest as the capacity to withstand such changes and absorb shocks by preserving its existing structure and processes.

Resilience, , is connected to the supply chain's capacity to anticipate unexpected events, address disruptions, and bounce back from them (Ponomarov and Hollcomb, 2009) ^[7]. This involves ensuring the continuity of operations while maintaining the desired level of coordination and control over structure and function. In the context of this research, supply chain resilience refers to its capability to respond to adverse effects created from disruptions occurring at any given moment. Its aim is to uphold the supply chain's objectives or even restore it to an improved state (Barroso et al., 2008) ^[8].

2.2.2 Supply chain resilience strategies

(Woong & Goh, 2021) ^[9] devised a Covid-19 risk management framework that revolves around eleven strategies implemented by companies to fortify their supply chains both prior to and during the Covid-19 pandemic. These strategies were categorized into supply chain resilience and supply chain risk management, which can be broadly classified as either proactive or reactive approaches (Woong & Goh, 2021) ^[9]. Of these 11 strategies, 6 are more relatable to the field of construction, which can be used in the case study of this research.

Stock Control: Certain companies opted to procure and establish strategic supply stockpiles in advance of the pandemic to mitigate potential product shortages during the outbreak. This proactive strategy entails minimal effort when implemented before the onset of the risk event. However, its effectiveness is short-term and its feasibility is somewhat limited. Stockpiling carries the risk of excess inventory unless the

duration of the event is anticipated to be prolonged (Woong & Goh, 2021) ^[9]. For example, an increase in gypsum storage, if it is known that the prices are going to surge, will only have a short-term effect in the project budget, since it will be only a matter of time before the product has to be bought with the new increased price.

Capacity Expansion: In response to a surge in demand, the most direct action is to increase production capacity during the risk event. One approach involves hiring additional personnel to ramp up the output of the sought-after product. Expanding production capacity means a resource-intensive strategy, demanding considerable manpower and escalating costs. This reactive strategy yields short-term effects, as its objective is to meet the spike in demand promptly during the risk event (Woong & Goh, 2021) ^[9]. For example, if there is a short-term increase in the demand for highways, the company might think of buying these machineries, something that will lead in stockpile of heavy expensive assets, which will quickly become a burden for the corporate.

Expanding Product Categories: Amidst the Covid-19 pandemic, certain companies specializing in single products diversified their product portfolios to mitigate losses stemming from low-demand items, instead focusing on those in higher demand. Diversifying single-product categories represents a reactive strategy entailing significant effort due to necessary production adjustments. However, its effects are enduring, positioning it as a long-term solution (Woong & Goh, 2021) ^[9].

Local Sourcing: Companies turned to local suppliers during the pandemic, facing challenges with international procurement. While this strategy requires minimal effort and enhances long-term supply chain resilience, it's often less cost-effective than global sourcing. (Woong & Goh, 2021) ^[9] suggest a balanced approach, combining local and overseas sourcing to manage risks and costs effectively.

Prioritizing High-Performing Categories: During the pandemic, companies focused on meeting demand for their best-performing products or categories, such as hand sanitizers or online sales for e-commerce businesses. This reactive strategy requires minimal effort but has short-term effects as companies adapt to disruptions (Woong & Goh, 2021) ^[9].

Asset Repurposing: Companies redirected resources from underperforming segments to bolster operations in more successful areas during the pandemic. This enabled them to ramp up production of high-demand products. This reactive strategy is resource-intensive, requiring significant changes to standard operations and infrastructure. However, its impact is short-term, as it may not yield benefits once demand returns to normal levels (Woong & Goh, 2021) ^[9].

2.2.3 Supply chain risk management (SCRM)

Supply chain risk management involves the process of recognizing, evaluating, and mitigating potential risks that could affect the operational efficiency of a company's supply chain. These risks encompass disruptions in material, service, and information flows, along with unexpected events that might affect the accessibility or quality of goods and services (Tummala and Schoenherr, 2011) ^[10].

Ensuring the continuity of operations and minimizing the impact of potential disruptions requires effective supply chain risk management for businesses. In today's interconnected supply chains, which involve numerous suppliers and partners in the production and distribution of goods and services, implementing such risk management practices becomes unavoidable (Ali, Golgeci, and Arslan, 2023) ^[11].

Economic instability and uncertainty can influence both the availability and cost of materials, as well as the demand for products and services, potentially leading to disruptions in the supply chain and revenue losses. By aiding businesses in anticipating and responding to these challenges, supply chain risk management plays a crucial role (Tummala and Schoenherr, 2011) ^[10].

2.2.4. Supply chain resilience in construction

Within the construction industry, there is a widespread understanding that placing greater emphasis on effectively managing the entire supply chain, ranging from raw material procurement to final product delivery, can output substantial benefits in terms of cost reduction, enhanced productivity, shortened project timelines, and improved overall quality. Achieving this requires a collaborative and comprehensive planning approach, which entails involving suppliers and subcontractors early in the construction project (Thunberg, 2016) ^[12].

In construction, the supply chain encompasses a complex network of individuals, organizations, and resources engaged in the production and delivery of building projects. This encompasses procuring raw materials, equipment, and tools, as well as managing suppliers, subcontractors, and logistics providers. Effective supply chain management in construction means optimizing material and information flow, ensuring timely resource availability, and minimizing waste and inefficiencies.

The construction industry is characterized by its short-term nature and decentralized decision-making processes, resulting in a highly fragmented landscape made off numerous small contracting firms and subcontractors. This fragmentation introduces uncertainty into construction projects due to inconsistent subcontractor use. The high number of subcontractors further complicates coordination and project management efforts (Thunberg, 2016) ^[12].

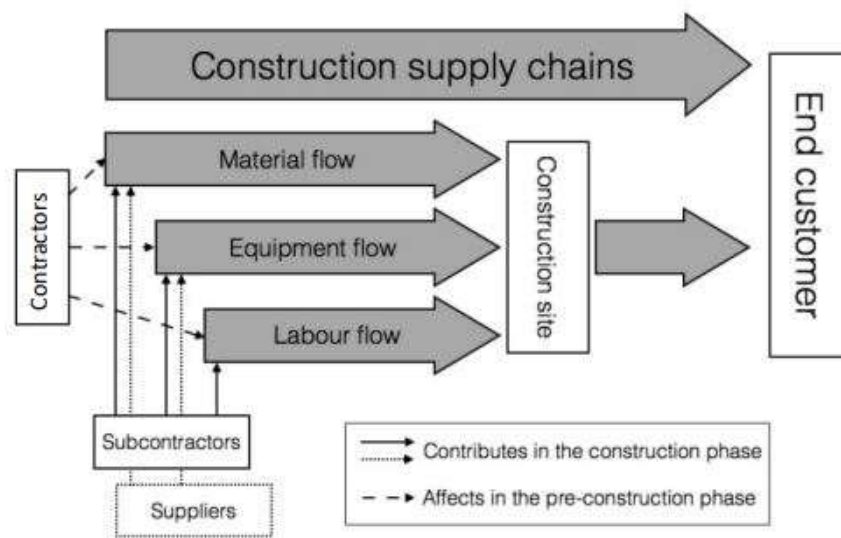


Figure 2. Supply chain in construction (Thunberg 2016) ^[12]

In the above figure, we see the three main inputs in the construction supply chain, which are Material, Equipment and Labor flow, leading the last chain, which is the End Customer.

Some important aspects to ensure that a supply chain will maintain its natural flow, are:

- Ensuring that the schedule of material arrival and production time are on schedule

- The subcontractor is involved in the planning phase of the project
- Focus is divided equally between pre-site and on-site planning
- Planning is done to improve the supply chain, and not the client requirements.

2.2.5 Offense versus Defense Resilience

A distinction between resilience stemming from adaptive capacity, and resilience based on the ability to withstand change and endure, is important when making an analysis for a management solution. Resilience can come from being able to adapt to change or from being able to resist change and maintain stability (Dr Elena Mamouni Limnios, 2011) ^[13]. The article also suggests that resilience isn't always good, especially if a system is not performing well. Additionally, it is important looking at resilience from a broader perspective that includes all the different stakeholders connected to an organization.

A comparison which may seem familiar to the Albanian society is that of the economy during the communist area (1946-1991). The country's economy was very resilient, since it was able to flow even though the diplomatic/economic trading relations with most of the world were closed. In overall, the economy was severely underperforming in almost every sector, leading us to believe that the resilience in this case is not wanted. In this particular case, under the categories specified by the author, we would say that the Albanian economy at the time falls under the Defense Resilience category, which means it is resistance to change, the opposite of being able to adapt to change, the offense category. The Resilience Architecture Framework (Dr Elena Mamouni Limnios, 2011) ^[13], presents an innovative way to categorize organizational resilience by considering both the level of resilience within a system and the desirability of the system's state. This typology offers a fresh perspective on how to understand and evaluate resilience within organizations. The Architecture Framework is divided into four sub divisions which are sought through carefully, being in the direction of the adaptability quadrant, vulnerability quadrant, the rigidity quadrant, and transience quadrant, offering a new way to analyze the capabilities of the resilience system which is going to be presented to Company X.

The proposed framework seems comprehensive and insightful, as it addresses the multifaceted nature of organizational resilience and acknowledges its potential downsides. By incorporating a network perspective, the analysis offers a more holistic understanding of resilience within the context of organizational dynamics.

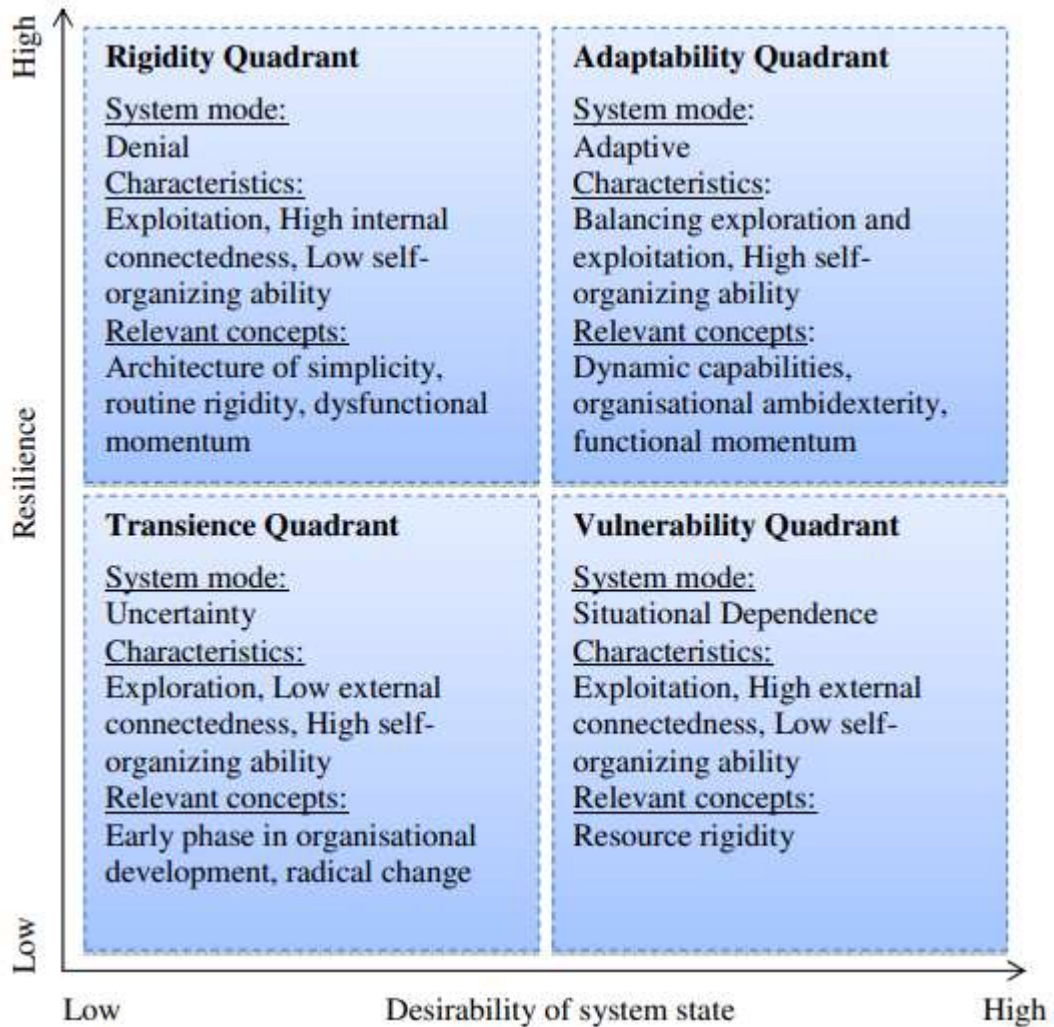


Figure 4. The resilience architecture framework

2.2.6 Difference between Avoiding and Managing SCD strategies

Supply chain disruption management and supply chain disruption avoidance strategies, are both critical aspects of ensuring the resilience and efficiency of supply chains, but they focus on different stages and approaches:

Supply Chain Disruption Management:

- Involves dealing with disruptions that have already occurred or are currently happening within the supply chain.

- It focuses on minimizing the impact of disruptions on operations, mitigating losses, and restoring normal functioning as quickly as possible.

- Strategies include rapid response mechanisms, contingency planning, alternative sourcing, inventory optimization, and effective communication with stakeholders.

Supply Chain Disruption Avoidance Policies or Strategies:

- These are proactive measures taken to prevent or minimize the occurrence of disruptions in the supply chain.

- The focus is on identifying potential risks and vulnerabilities in the supply chain and implementing measures to reduce their likelihood or impact.

- Strategies may include diversifying supplier bases, conducting risk assessments, investing in technology for supply chain visibility and transparency, developing redundancy in critical components or suppliers, and establishing robust quality control processes.

- Disruption avoidance aims to build resilience into the supply chain, reducing the frequency and severity of disruptions and enhancing the organization's ability to adapt to unforeseen events.

In summary, disruption management deals with handling disruptions that have already occurred, while disruption avoidance focuses on preventing or minimizing the impact of disruptions before they happen. Both are essential components of effective supply chain risk management.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Chosen research approach

The method used in this thesis is that of semi-structured interviews with open-ended questions. This give a better understanding of the strategies that are practiced by organizations of this caliber, interviews which help not only with the collection of data, but as well as the utilization of it. This methodology paves the way for a better understanding of their perspective. Another positive part of interview methodology is that a higher quality data is collected, since the possibility to focus on specific points and clarify them during the conversation is always there. Consequently, interviews contribute to enriching and improving the depth and precision of the gathered data.

The study methodology will encompass a thorough literature review, an analysis of the company's existing supply chain practices, stakeholder semi-structured interviews, and examination of successful supply chain resilience models. The thesis outcome will furnish Albanian companies, as well as “Company X”, with a pragmatic framework to fortify its supply chain resilience and enhance overall performance.

Three main methodological views, when analyzing a business, are represented as crucial (Arbnor and Bjerke 2009) ^[21]: analytical view, systematic view, and lastly the actor’s view. The approach can be taken from each of these sides, by starting with the examination of how each of these ways impacts the research process. By taking into consideration that the research topic is heavily unexplored, the chosen method will be that of a qualitative method.

Comprehending supply chain systems is very important in terms of being accurate in the calculation of total cost and to reduce the chances of a below target output level of results (Falk and Sanden,2021) ^[14]. Thus, when analyzing a supply chain, it is very important to perceive all the entities that are part of the chain, as an interconnected web, where each dot supports one another, in order to attain the desired image/result.

In addition, when choosing the right analysis methodology, it is crucial to evaluate the characteristics and objectives of the research topic (Falk and Sanden,2021) ^[14]. To further elaborate on this part, a distinction is made between four categories: descriptive, exploratory, explanatory and problem solving. This distinction contributes in choosing the right studying approach (Falk and Sanden,2021) ^[14].

The focus of this study is to analyze the supply chain resilience practices applied by “Company X” and private entities, when dealing with major supply chain disruption events, while creating a framework which can be used for the times ahead within these corporates. As explained above, taking into the consideration the exploratory characteristics of the study, a qualitative methodology is selected as the foundation of this research. The study places significant emphasis on the Company X generation of new theoretical insights, further reinforcing the selection of qualitative methodology. This method, (Bryman and Bell,2015) ^[15], is the main characteristic of a qualitative approach. The lack of objective theories also points the need for the study to shine back the social reality, which suggests that the information should stem from how individuals interpret and perceive things. A qualitative approach was valued to be more feasible than that of a quantitative approach, since in this scenario, a deeper insight is taken into to respondent’s experiences. Unlike the quantitative methodology, which is heavily relied on Company X generalizing amounts of data based on certain methods, the qualitative approach open war for a deeper delve of personal encounters.

When conducting unstructured interviews, an interview guide is usually used in order to structure the way that it is conducted. It is very important to keep in mind, that during the writing of the guide, questions need to align with the desired target, and not lead into biased answers. For example, it is worthy to use the word “How” instead of “What” when starting a question, a word which usually triggers defensive answers.

By using a continuous combination process, theoretical concepts are compared to empirical data gathered from the interviews in shine light into supply chain resilience strategies. It is important to note that this study did not choose a single path, but rather went back and forth with the answers, with theoretical framework transforming to empirical findings, as well as vice versa. By looking thoroughly empirical occurrences, case studies are able to output comprehensive understanding in aid of the theoretical framework.

Researching in a qualitative way, is usually perceived as subjective, meaning that question arise as to which extent the analysis maintains its objective focus. To answer this concern, this study is based on the principle where researchers have effectively separated their personal values and biases from the investigation.

3.2 Data collection methods

Data is collected through semi-structured interviews, having the main objective of receiving strategies which can be implemented in Albanian construction industry. These interviews lasted between 1 to 2 hours, being focused on the interview guide shown below (Figure 5, pg. 17), with the main results of the strategies suggested shown in the tabular form in Figure 8, pg. 24. The interviews were recorded, in order to analyze them at a later time, ensuring that no detail of any information received is not lost.

3.2.1 Interview guide

Interviews are divided into three categories, based on the purpose that they serve, where they can be included into the unstructured, semi-structured or fully structured branch. Unstructured interviews, give a far better freedom than any of the other interview types, where the interviewee is allowed to express his/her personal experiences, as well as contemplate on his/her events.

<u>Interview Guide</u>	
<u>Introductory questions</u>	<u>Thesis Questions</u>
<ul style="list-style-type: none"> -Introduction about the Master thesis -What is your role in Company X/MIE and how is it related to the construction industry? -How long have you been working in this position and in Company X/MIE? 	<ul style="list-style-type: none"> -Could you provide a brief overview of the supply chain processes involved in construction? -What obstacles are encountered within the supply chain? -What are the primary causes behind these obstacles? -Can you provide any instances of supply chain disruptions? -Does Company X/MIE employ any measures, frameworks, or digital tools to mitigate these disruptions? -Considering the unpredictability of some disruptions, how does Company X/MIE address them? -Are there any critical factors in managing supply chain disruption events?

Figure 5. Interview Guide

In order to make sure that none of the information received during the interview was lost, each interview was recorded, then transcribed into data information, with the final

goal of providing a case study based on each interview. To conclude, four case studies were produced based on the interview of each individual.

Experts in the field of construction which are related to the supply chain were chosen, with their position, number of years of experience, as well as field of expertise shown in the tabular form below (anonymity gives the individual being interviewed more freedom in his/her answers):

Candidate	Position	Experience (Years)	Field of expertise
A	"Project Manager (PM) at company X"	15	Having worked for almost all the big companies in Albania during his experience, his insight is very valuable, as to how Albanian companies have reacted during times of disruptions, and what strategies they could follow to quickly rebound from this situation.
B	"Planning, Budgeting and Head of control Director at company X"	8	Mostly involved in the budget cost control of projects within company X. His insight in the Albanian construction industry, related to the field of budget, cost, as well as procurement, is very important for the interview.
C	Head of Public Partner Partnership (PPP) department, in "Ministry of Infrastructure and Energy of Albania" (MIE)	9	Responsible for the contracts of PPP in Albania for construction of highways, dams, etc., from the initial phase of procurement, to the implementation of the contracts. The individual is well informed for the maneuvers followed by MIE in cases of disruptions.
D	Head of Procurement department, in "Ministry of Infrastructure and Energy of Albania" (MIE)	6	The insight of this individual is very important, since contracts of this sector are much more vulnerable to the disruptions (contractor company point of view), where the bidding offers are calculated with the coherent price of materials, having the objective of finishing the agreement as soon as possible. The scope of this interview, is to receive information on the strategies followed by the contracting authority (MIE) in cases of disruption, which can be paralleled to a company in Albania, as well as the lawful prediction of this situations in contracts.

Figure 6. Individuals which are interviewed, position, experience, field of expertise

3.2.2 Documentation Analysis

In addition to the data gathered during the interviews, a documentary analysis was undertaken. This methodology focuses on extracting information from company documents and reports, for ex. contracts which had to be re-formulated and signed due to the inflation caused by the Ukrainian war. When conducting documentary analysis,

it is essential to carefully consider the origin and the intended purpose of the documents, in order to assure their confidentiality.

3.3 Method of Analysis

The perception and analysis of interpretive data, (Gammerlgaard, 2012) ^[17], is one of the most important aspects of a qualitative study. In this research, the selected method, as stated above, is that of a qualitative one, while undergoing thematic analysis. This kind of analysis is widely used in case study reports, it's a procedure which follows a six-step process: (Braun and Clarke 2006) ^[18]

1. Familiarization: Developing a deep understanding of the data and becoming proficient in its content.

2. Coding: Highlighting significant portions of the text with color-coded labels to emphasize key points. This aids in pinpointing data related to specific topics. It's crucial to process all the data during this phase.

3. Theme Company X generalization: Sorting and categorizing codes into cohesive groups or themes. A theme might encompass several codes. During this stage, codes that are no longer relevant or mentioned infrequently may be omitted.

4. Theme review: Comparing the identified themes with the original data to ensure they accurately represent it and that the assigned codes are correct.

5. Theme definition and naming: Offering clear explanations and titles for the themes that have been identified, capturing their essence accurately.

6. Writing: examining each theme's significance and how often it appears in the discussion.

3.4 Moral Contemplation

In order to stay between the lines of moral/ethical considerations, each individual that was interviewed was asked for permission to use the data that was given by them during the interviews. Most of the data, in order to be part of the project, has been covered by substituting the private entity name with Company X, while, to part ways with the hesitation of giving straight forward answers from the persons being interviewed, their anonymity is kept throughout the end. Data, as well as recordings of

the interviews, were deleted with the approval of the thesis, in order to exclude any data breach that might happen to the company/MIE information, such as contracts with various suppliers before and after COVID (used to compare prices inflation), contracts with national contractors (used to overlook the prediction of supply disruptions), etc.

3.5 Timeline of research

In order to maintain a simple and effective structure, this research is divided into four phases, which are: initiation, preparation, implementation, and conclusions. This division of the thesis enabled organized research.

The first phase, that of initiation, was based on the pillars of familiarization with the structure and way of organization of Company X and MIE, and more importantly, studying any literature related to this field of study, focusing more on the Western Balkans study, since they are more closely related to Albania.

The second stage, that of preparation, was focused on planning the project research methodologies for the supply chain management and disruptions in this region.

The implementation phase holds the most weight of the project, being made of sub-stages, which include a literature review, followed by the interviews, and concluded with the analysis and interpretation of the data.

At last, we have the conclusions sector, where using the qualitative method from the interviews conducted with the stakeholders from “Company X” and MIE specialists, this sector was focused into three main bullet points:

1. Which factors caused disruption of the supply chain of Albanian construction companies? In order to create solutions, firstly the root causes of the disruptions need to be understood.
2. Based on the experiences of the individuals and literature review, what are the best strategies that can be followed, in order to avoid, as well as manage supply chain disruptions in Albania, which fit the reality of Albanian companies?

3. Creating a single framework which uses the strategies found, that can be implemented by most of Albanian construction companies, and most importantly fits the reality of the Albanian construction sector.

Suggestions for future studies are made, while the core of the thesis focuses on guiding Albanian construction companies on how to handle supply chain problems.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Framework for Albanian companies

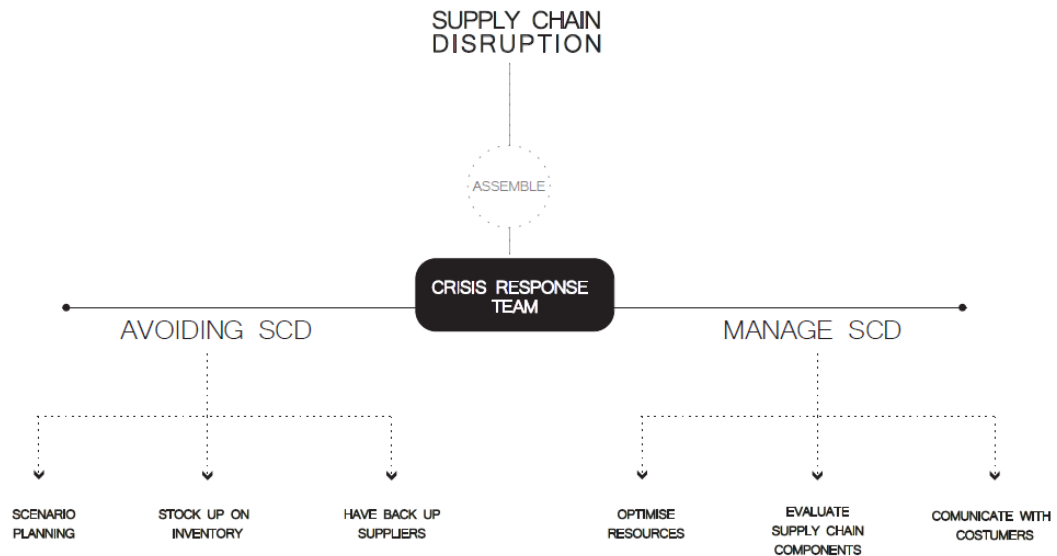


Figure 7. Supply chain disruption framework (Appendix pg.45)

The first imminent step, is that of creating an emergency team, where the team figures should be already selected, in cases of market crashes, or any kind of similar events. Competent personnel, with proper training and knowledge for this kind of situations, are very important if there is a need to deal with these types of supply chain disruptions. It is this team, that based on their experiences, judgement and constructive planning conversations, can make choices based on their position, whether to avoid (if in time), or manage the crisis once it has already grasped the company. After deciding whether they need to go in the managing, or avoiding direction, the team shall choose on the suggested scenarios, or a combination of them. The core of this study is expressed in the framework shown above, on how Albanian construction companies should react in cases of supply chain disruptions.

One of the findings during the interviews, was that having a crisis team in cases of disruptions, was a very good strategy to ensure the resilience of the supply chain. This finding came as a result of companies lacking this sector, which resulted in them being vulnerable to the recent market oscillations, such as the war in Ukraine and Covid 19.

Having a broad diversity in terms of the operational roles that the individuals have in the organizational level of the company, has a heavy role in the success of challenges facing the global market, since various perspectives, as well as experiences of the members, can help in decision making during this type of crisis. The main reason of having crisis teams, is to have individuals, who can deal with specific situations. This capability empowers organizations to recognize risks and their potential consequences, producing a tailored response. Moreover, involving representatives from different operational sectors of the organization in the emergency response team enables the incorporation of insights from various channels, thereby facilitating well-informed decision-making processes.

Regular communication between the individuals of the company is mandatory, since the diversification of the team members itself, is in conjunction with different events experienced by them. Having regular meetings, allows the team members to identify these risks and create an appropriate response. This kind of managing strategy is closely related to the flexibility of the company during times of disruptions. This trait enables teams, thus the company, to adapt to diverse situations, with strategies that are tailored by teams made of diverse individuals in terms of construction experience.

Crisis teams should receive support from all levels of the organizations, and most importantly, the shareholders. With the lacking support of the leading individuals, as well as employees, crisis teams may lose their decision-making ability. The capability is heavily defined by the universal support within the company. It is very important for the members of the supply chain to exchange information regarding the chain itself, and be willing to support one another. Crisis teams, are specifically more important during the recovery phase of the company, where resource optimization is the main scope. As a result, crisis teams need to be created before the disruption occurs, in order for the team to be involved throughout its evolving stage.

Albanian companies faced significant challenges in their construction supply chain, particularly with material and labor flow, as well as new challenges that were imposed by the Ukraine war and the COVID-19 pandemic. The study suggests taking a holistic approach to supply chain resilience and advises Albanian companies to adopt the above strategies to address these challenges.

Supply chain strategies recommended in order to make the supply chain more resilient.				
	Interview #1	Interview #2	Interview #3	Interview #4
Scenario planning		X	X	X
Stock up on inventory	X			
Having-back up suppliers	X	X		
Evaluating supply chain components		X	X	X
Relationship with suppliers/Communicating with costumers			X	X
Optimizing resources	X	X		X

Figure 8. Suggested strategies to make the supply chain in Albania more resilient (Appendix pg.44)

4.1.1 Avoiding SCD: Scenario planning

One of the main strategies in order to manage any disruption of the supply chain, is that of scenario planning, a great method to manage risks and disruptions. The essence of scenario planning, is that they are potential future events characterized by uncertainty, each with its own set of assumptions and possible outcomes. In extension to the concept, key points to analyze when studying scenario planning are interconnections, drive forces, and relationships that may impact the scenario itself.

The point of scenario planning is to help people understand different situations and lessen the effects of the disruption. Nevertheless, the goal isn't to find a solution for every scenario, something that is rather impossible to do, but to get managers and decision-makers thinking about important issues and give them a better idea of tough situations.

In order for any scenario planning to have the positive impact it is ought to have, a glass-through transparency is required by the contractors/suppliers. This clarity is needed as one of the main methods to create a good strategy, starts by communicating with the suppliers itself, assessing their answers, then coming up with a concrete plan. The contractors/suppliers are asked to come up with their own plan, which are compared in order to generate the best solution and create a better understanding of the situation.

It was noticed during the interviews with Company X, that an emergency team made of experts to suggest solutions was not created, during Covid19, or Ukraine war. Rather, each department had to make its own “maneuvers” and make sure not to dive into the spirals created by the massive disruptions at the time. As stated before, is rather impossible to have strategies for each hypothetical situation, but by making a generalization of actions needed to be taken by Company X, the risks caused by market changes, could be reduced by being ready for generalized situations. Since market crashes are proven to be problematic for the labor and material flowability of constructions projects, they add to the importance of having strategic plans on how to manage. These types of scenarios/plans, will only strengthen the ability of Company X to rebound from market crashes.

Even though the capacity to bounce back relies on reactive strategies, employing scenario planning as a tactic at Company X/Albanian companies, could facilitate a more proactive approach to risk management. Consequently, the risk stemming from the lack of raw materials and component shortages intensity could be reduced. Companies must take proactive measures to ensure a stable supply, positioning itself at the forefront. This underscores the suitability of scenario planning as a strategy for Company X. In summary, scenario planning has the potential to bolster Company X's resilience in various aspects.

4.1.2 Avoiding SCD: Stock up on inventory

When considering stocking up on inventory as a strategy to mitigate supply chain disruption, it's essential to dive into the nuances of this approach. This strategy involves holding higher-than-usual levels of inventory to act as a buffer against potential disruptions in the supply chain. While it can offer certain advantages, it also presents challenges that must be carefully weighted.

One of the primary advantages of stocking up on inventory is its ability to provide a buffer against short-term or long-term disruptions. By having excess inventory available, businesses can better absorb the impact of unexpected events such as delays in supplier shipments, transportation, or sudden spikes in demand. This buffer allows operations to continue more smoothly, minimizing disruptions and maintaining continuity in supply to customers. As one example was shown in interview #1, when

Covid19 Restrictions got announced, the price of Steel jumped from 600 Euro/Ton to 850 Euro/Ton. Right after receiving the new prices, Company Z started to look for new suppliers in the external market (at the time, their main supplier was Kurum, internal market supplier), and got offers from various countries. When the company received an offer of 570 Euro/Ton from Ukraine, they immediately ordered steel for the project in hand, which was a school by UN at the time (important to note that deadlines are very important in international tenders). The supplier from Ukraine noted that the amount of Steel that they could send, was a minimum of ten times the amount ordered by Company Z. Being in a situation like this, Company Z decided to apply for a bank loan, and ordered steel for 5 projects that were currently in constructions, as well as for the next 5 projects, since the price for their enquiry was even lower than the pre covid era. This radical/risky action turned in their favor, for two years later, the war would increase the prices to 1200 Euro/Ton, and many Albanian companies would shut down their construction processes, but not company Z.

Furthermore, maintaining higher inventory levels can help sustain customer service levels during periods of disruption. To continue on the example shown below, if the UN school would not finish in time, company X would have a hard time, not to say impossible, to even compete on any other international tenders. With surplus stock on hand, companies can continue fulfilling customer orders even if there are disruptions upstream in the supply chain. This helps uphold customer satisfaction and loyalty, safeguarding the reputation of the business in the long run.

Moreover, having surplus inventory offers flexibility in production planning and execution. It allows companies to adjust production rates or respond promptly to fluctuations in demand without being overly constrained by supply chain disruptions. This flexibility can be invaluable in meeting customer needs and optimizing operational efficiency.

4.1.3 Avoiding SCD: Have back-up suppliers

In the everchanging construction world, which is prone to disruptions, including natural disasters, transportation challenges, labor shortages, etc., having back-up suppliers emerges as a strategy for safeguarding it against unforeseen obstacles and ensuring operational continuity. This is related to the flexibility of one's supply chain,

meaning that a company, under a supply chain disruption, can be flexible with choosing its suppliers, to the one which better fits the situation. The importance of flexibility in building resilient supply chains should be emphasized, since it is this flexibility that enables organizations to effectively manage changes and challenges stemming from uncertain events by employing adaptable responses. This also ensures that the suppliers themselves keep a certain competition in order not to lose their spot as the main suppliers.

Diversification of risk: Central to the concept of backup suppliers is the principle of risk diversification. Relying solely on a single supplier exposes construction firms to considerable vulnerability. Any disruption, whether it's a factory shutdown, shipping delay, or quality issue, can transform into project delays and cost overruns. By cultivating relationships with multiple suppliers, firms can spread their risk across different sources, thereby minimizing the impact of any one supplier's failure.

Continuity of supply: Backup suppliers provide a safety net by offering alternative sourcing options. In the event of a disruption affecting the primary supplier, having secondary or tertiary suppliers in place ensures continuity of supply. Whether it's sourcing materials locally or tapping into global networks, the ability to substitute to alternative suppliers reduces downtime and keeps construction projects on track.

4.1.4 Managing SCD: Evaluating supply chain components

According to the interviews of individuals who work at Company X, as well as MIE procurement sector, it was noticed that the problems which resulted in complete work shut down and budget overrun costs, came as a consequence of lacking a clear view of the supply chain. Increased visibility of the supply chain, can assist in foreseeing the problems, thus, reducing the risk of them happening.

As for example, in one of Company X projects, the façade was decided to be fully made of glass and aluminum components. This job was contracted to Company Z, which ordered the glass system from an Italian company (highly specific closed system, ready to be mounted to aluminum components), while the material of aluminum was received through various local suppliers. When Covid 19 hit, Italy decided to shut down its factories, leaving company Z with no supplier when it came to the glass system, while aluminum supply chain continued to flow perfectly. For all

that Company X was interested, this job was contracted to Company Z, thus, the supply chain was not fully evaluated. Nevertheless, this caused a one-year delay to the project timeline, a delay which could have been avoided if Company X had evaluated the supply chain correctly, by having a backup supplier in times of emergency, or using any of the strategies mentioned above.

Another aspect which was noted during the interviews, with both research subjects, is that Covid19 and the Ukraine war are seen as very rare events, with MIE and Company X focusing in a particular case, and not the whole phenomena of a disruption. Even though Company X has the ability to gain detailed information from its contractors about their supply chain, it's the ability to process this data that makes a difference to a reliable supply chain of resources. This can happen by creating a specific structure within the organization, which deals with strategies about important target groups of suppliers, such as the ones of cement, steel, bricks, gypsum, etc.

Supply chain mapping is a suggested method in order to avoid these heavy disruptions, as well as lacking of raw materials. This method typically involves categorization in three tiers. Firstly, Tier 1 suppliers constitute those directly providing goods or services to a company, representing the immediate link in the supply chain and posing a direct impact on operations. Following this, Tier 2 suppliers serve goods or services to Tier 1 suppliers, thereby indirectly influencing the company's supply chain dynamics. Lastly, Tier 3 suppliers are positioned further downstream, serving to Tier 2 suppliers and adding the overall complexity of the supply chain network. By describing and analyzing these tiers, companies can gain insights into the complexity of their supply chains, enabling them to identify risks and develop strategies for enhancing resilience and efficiency.

4.1.5 Managing SCD: Relationship with suppliers/Communicating with costumers

During the interview with one of the individuals from Company X, it was noted that one of the risks, which resulted in shortage of materials, as well as risking the work fluidity, was the bad relationship with the suppliers. The resilience can be increased by investing in the relationship with the supplier, in the sense of implementing concrete strategies.

A good relationship with the suppliers, even clients and shareholders, starts by a good communication. Communication strategies are often initiated by having a good supply mapping of the contractors, with their chain being transparent and visible to the contracting company. Any withholding of the information from the contractor can lead to problems quickly escalating to much bigger issues. The main goal of this whole process, is making sure that both parties are working towards the same goal, sharing their thoughts of how the mutual objective can be achieved in a more feasible way.

During the interviews, it was noted that Company X has a certain approach towards this matter. Strategic partnerships, with preferable subcontractors are one of their traits in relation to this subject. For ex., for specific areas of work, Company X prefers to use (sub)contractors that have worked with them for more than 20 years, rather than choose other/new contractors, who may even offer to fulfill their contract for a smaller weight on Company X's budget. By having years of collaboration, Company X has created a direct and honest line of communication with its contractors, which paves the way for efficient decision making, and most importantly, information sharing. On the plus side, this strategy helps by sharing the risk between Company X and its suppliers/contractors, where both parties take part in the planning of works, as well as QA/QC. Nevertheless, this strategy is not used in all areas, where it needs to be noted that their range of works varies from civil works, to highways, dams, bridges, etc. Even though it was noted during the interviews that Company X is helpful to its contractors, there is still place for improvement.

A bad relationship with a contractor can lead to budget expenses, delays in the construction graph, but most importantly, it can result into contractors following their own schedule of works, according to their own interest. For ex., after a worsening of the relationship between parties, at site X, one of the façade contractors chose to follow their own schedule of works. At this particular case, 90% of the profit for the contractor, consisted on placing the glass, and only 5% in the finishing elements, application of silicone. After the relationship was practically broken, the contractor refused to continue with the finishing process, and continued with the glass placement only, which resulted in problems with water insulations for Company X, and stoppage of payments in relation to the subcontractor. If a certain communication strategy had existed between the two parties, this problem would not exist in the first place.

Having more commitment to suppliers, by taking more responsibility with the raw materials, could help Company X not only with the relationship of their contractors, thus sharing their risk, but also have the company more prepared in the case of a material shortage in the near/distant future.

The relationship with suppliers can be adjusted by reviewing the contracts with the suppliers. As seen by the experience of MIE, there are two cases when the contracts should or should not be adjusted. In the cases of public-private-partnership (PPP) when it comes to SCD, it seems that MIE's approach to providing assistance in times of need to PPP contracts, is almost non-existent. They see this type of contract as a business, where companies agree to build something with their own budget, with the target of using it for an average of 30 years, expecting their return of investment (ROI) plus profit. In the cases where this profit is not achieved, the government of Albania, through MIE, intervenes by securing a minimum value of ROI for the contractor, in order to ensure that the expenses, in the worst-case scenario, will equal the investment. Even if there are supply chain disruptions, the total length of these contracts in terms of construction + operation is totaled to decades, so MIE is reluctant to make any changes to the signed contract with the companies procured. Their contracts predict only Facilitating Conditions and Major Forces, with the later not being applied in the history of democratic Albania as of yet.

Regarding open procurement procedures, as expressed by individuals interviewed from MIE, the later was more sensitive towards SCDs. As seen during the Ukraine war, many companies in Albania started to shut down the construction sites, since the prices of the materials that the bid was initially made, increased by doubling/tripling its price. It was at this time that MIE decided to intervene by reviewing the prices of each ongoing contract already procured, resulting in contractors bouncing back from the disruption, continuing their work effectively. Even though the cost was increased, both parties were stratified in the end with the results, since the disruption was unable to stop the works of the ongoing procured contracts.

4.1.6 Managing SCD: Optimizing resources

Resource optimization involves efficiently managing and utilizing available resources to achieve maximum output and value while minimizing waste and inefficiencies. In the context of supply chain resilience disruptions, resource optimization focuses on maximizing existing resources effectively to mitigate the impact of disruptions and maintain operational continuity. This method includes:

Maximizing Efficiency: Ensuring that resources such as labor, materials, and equipment are used efficiently to meet demand and fulfill orders despite disruptions.

Allocating Resources Strategically: Prioritizing the allocation of resources based on critical needs and high-priority activities to minimize the impact of disruptions on essential operations.

Balancing Supply and Demand: Optimizing inventory levels and production capacity to align with demand patterns and supply constraints, thereby reducing the risk of shortages or excess inventory during disruptions.

Adopting Lean Principles: Implementing lean manufacturing and management principles to eliminate waste, reduce lead times, and improve overall operational efficiency, making the supply chain more agile and responsive to disruptions.

Investing in Technology: Leveraging advanced technologies such as data analytics, automation, and predictive modeling to optimize resource utilization, enhance decision-making, and identify opportunities for improvement within the supply chain.

Enhancing Collaboration: Fostering collaboration and communication among supply chain partners to share resources, information, and best practices, enabling a more coordinated and adaptive response to disruptions.

The objective of optimizing the supply chain is to reduce production, storage, and transportation expenses in order to maximize profits. It also helps balance the demand and supply by using technology to create a safety net at the lowest possible expense. It tackles tricky issues like not having enough infrastructure, lacking resources, high costs, changing demand, not having a steady and affordable supply, distorted prices, and not having enough rules and funding.

In supply chain resilience planning, simulation and mathematical models are created to handle disruptions by optimizing solutions. Simulation helps simulate how the system would react to disruptions as they happen in real life. There are various methods online, as well as endless studies on the methods which can be selected by the experts hired in this field of interest.

4.2 Results comparison to other studies

The results of this study consist on a applicable scheme for Albanian companies, where they need to rely mostly on their existing organizational structure. The analysis of past events, as well as the strategies suggested can help them create a clearer idea of the steps they need to take in cases of supply chain disruptions in the future.

Comparing these results to other studies, a difference is stated in terms of the generalization that the other studies are done. Albania's economy features a wide spectrum of construction companies, with several big private companies which are well structured, continuing with numerous small private companies directed by a limited number of people, and even public-private owned companies. Having a wide spectrum in terms of companies' structure for such a small country, highlighted the need to focus directly on the individual experiences of stakeholders with several years of experience in this sector. With that said, the study focuses solely on Albanian companies, differentiating its viewpoint from several studies which are focused on the western Balkan, or more generalized in terms of geographical viewpoints (such as Balkan states, eastern Europe, etc).

Having an economy where onshoring is seen as a distant opportunity (requires large human and financial capital), as well as advanced technologies requiring intensive staff training (as suggested by several articles to decrease the risk sector by usage of various software), the usage of suggested scenarios by the help of a single framework is seen as a more practical solution, based on the economic conditions of the state of Albania. The application of this framework can be done by using the existing structure of stakeholders in the company, relying on their experience, in difference to large investments required by the proposed solution of other studies.

CHAPTER 5

CONCLUSIONS

5.1 Supply chain disruption factors

After the interviews were conducted, this study was able to identify two factors which cause the disruptions in the construction supply chain;

1. Material flow
2. Labor flow

Material flow is part of external factors, since Albania mostly imports its raw, basic materials while the problems caused by labor flow, have their genesis in the internal factors.

In the case of MIE/public entity, since its role is only to contract and oversee projects, it was noticed that a disruption of material flow to its contractors was the only main problem. In the case of private entity, the labor flow, as well as the material flow are two factors, both of which concern companies in this sector.

These obstacles have been intensified in the last few years by two major events, that of Covid 19, and Russia-Ukraine war, which resulted in a worldwide massive inflation. During this chapter, a description of the challenges that were experienced by the individuals being interviewed will be made, as well as scenarios of measures that were taken by them, or the company that they work/worked for.

5.2.1 Covid 19 impact (SCD events)

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, emerged in December, 2019 in Wuhan, China. It rapidly spread worldwide, leading to millions of infections and deaths, overwhelming healthcare systems and triggering unprecedented societal and economic disruptions. Efforts to control the virus included lockdowns, vaccination campaigns, mask mandates, and social distancing measures, with varying degrees of success and challenges across different countries and regions.

Albania implemented a series of lockdown measures in response to the COVID-19 pandemic. These lockdowns were not consistently strict throughout the entire duration but varied in intensity based on the severity of the situation and government directives. Like many other countries, Albania experienced waves of lockdowns, with restrictions being tightened or loosened in response to changes in infection rates and other factors. As expressed by the respondents, the first major hit came in the sector of material flow. With countries forcing lockdowns worldwide, (Albania being in the last European countries to do so) factories started to shut down their production process, leading to major disruptions. These disruptions came in the form of inflation, since the offer started to decrease, with production gradually decreasing to the point of total factories shut down.

Albania, being highly dependent on the external market, saw a high increase in construction material cost, most prominently, steel. For example, the day that China started to impose the restrictions, as expressed in interview #1, steel in Albania, jumped from 600 Euro/Ton to 850 Euro/Ton in the margin of 12 hours. With an increase of 42% in price in one of the most important materials in the construction industry, Albanian companies were stranded. “Big companies”, which had the financial ability to continue the construction process proceeded to do so while taking a huge economical hit, with most of the small companies putting the RC works on hold.

The lockdown inflation effects, were not exclusive to Steel, but continued to the whole range of construction materials, such as cement, gypsum, etc. The transportation sector took a hit as well, where, as expressed by “The United States trade commission” on transportation personnel, the high rates of infection among the port workers, caused a global insufficiency in the number of cargos that could move to, and from ships. The material flow problems ranged from the transportation and logistics, to the financial side, led by soaring prices.

The disruption of labor flow was another major hit, with workers being forced to stay inside their homes, basically locking down the construction industry, with it being a highly active “on-site” profession. One of the measures taken by the government, was to not allow any visitors during that period of time, leading to missing workers coming from other countries, causing a major gap in their field of expertise. With people being

isolated for weeks, soon as they discovered that they were infected, working hours being reduced to a maximum of 4, any for many minor reasons, the disruption in labor flow became evident, and weighted heavily in the company shoulders.

5.2.2 Russia-Ukraine War (SCD events)

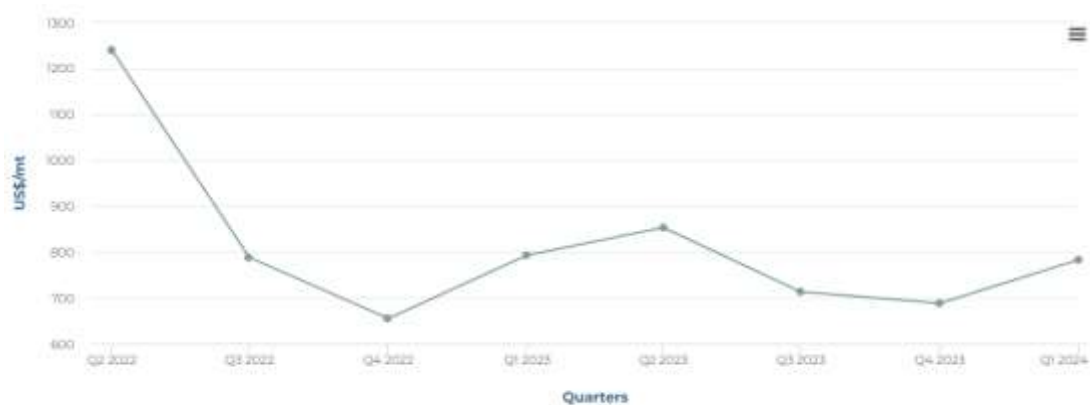
Europe's dependence on Russian steel has been a significant aspect of its industrial landscape. With Russia being one of the world's largest producers of steel, many European countries have relied on imports from Russia to meet their steel demands, including Albania.

However, the Ukraine-Russia war has disrupted this reliance and subsequently increased the price of steel in the construction industry. The conflict has led to geopolitical tensions, sanctions, and trade disruptions, causing uncertainty in the global steel market. As a result, European countries have faced challenges in sourcing steel, leading to shortages and price hikes. These increased costs have challenged the construction industry, impacting projects' budgets and timelines, and most importantly, creating material flow disruptions in the global supply chain.

To continue in the terms of steel comparison, after the Covid restrictions were removed, prices of steel started to return back to normality. At 20th of February 2022, Russia started the invasion of Ukraine, with both being in the top 5 steel exporters in Europe. This caused a significant increase in prices of steel, where the normal price pre-covid was 600 Euro/Ton, the war soared it up to 1250 Euro/ton. When it comes to cement, as stated by “Euronews Albania” on 17/05/2022, the prices went up 45%, from 66 Euro/100kg to 148 Euro/100kg, while for bitumen, the price increased by 21%.

Albania has some factories to support its own market, such as Kurum, which produces 700.000 tons of steel per year, various cement factories spread all over the country, as well as limestone and is rich in sand. Nevertheless, these capacities do not cover the market demand, with Albania being forced to import large amount of steel and cement per year, ranging at 160.000 tons of cement per year, and 100.000 tons of steel per same period of time. Importing this large numbers, can only be translated to dependence on the global market.

Since the sanctions imposed by UN took over the Russian business, more than 25% of steel has been removed from the European market, leading to an increase in prices as shown below. This upward price-tag fashion, which followed all the construction materials, increased the cost of Design-Build procedures in all areas of the industry, with the prices being reluctant to fall, never the less return back to pre-Covid values, even when the cost of raw material fell.



This chart displays Steel (Europe) [US\$/mt] from 2022 to 2024.

Figure 9. Steel price from Q2 2022 to Q1 2024

As shown on the graph in Figure 10, during Q1 of 2024, the steel price is standing at its new normal values, around 800 Dollar/Ton, falling by more than 50% from the Q2 of 2022, (Russia-Ukraine war start period). During Q2 of 2022, a huge increase in prices of the housing market was seen in Albania, where, as stated by Bank of Albania, the increase during Q3 of 2022 for Albanian housing market prices was at 18%. It was during this time that the Union of Civil Construction informed the public that the increase of steel prices, as well as cement, were the main factors behind the price increase phenomena.

As of Q1 2024, prices of raw materials are more than 40% cheaper than what they used to be before the war, but the housing market has known only the upward trend since the Covid 19 ending in 2021, reflecting the refusal of the market for the prices of end products to go back to “normal” values, once the period of disruptions is over (as of the first 6M of 2024, the housing market has increased its prices by 30% compared to 2023, source: Bank of Albania).

5.2.3 High demand in housing/ shortage of workforce (SCD events)

In recent years, there has been an increase in demand for the purchase of apartments and villas in Tirana and coastal areas by foreigners. This trend is driven by several factors:

- Growing tourism: Tirana and coastal areas have become increasingly popular destinations for foreign tourists, especially following the liberalization of the market and increased promotion of the city and tourist attractions both domestically and internationally.
- Rising foreign investments: Foreign investors have identified Tirana and coastal areas as favorable locations for various investments, including the acquisition of real estate such as apartments and villas for investment purposes or permanent residency.
- Expansion of new developments: Tirana and coastal areas are experiencing rapid urbanization and infrastructure development, making them more attractive to foreigners seeking opportunities for property acquisition.

These factors have pushed prices and demand for apartments and villas in Tirana and coastal areas, particularly in the most sought-after and developed areas. As stated by Bank of Albania, a total of 1.33 billion euros (Altax,2023) ^[22] have been invested in the real estate market by foreigners, which is 12.8% of the total of 10.38 billion Euros from foreign investment in Albania during 2023.

This high demand is accompanied with a blooming era in the construction industry. With imports of steel, cement, and many other materials, increasing yearly by 10%+. In Tirana construction sites are almost everywhere, in Durres Yacht Marina, a 1-billion-dollar investment is being implemented, while Vlora Marina, and many other luxurious projects in Dhermi, Shengjin, etc, are working as the backbone of the Albanian economy.

A surge in this sector, has resulted in high demand of construction workers, from carpenters, steel workers, electricians, to engineers and architects, etc. Despite a robust demand for construction projects driven by infrastructure development and real estate investments, the labor market faces a critical shortage of skilled workers. This shortage

can be attributed to the emigration of Albanians seeking better economic opportunities abroad, resulting in a drying workforce pool. As a consequence, the construction industry is challenged with labor flow, in the form of shortages, delayed project timelines, and increased labor costs. During 2021 in Albania, 42000 people chose to migrate, while in 2022, 46000 left the country (INSTAT 2022) ^[23]. Most of these individuals, hold a certain degree, and chose to offer their knowledge outside of the country, thus leaving a continuing whirlpool in the construction labor market, an industry which relies heavily on the experience of its workers.

5.2.4 Infinite waste, Finite resources (SCD events)

With finite resources and infinite waste, the construction industry stands in the brick of an environmental disaster. As calculated by EPA, in construction sites all over the world, an average of 30% of total materials that are delivered to a construction site, and up as waste, totaling to a medium of 16.55 kg/m² (Mahayuddin) ^[24]. But how can these materials effect the resilience of supply chain in a simple construction company?

With an endless spectrum of materials that are required to build a construction project, ranging from materials, to labor and equipment, the occurring waste (which can be cause from overordering, inefficient processing, or even reworking), it can affect the utilization of these resources.

Waste can greatly increase the construction project overall cost as well, with bigger projects, such as infrastructure, or big residential complexes (recently trending in Albania), being at higher risk. As expressed in the study of Open corporates Albania, December 2016, titled “Studimi i fizibilitetit zona e trajtimit të mbetjeve tiranë - z.t.m.t’/ “Feasibility study of waste management areas in Tirana”, the total cost for waste disposal in Albania is calculated to stand at 29.05 Euros/ metric ton (OCA, 2016) ^[25], while the Builders Association, as of February 2024, addressed the Municipality of Tirana for the high cost of 7 Euro/ Metric ton for soil, ordered to be paid in the Landfill of Tirana. With construction projects everchanging, according to the client needs (following the trend of foreign investors in Albania), the cost of one project can greatly overrun the initial budget.

Time delays, where waiting for additional materials as a result of overordering, redoing finished tasks, or even dealing with inefficiencies to the workflow (for ex. using the excavator and trucks to send the waste to landfills, where instead they can be used to continue the scheduled tasks), time delays can thrive through the entire supply chain. The mentioned delays can impact the supply chain resilience, by diminishing the company efforts to strengthen the chain in this direction.

Supply chain complexity of waste management and disposal, only contributes to the complexity of a construction project workflow, by adding extra steps to the works schedule. Added complexity, only increases the risk of vulnerability to disruptions, as the managing of materials only becomes harder to be dealt with efficiently.

The environmental footprint impact that construction waste has, is of significant importance. Regulatory changes forced by the government or its institutions, as well as society pressure to reduce the environmental footprint, can disrupt the supply chain, if they are not aligned with practices regulated by law. Failure to adapt to the aforementioned changes can undermine the resilience of the supply chain by exposing it to regulatory risks, or even reputational damage to the companies.

To enhance the resilience of the supply chain in the construction industry, stakeholders of Albanian companies should shift their focus on reducing waste through efficient resource management, adopt to the latest waste construction practices, and promote sustainable construction materials or methods. By minimizing waste and optimizing processes, the construction industry can build a more resilient supply chain capable of adapting to various disruptions.

FUTURE RESEARCH SUGGESTIONS

During the making of this research, it was noticed that companies in Albania lacked the use of any type of technological aid when it came to procrastinating or strategizing the future possible situation of disruptions. Taking a deeper dive into the software opportunities which aid in cases of disruptions, and their application field, in conjunction with Albanian companies' capacity to use this software aids, would be a good area of interest.

Even though a careful analysis was conducted on the supply chain, a narrower focus point would be that of analyzing specific supply chain components, resulting in improved areas for specific supply chain elements. For ex. conducting a specific study when it came to the supply of steel or cement, since they are the backbone of the construction industry.

This study was mainly focused on companies which mainly contract or subcontract various suppliers, when another point of view would be that of the suppliers themselves. Studying the thesis from their point of interest, and going into detailed interviews with them, could widen the spectra of results and solutions.

Since there are many technical solutions for supply chain disruptions, it would be of assistance to look at each solution mention above in the mathematical/ business cost point of view. An output of the opportune cost for each alternative would be of assistance as well. This whole process would create an accurate cost of what each solution alternative would be valued at.

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APPENDIX

Interview protocol and questions (semi-structured interview)

Name Surname:

Role in Company X or MIE:

Would you like to keep anonymity:

Information about the thesis:

-Purpose of the study:

-Defining supply chain, supply chain resilience. Creating a framework for Albanian construction companies in times of disruption.

-Scope of the study:

- What are the factors that affected/affect the supply chain in Albanian construction industry? How can Albanian construction companies create a more resilient supply chain, or react in times of disruption?

-Purpose of the interview

-Receiving information on how MIE/Company X have reacted in times of disruption. What procedures did they follow, and what were the results. What suggestions do the individuals have, in order to create a more resilient supply chain, based on their past experiences?

Interview Guide:

Introductory questions (Phase 1):

-Introduction about the master thesis.

-What is your role in Company X or MIE and how is it related to the construction industry?

-How long have you been working in this position in Company X or MIE?

Thesis questions (Phase 2):

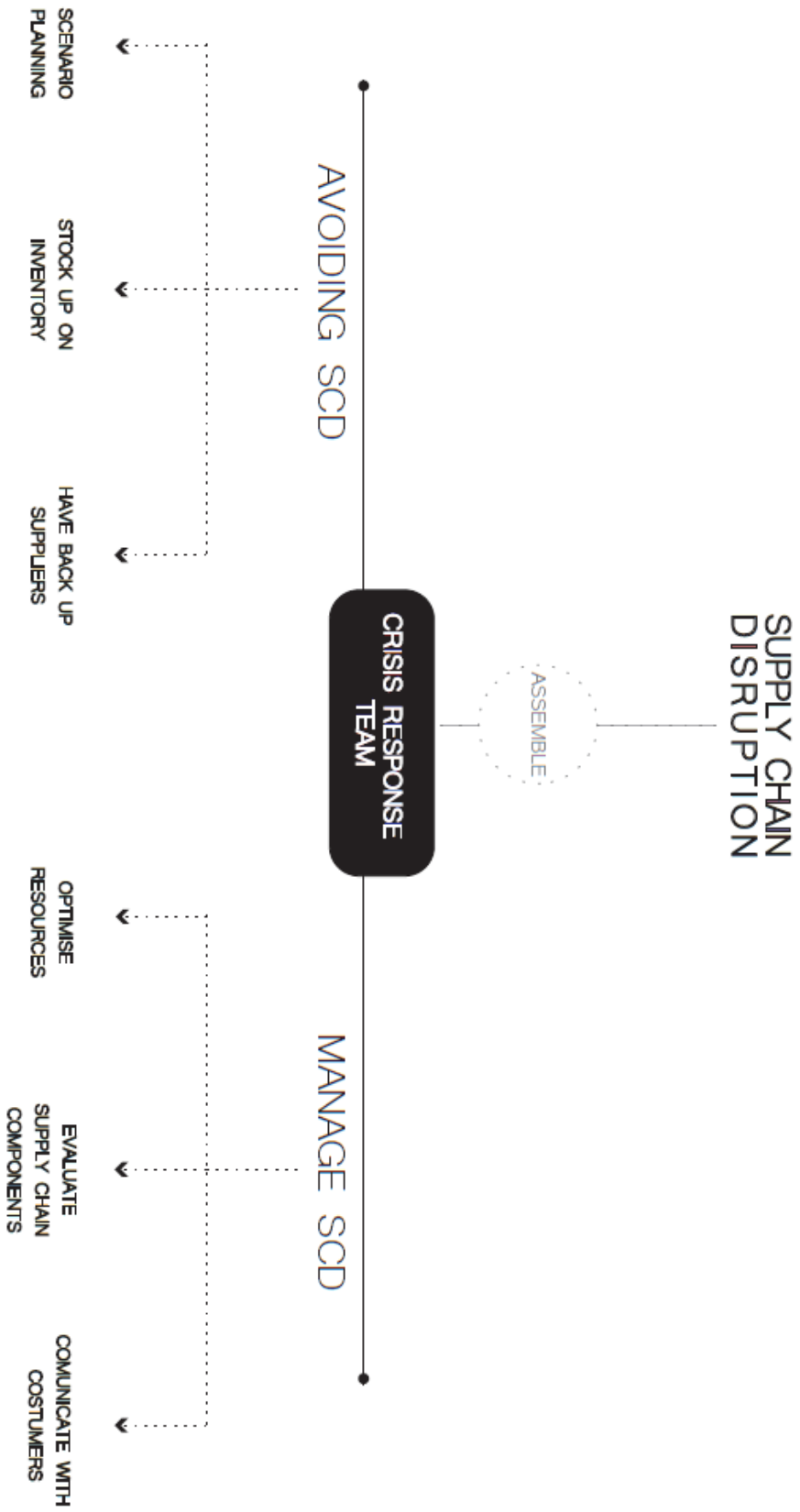
- Could you provide a brief overview of the supply chain processes involved in construction?
- What obstacles are encountered within the supply chain?
- What are the primary causes behind these obstacles?
- Can you provide any instances of supply chain disruptions?
- Does Company X or MIE employ any measures, frameworks, or digital tools to mitigate these disruptions?
- Considering the unpredictability of some disruptions, how does Company X or MIE address them? Does the contracting entity foresee special disruptions conditions in the initial procurement contract?
- What are the main factors that have cause disruption of the supply chain construction industry? Are there any critical factors in managing supply chain disruptions?
- Based on your past experiences what do you think are some measures that should be taken, in order to avoid/manage SCD?

Interview answers expressed in tabular form:

Supply chain strategies recomondned in order to make the supply chain more resilient.				
	Interview #1	Interview #2	Interview #3	Interview #4
Scenario planning		X	X	X
Stock up on inventory	X			
Having-back up suppliers	X	X		
Evaluating supply chain components		X	X	X
Relationship with suppliers/Communicating with costumers			X	X
Optimizing resources	X	X		X

Strategies recommended to make the supply chain more resilient, figure used in pg.23

Framework for Albanian Companies, used in page 21:



Individuals who are interviewed, Candidate, Position, Experience in years, Field of expertise. Used in pg18:

Candidate	Position	Experience (Years)	Field of expertise
A	"Project Manager (PM) at company X"	15	Having worked for almost all the big companies in Albania during his experience, his insight is very valuable, as to how Albanian companies have reacted during times of disruptions, and what strategies they could follow to quickly rebound from this situation.
B	"Planning, Budgeting and Head of control Director at company X"	8	Mostly involved in the budget cost control of projects within company X. His insight in the Albanian construction industry, related to the field of budget, cost, as well as procurement, is very important for the interview.
C	Head of Public Partner Partnership (PPP) department, in "Ministry of Infrastructure and Energy of Albania" (MIE)	9	Responsible for the contracts of PPP in Albania for construction of highways, dams, etc., from the initial phase of procurement, to the implementation of the contracts. The individual is well informed for the maneuvers followed by MIE in cases of disruptions.
D	Head of Procurement department, in "Ministry of Infrastructure and Energy of Albania" (MIE)	6	The insight of this individual is very important, since contracts of this sector are much more vulnerable to the disruptions (contractor company point of view), where the bidding offers are calculated with the coherent price of materials, having the objective of finishing the agreement as soon as possible. The scope of this interview, is to receive information on the strategies followed by the contracting authority (MIE) in cases of disruption, which can be paralleled to a company in Albania, as well as the lawful prediction of this situations in contracts.