Evaluation of Business Continuity Management

A case study of disaster recovery during the Covid-19 pandemic

Authors

Filip Nilsson	M.Sc. in Mechanical Engineering	Lund University
Fredrik Tegström	M.Sc. in Industrial Engineering and Management	Lund University

Supervisors

Andreas Norrman	Professor	Lund University
Anonymous	Former Assistant Risk Manager	The Company

Department of Industrial Management and Logistics
Division of Engineering Logistics
Faculty of Engineering, LTH
Lund University

Acknowledgement

This thesis was conducted at the Division of Engineering Logistics at the Department of Industrial Management and Logistics, Lund University, Faculty of Engineering (LTH). Furthermore, the thesis was conducted at the Company, which provided empirical data and the opportunity to study the disaster recovery aspect of Business Continuity Management during the Covid-19 pandemic. When writing this thesis, numerous individuals have been very encouraging and contributed significantly to the possibility for us to complete this thesis with the expected results. To them, we would like to express our appreciation.

First, and foremost we wish to thank our company supervisor, for her valuable insights into the "business continuity management"-practices at the Company. The company supervisor's insights, combined with her dedication and willingness to answer our questions and guide us throughout the process, significantly contributed to our understanding of the subject and the result in the form of this master's thesis. In addition to the company supervisor, countless individuals have been very helpful during this process by taking time out of their busy schedules to participate in interviews, provide us with guidance and answer our questions. We experienced an incredible amount of commitment from all of you whom we encountered during this process. For this, we are truly grateful.

We would also like to express our sincerest gratitude and appreciation towards our LTH supervisor, Professor Andreas Norrman. His insightful feedback, extraordinary guidance and remarkable commitment contributed significantly to our sustained level of motivation. Throughout the process, we experienced a seemingly unlimited amount of availability from Andreas, and his dedication to assisting us has truly been invaluable. For this, we are very grateful, especially considering the circumstances of writing a master's thesis during an ongoing pandemic.

Lund, February 2020
Filip Nilsson & Fredrik Tegström

Abstract

Background
The Company produces and sells specialised products and technical solutions worldwide through more than ten different technology-based and decentralised Business Units. While the "Business continuity management"-programme has been implemented throughout the Company for many years, many of the Business Units' "disaster recovery"-capabilities had not been tested until the Covid-19 pandemic.

Problem Formulation
In recent years, the follow-up by corporate regarding the organisation's BCM-implementation has reached a plateau. The pandemic outbreak of Covid-19, where the Company had to put the disaster recovery-practices to the test, provided an unparalleled opportunity to evaluate the current processes to better understand how the disaster recovery planning process can be improved. Thus, the Company has expressed a desire to evaluate the current BCM program, primarily focusing on disaster recovery.

Purpose
To provide suggestions on how the Company's Business Continuity Management-practices can be updated to improve future disaster recovery.

Method
The study followed a combined explanatory and descriptive approach. A theoretical framework was developed and applied in a multiple case study to create an increased understanding of the research area. The selected cases were three business units with associated business functions, where each case consisted of four interviewed individuals who had different responsibilities in a supply chain setting. An abductive research approach was adopted to study "Business continuity management and management of disaster recovery" at the Company during the Covid-19 pandemic. This thesis has been a complete elaboration between the two authors. Each author has been involved in every part of the process and contributed equally.

Conclusions
The analysis indicated similar patterns across the cases. Disaster recovery has, in all cases, mainly been coordinated through the Company's crisis management structure. Recovery of disruptions in the material flow has mainly been managed within the regular functional structure and through collaboration with other Company functions. The measures have, to a certain extent, been developed reactively. The existing BCM-programme has contributed during disruptions in the supply of materials and components and manufacturing. Furthermore, the authors identified several improvement areas for the Company's BCM program, including the scope and the objectives of BCM, the business impact analysis, and training.

Contribution
Through a case study, the authors provide insight into how a leading multinational company has been affected by Covid-19. This study is an early indication of how the pandemic contributed with insights about appropriate adjustments for a company's BCM-programme to ensure a more effective disaster recovery in the future.

Keywords: Business continuity; Disaster recovery; BCM; Covid-19; Continuity planning; Case study

Table of Contents

List of Figures

List of Tables

List of Abbreviations

BCM	Business Continuity Management
BCP	Business Continuity Planning
BIA	Business Impact Analysis
BU	Business Unit
CM	Crisis Management
CMT	Crisis Management Team
DR	Disaster Recovery
DRP	Disaster Recovery Plan
ER	Emergency Response
ERP	Emergency Response Plan
HR	Human Resources
MTO	Maximum Tolerable Outage
MTPD	Maximum Tolerable Period of Disruption
PG	Product Group
RM	Risk Management
SCRM	Supply Chain Risk Management
QMS	Quality Management System

1 Introduction

To provide context for the reader, the introductory chapter provides a brief background on the study's area of interest and introduces the Company, where the case study was conducted. After establishing a context, the chapter culminates in a problem formulation, leading to the study's overall purpose. The chapter concludes with a brief description of the study's focus and delimitations, target audience, and report outline.

1.1 Background

1.1.1 Impact of the pandemic

In December 2019, the coronavirus (Covid-19/SARS-CoV-2) was reported for the first time in Wuhan City, Hubei province, in China (World Health Organization, 2020). This marked the beginning of a pandemic that affected most people's lives and most organisations' operations worldwide in the early 2020s. When the virus began to spread, countries' governments introduced various precautionary measures to reduce the virus' transmission, examples of such measures being: curfews, restrictions on larger gatherings, and border closures (OECD, 2020). The direct and indirect physical, psychological, and economic consequences of the pandemic have posed significant threats to many companies' continued operations, forcing governments in several countries to coordinate financial support packages for both affected businesses and individuals, of an unprecedented magnitude (European Union, 2020).

During the pandemic, something that quickly became evident was how different industries were affected differently by the pandemic. While some industries saw an increase in demand (such as pharmaceuticals, healthcare, and technology), other industries saw a decrease in demand (such as automotive, energy, and transport) (Ivanov, 2020). For the manufacturing industry, one of the most significant challenges was related to balancing supply with demand. The challenge was complicated by delivery constraints (mainly due to transport restrictions and forced closures of factories) and unpredictable demand patterns (due to changes in consumption and purchasing behaviour) (Sharma et al., 2020). This was particularly evident in the pandemic's early phase when customers' panic buying and hoarding behaviour (of commodities, such as toilet paper, face masks, and hand sanitisers) resulted in stock-outs at retailers (Sheffi, 2020; Ivanov, 2020).

Two trends in the manufacturing industry had particularly significant effects on companies' supply chains during the pandemic; *the globalisation* (through outsourcing and offshoring) and *the streamlining of supply chains* (Ivanov & Dolgui, 2020; Norrman & Jansson, 2004). These two trends have made today's manufacturing companies more vulnerable to unforeseen events (such as natural disasters, epidemics, political decisions, acts of war and terrorism). Unforeseen events which previously would hardly affect a company may now have business-critical impact instead (Manuj & Mentzer, 2008a; Norrman & Jansson, 2004). These events are therefore not be overlooked although they, in some cases, can be tough to anticipate and safeguard against (Supriadi & Sui Pheng, 2018). While *globalisation* and *streamlining of supply chains* have increased the companies' risk exposure and vulnerability, they have also provided the companies with cost savings and access to new markets for materials, labour, customers, financing, and tax abatements (Manuj & Mentzer, 2008b). As the cost savings and market opportunities offered by global and streamlined supply chains cannot be ignored, managing these risks has become an increasingly hot topic, both in the industry and in academia (Heckmann et al., 2015; Fan & Stevenson, 2018; Norrman & Wieland, 2020).

1.1.2 Risk Management in the manufacturing industry

To better cope with the increased risks related to the supply chain, the area of supply chain risk management (SCRM) has emerged. SCRM aims to develop strategies for identifying, assessing, treating, and monitoring risks in supply chains (e.g., Norrman & Jansson, 2004; Ho et al., 2015; Fan & Stevenson, 2018). In the supply chain literature, several different frameworks for managing risks in the supply chain have been developed, see, for example, *Norrman and Jansson (2004)* and *Manuj and Mentzer (2008a)*. Manuj & Mentzer (2008a) present a framework for SCRM, illustrated in Figure 1 below.

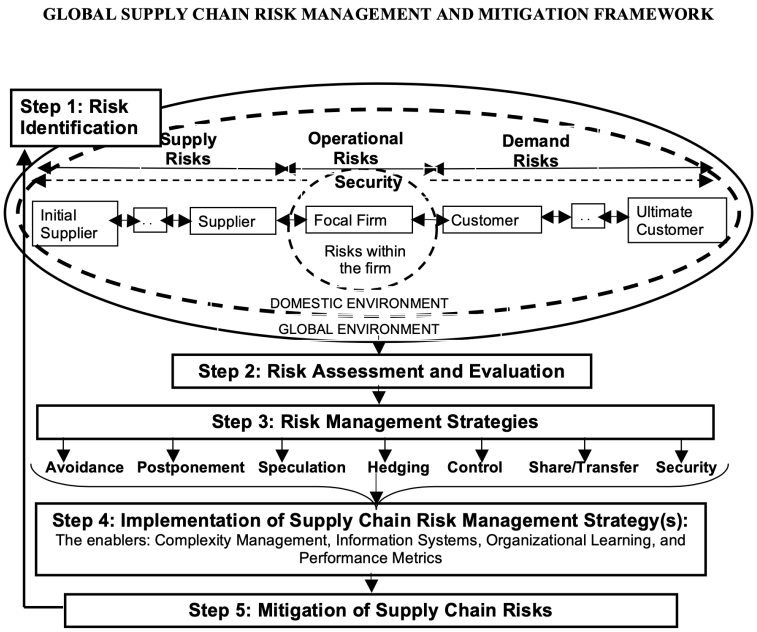


Figure 1.1: Conceptualisation of supply chain risk management framework. (Source: Manuj & Mentzer 2008a, p. 144)

There are several definitions regarding the objective(s) of SCRM (e.g., Wieland & Wallenburg, 2012; Fan & Stevenson, 2018). In a business continuity perspective, *"SCRM manages exposure to serious business disruptions arising from risk within and outside the supply chain. In this sense, SCRM aims to build the capability to reduce vulnerability and ensure business continuity "* (Fan & Stevenson, 2018, p. 210). SCRM only deals with the supply chain risks and does not consider risks related to other parts of the company's business activities. However, it is important to remember that risks also arise in connection with the manufacturing companies' other infrastructure and business activities, such as IT, Finance, and Sales. The area of *Risk Management (RM)* has traditionally taken a more holistic approach to risk management within organisations, although the main focus has been on risk management in Finance and IT (due to pressure from regulatory bodies, financial incentives and a larger proportion of risks having more devastating consequences). As a management concept, Risk Management is concerned with understanding the risks an organisation faces, reducing their likelihood of materialising and minimising their potentially negative impact. Thus, *Risk Management* focuses primarily on managing the risks before they materialise, which differs from SCRM, focusing on managing risks related to the supply chain, both before and after they have materialised.

1.1.3 Business Continuity Management

An area that can be said to bridge the gap which remains after applying both SCRM and RM (i.e., management of corporate-wide risks, or disasters, after they have materialised) is the area of

Business Continuity Management (BCM). BCM comprises three different phases: Emergency Response (ER), Crisis Management (CM) and Disaster Recovery (DR) (Smith, 2003; Supriadi & Sui Pheng, 2018). ER focuses on the acute phase of a disaster and includes the measures taken to protect lives, the environment, and material property. CM focuses on maintaining critical functions in the company during a crisis, whereas DR is concerned with actions taken to restore the business activities to the "normal" level (Supriadi & Sui Pheng, 2018). In other words, BCM can be said to address the issues of how to best resume business processes once an unexpected event (i.e., risk) has materialised (Norrman & Jansson, 2004). BCM is primarily concerned with the management disciplines, processes and technologies that seek to provide means for the continuous operation of critical functions in all circumstances (Hiles & Barnes, 2001; Norrman & Jansson, 2004). BCM can be said to overlap with both SCRM and Risk Management, and some claim that the development of business continuity plans (a key element of BCM) is the risk management measure to be taken for risks with low probability where the estimated impact is business failure (Norrman & Jansson, 2004). British Standards Institution (2008, p. 1) defines Business Continuity Management as follows:

"Business Continuity Management (BCM) is a holistic management process that identifies potential threats to an organization and the impacts to business operations that those threats, if realized, might cause, and which provides a framework for building organizational resilience with the capability for an effective response that safeguards the interests of its key stakeholders, reputation, brand and value creating activities."

Knemeyer et al. (2009), Hora and Klassen (2013) and Ambulkar et al. (2015) emphasise that recovery policies in supply chains are crucial in dealing with business disruptions. The negative impact stemming from such business disruptions can be either a direct result of financial loss or indirect financial loss through disruptions in processes, reputational damage, legal actions and negative impact on the health of employees or the public (Gibb & Buchanan, 2006). To minimise the negative impact once an unexpected event has materialised, the company needs to ensure a quick recovery of business-critical processes, functions and infrastructure (Hiles, 2007). The processes, functions and infrastructure particularly critical for the company's continued business operations are, among other things, what BCM helps to identify, prepare and manage the recovery of in periods of disruptions (Gibb & Buchanan, 2006).

1.1.4 Resilience and recovery from impact

One area which recently has attracted much attention from both academics and practitioners is the concept of resilience (Ambulkar et al., 2015; Heckmann et al., 2015; Kamalahmadi & Parast, 2016; McKinsey Global Institute, 2020). Within the supply chain-literature, Ponomarov and Holcomb (2009, p. 124) describe resilient supply chains as supply chains that *"incorporate event readiness, are capable of providing an efficient response, and often are capable of recovering to their original state or even better post the disruptive event."* Once these disruptive events occur, companies need to be well prepared and react quickly to recover as soon as possible (Christopher & Peck, 2004; Ponomarov & Holcomb, 2009). In recent years, there has also been an increasing interest in various forms of "ecological resilience", which is not only concerned with getting back to where one was before the crisis but also to adapt to the new situation that follows the crisis (e.g. Davoudi et al., 2013). Regardless of what definition is used, an essential part is to recover the company's critical processes, something which BCM helps to identify and ensure the restoration of.

To reconnect to the pandemic experience of Covid-19, most manufacturing companies have experienced business disruptions related to, among other things, the supply chain, labour, cash flow, consumer demand, marketing and communication (Donthu & Gustafsson, 2020). In such critical moments when companies face crises with a decisive impact, they have several important

questions to answer (to decide on appropriate measures), i.e. *How long can our business sustain such disruptions? How long does it take before our processes are recovered? Which of our processes, products and customers' needs to be prioritized first to ensure a quick recovery?* These questions are not only important to be able to answer for a company facing a pandemic, but rather in any corporate crisis, the answers to the questions are also what BCM sets out to answer.

1.2 Business Continuity Management and the Company

This thesis is conducted on behalf of the Group Risk Management department of the case-company (here fourth referred to as *the Company*). The Company has been working with BCM for many years. While the BCM-programme has been implemented across the Company, many practitioners throughout the Company have not had to put its recovery capabilities and BCM-programme to the test. With an enterprise-wide crisis such as the Covid-19 global pandemic, the Company invited the authors to study how recovery from the pandemic has been managed and how these learnings can improve BCM at the Company.

1.2.1 A brief introduction to the Company

The Company delivers a wide range of specialised products and services primarily used in different industrial processes. The Company has roughly 20.000 employees in over 50 countries. Combined, the Company has around 40 major production sites and over 70 service centres. The Company is structured into a matrix-organisation with three main divisions (see Figure 1.2). The three divisions have over ten technology-based Business Units (BUs). The BUs have full profit and loss responsibility. They are globally responsible for driving the business for a defined group of products, covering everything from research and development to marketing, Sales & Service, and overall strategic direction for the Company's business within said technology-based BU. The BUs work in close relationship with the Operations function and the Sales & Service organisation.

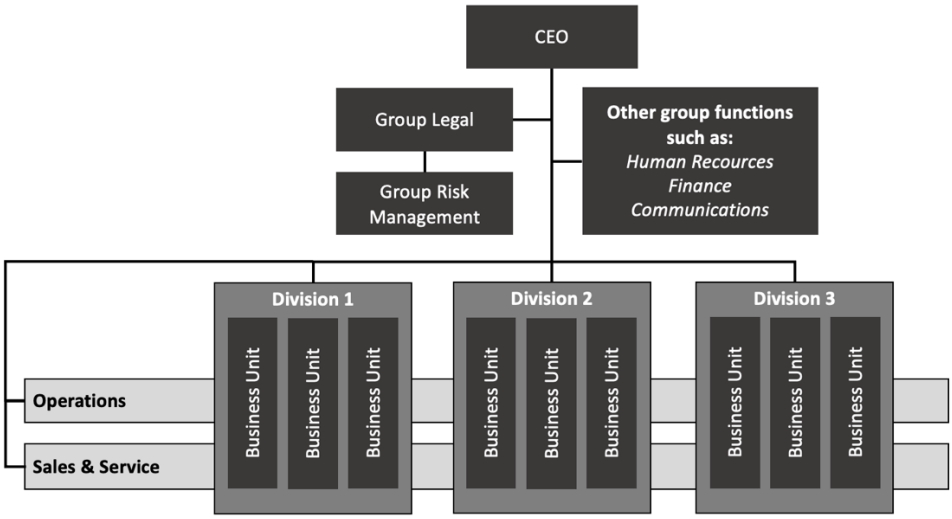


Figure 1.2: Organisational overview of the Company. Developed by the authors, adapted from the Company intranet.

The Operations function is responsible for the *sourcing*, *production* and *delivery* of the Company's products. The Operations function is structured into Product Groups (PGs); responsible for producing and delivering the BU's specific product assortments and associated spare parts. Each PG has a strong connection to one or several BUs. The Sales & Service organisation consists of a global network of sales companies and several central support functions. The sales companies are responsible for the more operational type of sales in different regional markets; they are organised

into a few different "clusters" to facilitate the sharing of resources and best practices among each cluster's sales companies. The sales companies are differentiated based on geographical region and are responsible for the operational sales of the different BU's whole product ranges.

Figure 1.2 also shows the "Group Legal"-function which accommodates the "Group Risk Management"-department (which commissioned this master's thesis). The Group Risk Management-department is (among other things) in charge of how Business Continuity Management is organised within the Company.

For this study, which will be based on three different BUs, the organisational structure can be further elaborated upon, as illustrated in Figure 1.3. Each BU within the Company is associated with a particular PG (which may serve several different BUs). The "Sales & service"-organisation, which is the main point of contact with customers, is structured based on different geographical regions. The sales regions are then divided based on division, and sometimes Business Units, the level of detail can vary between sales companies based on the size of the markets they serve.

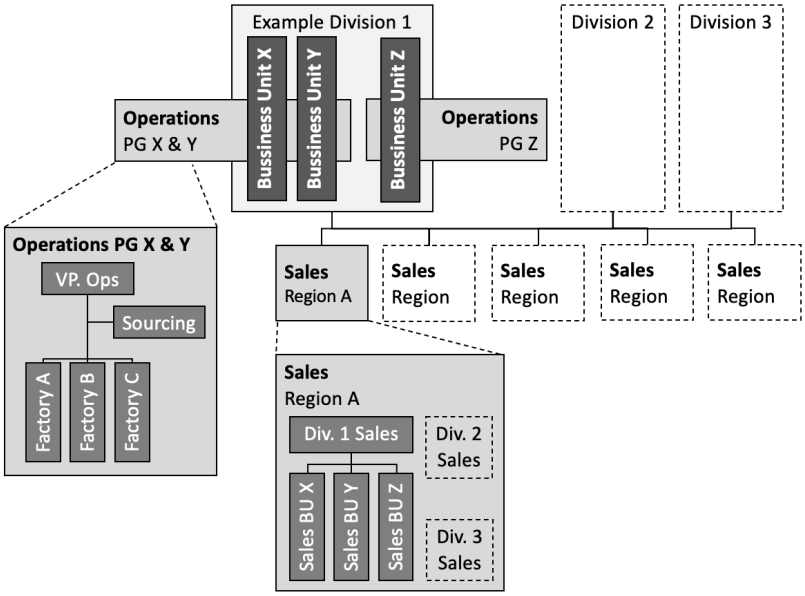


Figure 1.3: Organisation chart which illustrates the structure of Business Units, Product Groups and the Sales organisation. Developed by the authors, adapted from the Company.

The organisational structure in the figures above is based upon the Company's functional structure, not to be confused with the Company's "legal entity"-structure. The "legal entity"-structure is based on the legal responsibilities (such as tax registration, customs, insurance). Within the Company, a legal entity can encompass several sites and functions. A function or site can, however, serve several different legal entities (for the sake of simplicity, the reader can regard *site* and *legal entity* as equivalent when reading this thesis). Important to mention is that each legal entity has a designated managing director. However, the Company's business-related reporting structure is not based on the legal structure but rather the functional structure.

1.2.2 Business Continuity at the Company

The Group Risk Management department at the Company is responsible for governing corporate risk strategies and insurance. In the early 2000s, it was identified that there was a need to improve the corporate-wide risk management strategy, which triggered the development of a policy for Business Continuity Management (BCM). The current BCM policy was originally launched in 2009

and has been continuously revised until 2018. The BCM-policy is a corporate governance policy, and the Company's legal entities must follow the policy. The Company's Internal Audit Department audits the implementation of the BCM-policy. The BCM process is thus (in general) carried out at the "legal entity" level.

The Company's BCM-policy is structured around six main steps:

1. *Identification of critical business processes (CBP)*
   Mapping of processes that are essential to products and services will be deemed critical for continued success because they generate or support the generation of a large proportion of value for the business, or they may do so in the future.
2. *Risk Mapping with respect to the CBP*
   Mapping of all risks that could have a serious impact upon the Company's CBP.
3. *Business Impact Analysis (BIA)*
   Assessing how the disruption of various processes would affect the Company in terms of lost revenue.
4. *Loss prevention*
   Implementation of mitigating strategies (including risk transfer).
5. *Emergency Response Plan*
   The development of an Emergency Response Plan (ERP) that should cover actions directly necessary to respond to an identified risk. Emphasis is put on emergency response to sudden disruption of CBP in the immediate period after the risk has materialised (see Figure 1.4).
6. *Disaster Recovery Plan*
   The development of a Disaster Recovery Plan (DRP) that should contain actions necessary to restore normal operations after an incident or a crisis. Emphasis is put on expediting the resumption of normal operations and should be initiated after the emergency response plan, which is illustrated in Figure 1.4.

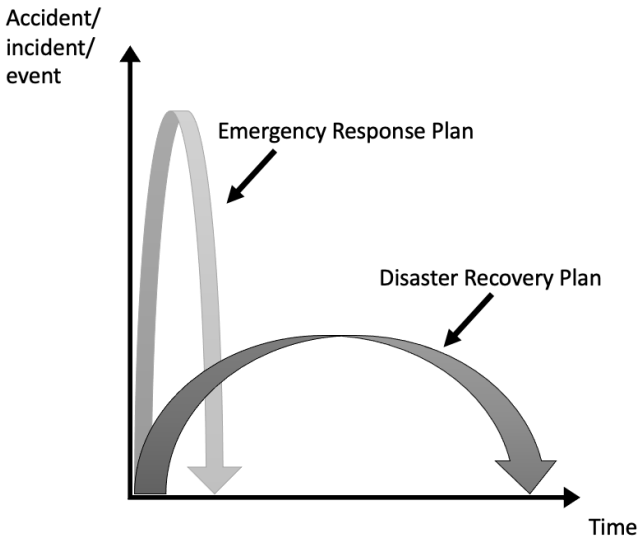


Figure 1.4: Scope of event/incident response strategies at the Company. Adapted from the Company.

All the Company's legal entities are categorised as A, B, or C entities. This classification is determined by the Finance department and is based on last year's revenue. This classification is also used to determine the scope of the legal entity's BCM-process. Table 1.1 below depicts a summary of the requirements placed upon a legal entity based on their classification.

Table 1.1: The scope of BCM defined for a legal entity within the Company (Nat Cat is referring to Natural Catastrophes) (Source: The Company)

The BCM process	Basic	Medium	Advanced
	C entity	B entity	A entity
Identify Critical Business Processes [CBP]	Yes - IT	Yes - Production - IT - Key Machines - Key Suppliers	Yes - Production - IT - Key Machines - Key Suppliers
Risk Mapping [Risk = an event that can interrupt a CBP] [Ex. of reports identifying risks; FM Global Risk Report, Internal Audit report etc]	Yes - Fire - IT Security	Yes - Fire and - Nat Cat, - IT Security	Yes Including but not limited to: - Fire, - Nat Cat, - Power Failures - IT Security
Business Impact Analysis	No	No	Yes
Loss Prevention [Prevent an identified Risk from occurring] [Ex. of reports recommending Loss Prevention; FM Global Risk Report, Internal Audit report etc]	Yes	Yes	Yes
Emergency Response Plan [What to do in case of a fire etc]	Yes [including but not limited to evacuation plans]	Yes [including but not limited to evacuation plans]	Yes [including but not limited to evacuation plans]
Disaster Recovery Plan [How to get back into business after a fire etc]	Yes	Yes	Yes

In connection with its work on the BCM-policy, the Company has developed a document called "Crisis Management Procedures", stating the Company objectives when a crisis occurs. The document concentrates on the processes of how to (a) identify Incidents and Crises, (b) establish responsibilities (based on the principles of incident and crisis management), (c) appoint a Crisis Management Team (CMT) and (d) how to set priorities when a Crisis has been identified. The extent of the local Crisis Management Procedures will depend on the local legal entity's size and the nature of its business. In order to be able to handle incidents or crises when they occur, the local Managing Director or Site Manager is responsible for having procedures and the following documents in place:

- Business Continuity Management Policy (including templates)
- Emergency Response Plan (ERP)
- Disaster Recovery Plan (DRP)

These documents are to be developed in conjunction with the Crisis Management Procedures.

1.2.3 Internal Auditing - internal evaluation of BCM

The auditing of BCM is conducted through the internal audits at the Company, hence BCM is only a small part of the whole internal audit process. The auditing frequency is dependent on the ABC-classification of the "audit entity". A-entities are audited every 3-years, and B&C-entities are audited every 3-5 years.

While the BCM-policy is required by the legal entities within the organisation, the internal audits which partly evaluate BCM are based upon the "audit entity"-structure. The "audit entity" is of a more practical nature, e.g., when several countries are covered by one sales organisation/site, the "audit entity" is the site/organisation although each country covered by the site/organisation has a separate legal entity. Further, when a sizeable legal entity covers several organisations/sites, it can be split into separate audit entities.

The audits are performed by collecting the local BCM-policy and the including documents alongside interviews of staff locally responsible for the BCM-policy. The local BCM-policy and plans are then assessed against the content and templates of the corporate BCM policy to confirm that all steps, such as risk mapping and calculation of Business Impact, have been carried out and are included. It is also verified that the BCM-policy and its plans encompass the whole audit entity. While the quality of the BCM is not assessed, individual auditors can go beyond the basic requirements and give more in-depth feedback.

The output of the audit is presented as "findings" with comments that need to be corrected. A follow-up audit is made at a later stage to verify that the findings have been corrected. Depending on the findings, verbal confirmation over the phone or reassessment of the documentation may be required.

1.3 Problem formulation

As a result of the pandemic's global impact, there is an exceptional opportunity to learn more about benefits of business continuity management in connection with disaster recovery and learn more about how organisation's BCM-programmes can be readjusted to ensure a more effective recovery from future crises. Furthermore, considering the pandemic outbreak of Covid-19, where the organisations throughout the Company have had to put the BCM-practices to the test, the Group Risk Management-department sees an opportunity to evaluate the current BCM-processes, especially as the follow-up of BCM-implementation has reached a plateau in recent years from corporate.

The current responsibility and scope of BCM within the Company has historically been concerned with corporate legal entities; this has resulted in a focus and scope dominated by sites, facilities, and infrastructure, both in terms of templates distributed internally and currently implemented BCM-plans. While there has previously been a common conception that the current scope fails to encompass business processes, which often transcends the Company's legal entities, the impact from previous disasters and crises have largely been isolated to individual sites. Hence, the Covid-19 pandemic presents an unprecedented opportunity to investigate the contribution of BCM to disaster recovery from a more holistic perspective and identify possible areas improvement for the Company’s BCM-practices.

1.4 Purpose and research questions

The purpose of this thesis is to "provide suggestions on how the Company's Business Continuity Management-practices can be updated to improve future disaster recovery". For a better understanding of what the purpose is concerned with, see Figure 1.5.

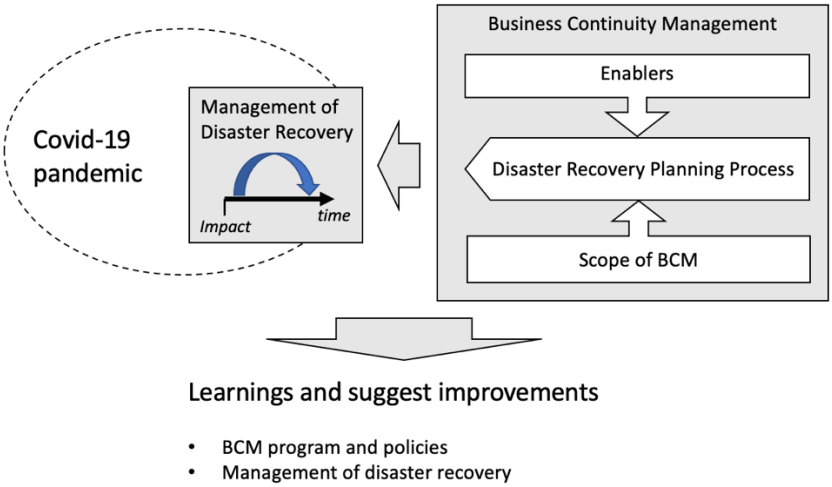


Figure 1.5: Illustration of purpose of the thesis. Developed by the authors.

To fulfil the purpose, the following research questions (RQs) need to be answered:

- ***How has the Company managed disaster recovery from disruptions during the Covid-19 crisis, and what has been the key learnings?***

- ***How has the current BCM-programme and policies affected management of disruptions related to the Covid-19 crisis?***

- ***How can "Management of Disaster Recovery" be improved?***

1.5 Focus and delimitations

To fulfil the study's purpose and answer the stated RQs (while also considering the limited amount of time), the following delimitations have been made.

- The directives from the Company representatives are primarily concerned with the scope of the thesis being limited to the disaster recovery phase of business continuity management. In other words, the process of restoring critical business processes and capabilities after a disruption has materialised. Hence, the following aspects will not be included in the thesis' scope:
    - "Emergency response"-procedures, e.g., evacuation plans in case of fire or electricity-outage.
    - Proactive risk mitigation strategies that reduce the probability of an event which causes a disruption.
    - BCM-programme management.
- To only make suggestions and not consider their potential implementation (related to the third research question).
- The scope includes risks related to information flows but will not cover BCM in terms of IT-infrastructure.
- The thesis is also limited to a select number of the Company's Business Units and Product Groups, due to the time constraint of the master's thesis (20 weeks). How the cases were selected is described under Chapter 3 – Method and Approach.

1.6 Target group

This report is targeted towards the Group Risk Management-department at the Company, general practitioners, and academia. The Group Risk Management-department can benefit from this thesis as it provides suggestions for adjustments to enable a more effective disaster recovery in future crises. The thesis is also considered relevant for practitioners in manufacturing companies considering implementing or improving BCM within their organisations.

In academia, students within Supply Chain Management (SCRM) and students within Risk Management interested in Business Continuity Management can benefit from this thesis by being inspired to study business continuity management when conducting their own thesis.

1.7 Report Outline

The thesis consists of seven chapters that are briefly described here below. The authors should mention that the thesis has been a complete elaboration between the two authors. Each author has been involved in every part of the process and contributed equally.

Chapter 1 introduced the research phenomenon "*disaster recovery*", *the Company* (where the case study is conducted) and the thesis' purpose (with associated research questions). The thesis' focus and delimitations, and the intended target group, have also been stated in the introductory chapter. ***Chapter 2*** presents the theoretical frame of reference of BCM. The theoretical framework, based on BCM (used for the single- and cross-case analysis), is presented at the end of the chapter. In ***Chapter 3***, the reader is provided with an understanding of how this report has been conducted. The chapter aims to give insight into how the thesis' study has been designed. ***Chapter 4*** provides the reader with information about each case. The reader is also presented with the interviewees' perceived needs (with respect to the aspects of the theoretical framework). This information then serves as the empirical basis for the single-case analysis (presented in *Appendix B)*. ***Chapter 5*** presents the cross-case analysis. The cross-case analysis intends to answer the three research questions posed earlier in this chapter and forms the basis for the conclusions. ***Chapter 6*** presents the conclusion and further discusses the thesis' contribution, limitations, and proposals for future research. In ***Chapter 7,*** the additional recommendations, which the authors provided the Company with, are disclosed and further accounted for. These are based on the report's conclusions and are not necessary to fulfil the purpose of the thesis.

2 Theory

This chapter presents the theoretical frame of reference. Section 2.1 explains key concepts and constructs of BCM. Section 2.2 presents the developed theoretical framework for studying disaster recovery (and implementation of BCM).

2.1 Business Continuity Management

Business continuity management (BCM) as a discipline has been developed since the 1970s in response to the various crises and disruptions in company's value creating activities (Herbane, 2010). By developing continuity plans[1], the company can address how to handle crises and disruptions in the best possible way.

2.1.1 BCM and Crisis Management

The relationship between Business Continuity Management and other disciplines is an important aspect to bring up. Disciplines such as incident management, risk management, crisis management, and business continuity management, all strive to prevent and manage disruptive events which pose a threat to an organisation's ability to achieve its objectives. While they are separate disciplines, there exists some overlap and they can be difficult to separate due to their overall similar objective. (FSPOS, 2019)

Cook and Andersson (2019) describes the management of a disruptive event structured around the three following phases: emergency response, crisis management, and business continuity. The emergency response phase is based upon immediate actions to ensure that people, assets, and the environment is safe, and concerned with the immediate impact and containment of the event (The Legislative Assemblies Business Continuity Network, 2019). The crisis management phase is concerned with the short-term impact to the organisation, and the business continuity phase (also referred to as disaster recovery) is concerned with keeping the business running and recovering of the business to pre-disruptive levels. (Cook & Andersson, 2019)

The lines between the phases and when an organisation should transition to the next phase is difficult to define and can depend on the crisis. The doneness-criteria should determine when to transit into the next phase and responsibility can be handed over from the crisis management team to the business continuity team. In practice, the next team should be brought in before the time of transition to fully understand the situation. (Cook & Anderson, 2019).

2.1.1.1 Crisis Management

Crisis Management (CM) is the process that ensures that an organisation has the right structure and routines to manage a crisis. A crisis is generally an event that cannot be handled by other preventative and management routines and is escalated to a crisis management team (FSPOS, 2019). Herbane (2010, p. 979) defines Crisis Management as:

"Crisis management is the organisation and coordination of activities in preparation for, and response to, events that prevent or impede normal organisational operations (thereby threatening its most important goals). These events may be characterised by low probability, high consequence, ambiguity and little time to respond."

The fundamental purpose of CM is not to create plans that will perfectly prevent a crisis, but rather the necessary intellectual and emotional learning to effectively respond when a crisis occurs (Mitroff et al., 1988). No matter the amount of preparation an organisation makes, a crisis will

[1] Referred to as Disaster Recovery Plan (DRP) within the Company.

create a reaction from stakeholders which will impact the success or failure of managing the crisis (Pearson & Clair, 1998). Mitroff et al. (1988) also argue that planning for every crisis is not a realistic task, but many crises share similar traits, and can be structured in a crisis portfolio and schools to prepare crisis planning and response for a selected group of crises.

One of the key factors to an organisation's capability of handling crises is the formation of a crisis management unit, or crisis management team (Mitroff et al., 1988). The crisis management team should be composed of people with specific competences and mandate to manage the crisis at the strategic level (FSPOS, 2019). The leader of the crisis management team must have significant training and work well under pressure. Pressure is likely to come from both senior management and people looking for guidance or instructions. This can either be regular management staff or a specialised crisis manager (Cook & Anderson, 2019).

Further, crisis management will be more effective if communication is swift and accurate to key stakeholders (Pearson & Clair, 1998). The act of downplaying and not being transparent will not instil confidence in the company and by leaving out facts people will just fill in the blanks themselves (Cook & Anderson, 2019; Pearson & Clair, 1998).

Different functions within the company will also have different views upon when the crisis management phase is terminated: for human resources is likely when communication is established with all employees and all are out of harm's way, for corporate communication it could be when the stock price has stopped falling, and so forth. The business continuity phase may be initiated, and the business continuity team activated simultaneously as the crisis management phase, and it is important to make sure that no duplication of work is carried out. (Cook & Anderson, 2019)

How to view BCM in relation to CM is not clearly defined. While Cook and Anderson (2019) depicts it as different phases, Hiles (2007) argues that Business Continuity Management can fall under an organisation-wide crisis management umbrella with the specific objective of recovering from a crisis. FSPOS (2019) states that CM is partly designed to handle events which BCM (or similar disciplines) fails to address.

2.1.2 Objective and Scope of BCM

2.1.2.1 Objective of BCM

Before starting the work with business continuity management, it is important to define the objective for BCM within the company. At a generic level the objective of BCM may seem obvious, *"to continue doing business after a disaster, resuming business activities and continue to serve the customers"* (Hiles 2007, p. 20). The objective should however clarify what the organisation has set out to achieve with BCM (Hiles, 2007). According to Hiles (2007), there are typically three types of objectives that organisations tend to use in connection with BCM:

- *Rebuilding infrastructure.* Focusing on alternative facilities and locations as well as other solutions to minimize downtime for key infrastructure and systems.
- *Resumption of business activities.* Focus is on setting up an organisation and the facilities required for key people to be able to resume their operations.
- *Continuity in customer service at an acceptable level.* The focus is on defining what level of service level is to be maintained during a disaster, and what is required to achieve that level.

Wong & Shi (2015) provide three reasons for why setting BCM-objectives are crucial:

- To understand the organisation's purpose with BCM.
- To act as a guide in the process of implementing measures to achieve the purpose.

- To provide a basis for evaluating how close the organisation is to fulfilling the purpose.

Further, according to Wong and Shi (2015), the objectives are specific measurable results which define the deliverables of BCM. Two following principles should be used in connection with the development of objectives for BCM: (i) The corporate objectives should form the basis for the development of the business continuity objectives; (ii) the corporate drivers and external influences should also be considered. Further, the objective should fulfil the following five attributes: clear, relevant, practical, measurable and time-based. (Wong & Shi, 2015)

2.1.2.2 Scope of BCM

Based on the objective set in the previous step, a scope needs to be set for what is to be considered and what is not going to be considered within BCM (Tucker, 2015). The scope needs to take into account the time and resources that the organisation is willing to dedicate to the work related to BCM. If the scope of the programme is set too broadly (for example, a company-wide scope), it is likely that the defined objective will not be achieved; if the scope of the programme is set too narrow, the more holistic challenges related to the organisation's processes will likely not be considered (Wong & Shi, 2015). According to Wong and Shi (2015), a good starting point for setting the scope of BCM is at the board level. When defining the scope, the activities that contribute to fulfilling the company's own goals and obligations need to be considered. The defined scope will then serve as a roadmap for the (internal and external) auditors when evaluating the work (Tucker, 2015). The scope can, according to Tucker (2015), be set as a part of the organisation (e.g. based on a geographical location, functional areas or Business Units, etc), but most importantly it must consider the context of the organisation. Where "the context of the organisation" implies that the upstream and downstream dependencies must be included, although they may initially appear to be outside the boundaries of the organisation and its BCM-scope (Tucker, 2015). These dependencies are however usually first identified in connection with the business impact analysis (at a later stage), but an initial review is recommended to determine how the scope should be set to include internal and external dependencies, business functions, legal (or contractual) requirements, and external stakeholders.

The scope then defines which business areas that are included in the BCM-programme. The management decision is often based on the criticality of the products and services, such as those that account for a significant proportion of business revenue (Wong & Shi, 2015). Wong and Shi (2015) also advocate that all outsourced activities that support the delivery of the in-scope products or services are to be included in the BCM-programme.

According to Smith (2003), BCM should be a business-owned and driven process, which does not only consider specific areas (such as IT). Figure 2.1 below shows the difference between the old and new considerations for BCM as described by Supriadi and Sui Pheng (2018) based on Herbane et al. (1997). The Figure 2.1 describes *standard practice* and *better practice* for BCM based on a set of different dimensions. The first two dimensions in Figure 2.1, show how a more holistic scope for BCM is in line with better practice, which further confirms the above presented theory.

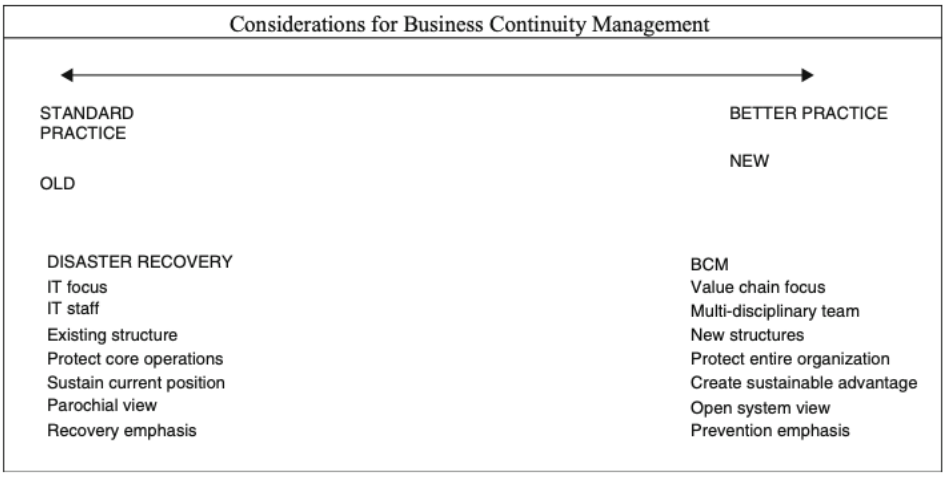


Figure 2.1: Old and new BCM approach. (Source: Supriadi & Sui Pheng 2018, p. 44)

With regard to the implementation of BCM, various assessment tools have been developed for measuring BCM preparedness (the degree of maturity for an organisation's work within BCM). This type of assessment can help the organisation to understand what has been achieved and what it should prioritise to further develop the work with BCM (Peng et al., 2011; Stevanovic 2011). Table 2.1 below presents a BCM preparedness model developed by Marsh Risk Consulting which has been obtained from Supriadi and Sui Pheng (2018). The table shows the different levels of preparedness (with the associated label next to it), an overview of what the level of preparedness implies, and what it means in terms of the organisation's ability to respond. Table 2.1 indicates that a more holistic BCM scope (level 4) entails a higher degree of maturity than a narrower scope (see level 1-2).

Table 2.1: Marsh Risk Consulting BCM preparedness level. (Source: Marsh Risk Consulting, 2010 referred in Supriadi & Sui Pheng 2018, p. 61).

Preparedness level	Label	Overview	Organization's ability to respond
Level 5	Optimizing BCM	BCM driven by corporate strategy is subject to continuous improvement and is integrated into the overall risk management and operational strategy	Organization has sustained ability to respond to and survive strategic threats and crises—both anticipated and unanticipated
Level 4	Integrated BCM	BIA is done at divisional level and value/supply chain dependencies are understood and protected	Organization understands its business processes and has the ability to deal with crises and recover processes across sites and into the supply chain
Level 3	Established BCM	Emergency response, crisis management and BC plans are completed and linked. Training and exercising embedded in the organization	BCM response is integrated and BCM capabilities can be sustained
Level 2	Formalizing BCM	Corporate policy driving a consistent approach at site level. BIAs are done for sites and recovery strategy agreed	Key location(s) have built the ability to respond to a localized emergency and recover business
Level 1	Undeveloped BCM	Ad hoc and reactive approach—not a systematic BC	Minimum legal/regulatory requirements met providing protection for people and facilities

In addition, to ensure that BCM is implemented correctly and at the right level within the organisation, Hiles (2007) addresses some important issues that management needs to address and

document in a BCM policy. For example, how should BCM be linked to the organisation's objectives? What criteria should be used to determine the criticality of each business activity? What are the most likely causes of a major incident and what types of impact are likely to occur? Who are the stakeholders who are likely to be affected by business disruptions? How will BCM be handled continuously?

2.1.3 BCM as a management programme

In order to benefit from BCM, like any other management system, it requires organisation, assessment, training, testing, continuous improvement, and more. Further, to achieve its purpose, the BCM must be aligned with the objectives of the organisation as a whole. (Hiles, 2007)

British Standard on Business Continuity Management (BC 25999:1), illustrates the BCM process with the BCM lifecycle (Figure 2.2), building on several elements which needs to be undertaken to implement BCM. These elements will be described more in depth but are first described in brief below Figure 2.2.

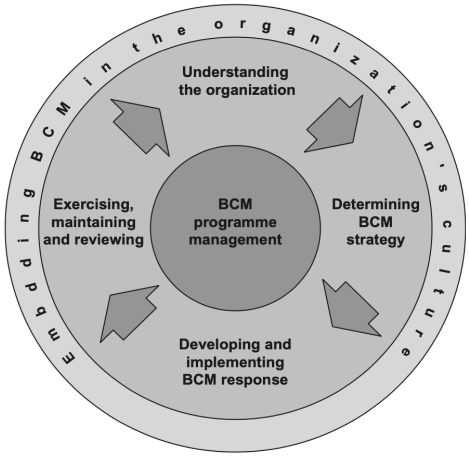


Figure 2.2: BCM Lifecycle. (Source: BC 25999:1, adapted by Hiles 2007, p. 107)

BCM-programme Management
The programme management is responsible for initiating BCM, assigning responsibilities, implementing BCM, and maintaining BCM capabilities (Hiles, 2007). This will be further elaborated upon in Section 2.1.4 BCM-programme Management.

Understanding the Organisation
Refers to the understanding and prioritisation of products and services and the required time recover these in the event of disruptions. Key elements are the identification of critical processes and assets, stakeholder obligations, the impact of disruptions, and consideration of dependencies (Hiles, 2007). This will be further elaborated upon in Section 2.1.5 Understanding the Organisation.

Developing and Determining Business Continuity Strategies
This step refers to determining the appropriate strategies to recover identified processes within an acceptable timeframe and to an acceptable capacity (Hiles, 2007). This will be further elaborated upon in Section 2.1.6 Developing and Determining Business Continuity Strategies.

Developing and implementing BCM response and Disaster Recovery Plans
The creation of a management framework of incident management, business continuity, and business continuity plans to be used in a disruptive event or crisis (Hiles, 2007). This is further

elaborated upon in Section 2.1.7 Developing and implementing BCM response and Disaster Recovery.

Exercising, maintaining and reviewing
Understanding the current state of the BCM-program, possibilities for improvement and that strategies and plans are aligned with the current organisation and its objectives (Hiles, 2007). This is further elaborated upon in Section 2.1.8 Education, testing and reviewing.

2.1.4 BCM-programme Management

The trigger to initiate a BCM-programme is commonly due to demands from stakeholders, regulatory requirements or disruptive events within the company or that of a competitor.

To initiate a BCM program, according to Hiles (2007) a key factor is to gain support from senior management. Hiles (2007) argues to use a cost-benefit analysis which not only covers hard cost, but also takes into consideration damages to brand, market shares, and satisfies stakeholders and auditors. It should be possible to create a scenario of the possible consequences if the company does not implement BCM.

Another key success factor is to communicate the prioritisation of business continuity to employees and appropriate 3rd party actors in order to build an organisational awareness and support for business continuity. The lack of endorsement and visible support from senior management will likely transform the business continuity planning process into a bureaucratic task to do when they have time. (Hiles, 2007) The two key success factors of support from senior management and clear communication across the organisation also has support in literature concerning change initiatives in general (McKinsey, 2015).

Hiles (2007) argues that the programme management team should change between the phases of establishing the BCM-programme within the organisation. The first phase, information gathering, consists of evaluating risks, conducting risk impact analysis, and establishing recovery teams within the organisation. The second phase consists of developing plans that control the company's initial response.

2.1.5 Understanding the Organisation

This section covers Risk Analysis (2.1.5.1), which is undertaken to identify and manage specific risks. Then, the process of Business Impact Analysis (2.1.5.2), the foundation for the continued business continuity planning process (called disaster recovery planning within the Company) is explained. Within the Business Impact Analysis-section, both quantitative and qualitative methods for estimating impact are described.

2.1.5.1 Risk Analysis

While Business Continuity Planning (BCP) is aimed at reducing the impact if a disaster materialises (Norrman & Jansson, 2004), risk analysis plays an important role in conjunction with BCP under the Business Continuity Management process (Hiles, 2007). The objective of a risk analysis is to control specific or obvious risks in order to prevent disruptions (Hiles, 2007). In the context of BCP, the role of risk analysis is to partly understand what might be damaged or disrupted (Norrman and Jansson, 2004). To an extent, depending on industry and geographical location, some risks or forms of risk analysis may be mandatory through legislation (Hiles, 2007).

When performing a risk analysis, Wong & Shi (2015) recommend addressing the following questions:

- What can go wrong?
- What is the probability that this will happen?
- What consequences does the business have if the risk arises
- How can the risk be managed or controlled?

The approaches to risk analysis can in general be divided into *the qualitative method* and *the quantitative method*. The qualitative method tends to be applied to a greater extent within BCM, as the knowledge about probability and impact tends to be sufficient (within the organisation) to form the basis for developing risk mitigation and continuity strategies. A qualitative approach usually contains the following elements: (i) a brief description of the risk; (ii) an overview of the risk assessment process; (iii) the process mapping that indicates where the risk may arise; (iv) the factors that influence its occurrence; (v) the relationship with other risks; (vi) the probability of it happening; (vii) the effects that can affect the organization. The quantitative approach is instead based on numerical estimates of the identified risks (in terms of probability and impact). The results are then compared with the numerical risk criteria in the evaluation phase to determine an acceptable risk level, and based on this, different risk mitigation or continuity strategies can be developed. Thus, the quantitative approach provides more objective risk assessments but requires, in general, access to significantly more resources (time, money, and staff). (Wong & Shi, 2015)

In theory, risk analysis is based upon the principle of expected value by multiplying probability and impact of a disruption (Norrman & Jansson, 2004). Risks and their respective probability and impact are then plotted in a matrix which is associated with certain actions (Figure 2.3) (Norrman & Jansson, 2004; Hiles, 2007; Wong & Shi, 2015). These actions can either be aimed at reducing the probability of a risk or reducing its potential impact (Norrman & Jansson, 2004). While such actions are possible in many scenarios, the question remains of how to deal with low probability risks and genuine uncertainties where the potential impact is severe or potential business failure. To quantify such risks based on expected value makes sense when addressing a vast portfolio of assets, but only becomes a guess when isolated to a single asset or process (Hiles, 2007). Further, the list of low probability risks and uncertainties that can cause a disaster can be considered almost infinite (Hiles, 2007), hence addressing all potential causes will be overwhelming. Instead of addressing all potential causes of a disaster, Hiles (2007) proposes the use of BCP to ensure continuity if a disaster should materialise. Hence, Risk Management cannot be regarded as a substitute to BCP (Hiles, 2007). Figure 2.3 illustrates the relationship between BCP and proactive risk mitigation strategies.

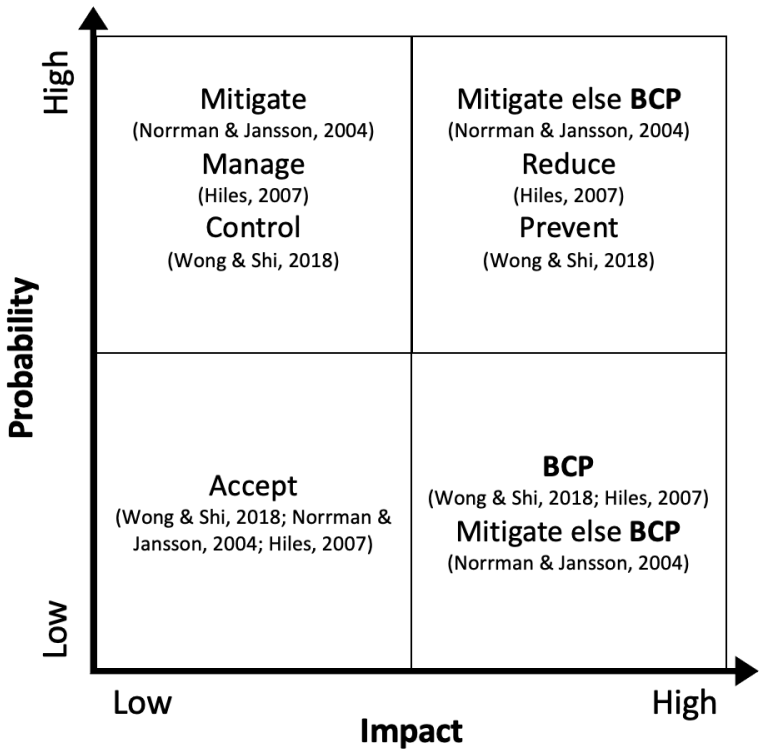


Figure 2.3: illustration of a probability-impact matrix and the role of BCP in Risk Analysis. Adopted from Hiles (2007, p. 142), Wong and Shi (2015, p. 171) and Norrman and Jansson (2004, p. 449).

This raises the question of what constitutes an impact that justifies BCP? Hiles (2007) defines it as a disruption which may threaten the viability of the company. Norrman and Jansson (2004), within the discipline of Supply Chain Risk Management (SCRM) and their case study of the telecom company Ericsson, describes the use of continuity plans to address specific risks when these cannot be mitigated to an acceptable level. However, the emphasis within SCRM literature is rather on proactive management of supply chain risks through mitigation strategies such as hedging (e.g. multiple sourcing) or speculation (e.g. buffer stocks) (e.g. Manuj & Mentzer, 2008b; Lavastre et al., 2012).

2.1.5.2 Business Impact Analysis

Hiles (2007) argues that the Business Impact Analysis (BIA) is the most fundamental building block of the business continuity lifecycle (Figure 2.2). The BIA aims to identify critical processes, critical resources, and understand the consequences and damages in case of a disruptive event, both in terms of direct damages and damages caused by the disruption of business operations (Paunescu et al., 2014; Hiles 2007; Wong & Shi, 2015). Hence, the BIA is the basis upon which continuity strategies are planned and serves as a benchmark to evaluate and justify spend on continuity. Besides the expected damages, the BIA also provides insights of dependencies between processes and resources within the organisation (Hiles, 2007).

Hiles (2007, p. 146-147) uses the following definition to define BIA:
"the management level analysis by which an organization assesses the quantitative (financial) and qualitative (non-financial) impacts, effects and loss that might result if the organization were to suffer a Business Continuity emergency, incident or crisis. The findings from a BIA are used to make decisions concerning Business Continuity Management strategy and solutions"

It is important that the BIA focuses on impact from a disruptive event, not the cause (Hiles, 2007). An impact, e.g., denial of access to a facility, may be caused by many different events and considering them all will only delay the process. Another common misperception is that the BIA is used to build a business case of Business Continuity Management, however Hiles (2007) argues that to establish a BIA, at least the first time, will demand considerable resources, and does not provide any value if the organisation is not prepared to act on its output. Hence, it is important that criticality reflects the corporate objectives and obligations (Wong & Shi, 2015).

Tjoa et al. (2008) highlights the duration of when a disruption is unacceptable to the business as one of the most important deliverables of the BIA. These are called recovery objectives and can be broken down into a few measurements which are illustrated in Figure 2.4.

Maximum Tolerable Period of Disruption (MTPD): MTPD is defined as the maximum time before the company's viability is threatened by the disruption of the activity (Tjoa et al., 2008; Hiles, 2007). In essence, any process that requires careful planning to be fully recovered within the MTPD should be categorised as critical (Hiles, 2007).

Maximum Tolerable Outage (MTO): MTO is defined as the duration from impact until an activity needs to be resumed to an acceptable level. MTO has to some extent replaced the measure of Recovery Time Objective (RTO). For some activities the acceptable level may exceed normal operations (Hiles, 2007), e.g., in the case of customer service, the grocery and travel industries have experienced a surge in call volumes in the context Covid-19 (Deloitte, 2020).

Recovery Time Objective (RTO): RTO is defined as the duration from declaration of a disaster until an activity needs to be resumed to an acceptable level (Hiles, 2007).

Recovery Point Objective (RPO): RPO defines which point in time prior to the disruption that an activity must be restored to, a measure commonly used regarding loss of data (Tjoa et al., 2008; Hiles, 2007). E.g., transactional data may have to be restored to moments before impact, whereas the company website or CNC-machine software may be restored to a backup a few days or weeks prior to the disruption.

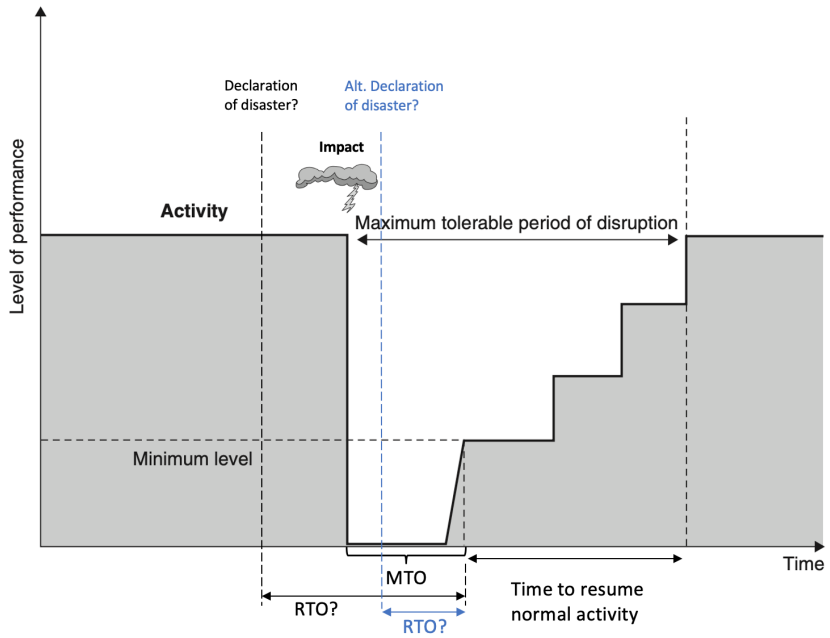


Figure 2.4: Illustration of MTPD, MTO and RTO. Based upon Tjoa et al. (2008) and Hiles (2007)

In practice, the recovery objectives of MTPD, RTO, and MTO can be described as the conversion of "unacceptable impact" from financial and non-financial impact into time. However, the use of the definitions is not consistent throughout the literature. For example, Torabi et al. (2014) defines MTPD from the point of impact until minimum acceptable performance level is resumed, in other words almost identical to the definition Hiles (2007) uses for MTO. In the case of the Company, RTO is defined as the duration from impact until a specific financial loss is reached. The authors of this report will use the definitions provided by Hiles (2007), which are illustrated in Figure 2.4.

2.1.5.2.1 Scope

Before conducting the BIA, it is important to define the scope. The scope can be defined in two dimensions: organisation and time.

- *Organisational scope:* Which part(s) of the organisation should be covered by the BIA? A full enterprise BIA or a smaller pilot project? (Hiles, 2007). Norrman and Wieland (2020) provides an example of BCM within Ericsson which further extend the scope beyond the organisation to the supply chain.
- *Planning horizon:* Ideally, a defined timeframe of the period of potential disruption that shall be addressed by the BIA. For a manufacturing organisation, a realistic planning horizon may be several months or years to encompass loss of specialized manufacturing sites. (Hiles, 2007)

One of the most difficult aspects of conducting a BIA is communicating to the organisation what information is needed. A common pitfall is that all tasks and processes tend to eventually become critical. Hence, the purpose of the planning horizon is to set a boundary and only consider processes and tasks that become critical within the planning horizon. (Hiles, 2007)

2.1.5.2.2 Quantitative approaches to estimating impact

Norrman and Jansson (2004) describes how Ericsson estimates financial impact by calculating a Business Interruption Value, BIV. BIV is defined as business recovery time multiplied by gross margin plus additional costs of idle capacity and inventory. The business interruption value is then categorised into four categories ranging from negligible to severe impact. The BIV is then used in combination with risk identification to determine if continuity plans are required. The BIV is also used for comparison against the cost of risk mitigation strategies. (Norrman & Jansson, 2004)

While used more as a crisis management tool, General Motors used a similar way by quantifying the disruption they called Value at Risk, which constitutes of the estimated number of days of disruption multiplied by profit per day. Although a rough estimate, it illustrates the potential financial impact of a disruption. (Sheffi, 2015)

Another important factor to consider is that recovery is seldom instant, but rather characterised by a ramp up period (e.g., Sheffi, 2015; Norrman & Jansson, 2004; Torabi et al, 2014). This raises the question of how to measure and define when the company has recovered. Similarly, the actual impact towards the company's customers rarely occurs at the same moment as the disruptive event as buffers often exists throughout the supply chain (Sheffi, 2015). An example of a single component and the difference between impact and disruption time is shown in Figure 2.5.

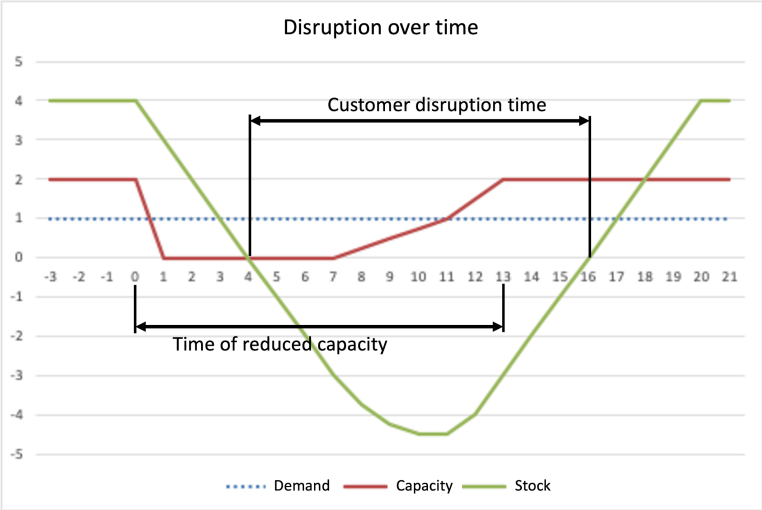


Figure 2.5: Illustration of disruption over time. While disruption occurs at time 0, customers are first affected at time 4. Similarly, full capacity is restored at time 13 but customer impact is eliminated at time 16. Developed by the authors.

While the quantitative approaches provide estimates in terms financial impact, they fall short when considering softer, non-financial damages, which may be more difficult to quantify.

2.1.5.2.3 Qualitative approach to BIA

Both Hiles (2007) and Wong and Shi (2015) suggest that the BIA should not be limited to only "tangible" damages such as profit- and equipment-loss, but should also consider "intangible" damages, for example to customer relations and the company's reputation. Hence, a qualitative approach to BIA, based on questionnaires, surveys, interviews or workshops can be used to consider intangible damages in those cases where a more quantitative method might be difficult to apply (Hiles, 2007; Norrman & Jansson, 2004). Wong and Shi (2015) argue that the BIA should be performed end-to-end from a business service or product context to ensure that the relationship between different parts of the organisation is assessed. An effective approach is to work backwards from the final output in terms of products and services delivered (Wong & Shi, 2015).

When the BIA's purpose has been communicated to the organisation under analysis, the first step is to conduct an initial survey. The survey aims at eliminating non-critical tasks and processes within the planning horizon from a more detailed investigation. To achieve this, Hiles (2007) suggests a scoring matrix which includes both financial and non-financial impacts. However, as Hiles (2007) points out, distinguishing if a process is important or critical quickly becomes very difficult, especially when considering damages that are difficult to quantify. Hence, a filtering-survey will likely result in inconsistencies and require moderation. Hiles (2007) proposes an approach where criticality can be peer-reviewed by a small group of stakeholders to achieve a balanced assessment.

Once an initial filtration of non-critical processes is completed, a comprehensive data collection of the remaining tasks and processes in the scope of the BIA is conducted (Hiles, 2007). This process requires interaction with key personnel who have an in-depth understanding of the process under investigation. The objective of the data collection is to understand:

- The maximum tolerable outage (MTO) and maximum tolerable period of disruption (MTPD), see Figure 2.4
- Is the process continuous or periodical?
- Recovery Point Objective (related to loss of data)

- Dependencies: What other processes does the task/process depend upon and what processes/tasks are dependent upon the process?
- Resource requirements: Minimum staffing, skill level?
- What equipment/facilities are needed? (quantities and time-frame)
- What IT-systems and applications are needed?
- What contingency plans are already in place?

These questions should be asked both in terms of minimum acceptable performance and how the picture might change over time. These findings also require moderation and continuous sanity checks. Further, it is common that once the BIA is undertaken, tasks and processes that were initially neglected as non-critical, thus outside the scope of the BIA, are identified as critical dependencies to other processes and will have to be incorporated. The BIA output is then a set of recovery requirements for the recovery of the processes' activities, both in terms of resources and time frame. A comparison of BIA with the risk analysis can help identify gaps and weaknesses in BIA. Once completed, the BIA should be presented in terms of a report, outlining potential impact and requirements. Hiles (2007) argues that the report should be presented to managers in the context that if not acted upon, the management accepts the as-is outcome detailed by the BIA. (Hiles, 2007)

2.1.5.2.4 Revision and updating BIA

Various best practices exist of how often the BIA should be updated, and ideally the BIA should reflect the organisation in its current state. For large complex organisations, a process which identifies, and addresses impact of significant changes coupled with a thorough periodical revision every second or third year may be sufficient. For smaller companies or individual entities within a large organisation, it may be possible to revise the BIA annually (Hiles, 2007).

2.1.6 Developing and Determining Business Continuity Strategies

A continuity strategy is a strategy of how to, at least, meet all the recovery requirements which are identified through the BIA (Hiles, 2007). In other words, it should ensure restart of minimum viable operations within the Maximum Tolerable Outage and full recovery within the Maximum Tolerable Period of Disruption. The practical nature of the continuity strategy will be closely connected to the business process that should be recovered.

A continuity strategy will depend upon either one or several contingencies. A contingency is defined as: "planned replacements for any resources, which may become unavailable in an unexpected way or at an unexpected time. These resources would normally be those required to support the organization's critical functions." (Hiles 2007, p. 162). Contingencies can either be provided in-house, by third-party suppliers, reciprocal arrangements within the organisation, or reactive. Each type is associated with different levels of risk and cost (Hiles, 2007).

In-house contingencies: Providing contingencies in-house ensures control and immediate availability to the organisation's specifications without any time-constraints on occupation. The major disadvantage is that in-hose contingencies often are very expensive, sometimes cost can be absorbed by finding alternative use for the contingency. (Hiles, 2007)

Third-party contingencies: A more cost-effective solution is to source contingencies from suppliers. The responsibility of maintenance and currency is then placed on the supplier instead of the company. Such dedicated services are common within IT. However, outsourcing contingencies requires careful considerations of contractual arrangements and often provide less control than an in-house solution. (Hiles, 2007)

Reciprocal Arrangement: Reciprocal arrangements refers to agreements within the organisation where other parts of the organisation will provide contingencies. This can be utilizing spare capacity or converting non-critical resources such as an in-house restaurant facility into office space. Reciprocal arrangements should be carefully considered as they will, to some extent, transfer the disaster within the organisation. (Hiles, 2007)

Reactive arrangements: Reactive arrangements refers to the sourcing of contingencies after a disaster has materialised. Consequently, these are the most cost-effective contingencies in terms of investment before initiation. In practice, a reactive arrangement can consist of a list of potential suppliers of contingencies, e.g., component/material suppliers, property agents etc. However, reactive arrangements have the inherent risk that no contingencies are available when needed (Hiles, 2007). The case of Ericsson and Nokia is a clear example where Nokia quickly managed to secure alternative sources of supply of semiconductors after a fire at its supplier. Nokia's competitor Ericsson, who reacted later, did not, and faced severe damages which later forced Ericsson to merge with Sony (Sheffi, 2015).

Typically, there is a clear relationship between speed and reliability compared to the continuity strategy's cost (Hiles, 2007). A very important aspect is to find the right trade-off between the cost of impact and the protection the strategy offers, as illustrated in Figure 2.6 (Norrman & Jansson, 2004). Ideally, this should be the most cost-effective strategy, but this might not be possible for practical reasons (Hiles, 2007). Hiles (2007) argues that three initial proposals of strategies should be developed and presented to senior management, with different emphasis on speed of recovery and cost. However, all proposals need to satisfy the recovery requirements realistically. Once a strategy is chosen, it must be complete and not contain any weaknesses (Hiles, 2007). Hiles (2007) recommend that a risk analysis is conducted for the strategy in order to identify any potential weaknesses.

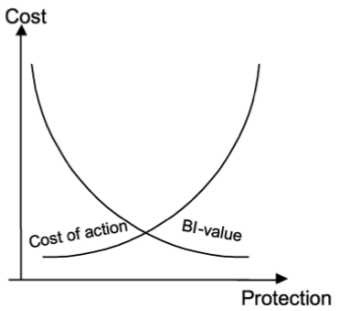


Figure 2.6: Conceptual illustration of cost of protection compared to cost of impact. (Source: Norrman & Jansson 2004, p. 451)

Another aspect is the management of recovery. Both Cook and Andersson (2019) and Hiles (2007) argue that it is preferable to appoint a designated recovery organisation who are responsible and capable of implementing the continuity plan. According to Hiles (2007), the recovery organisation should be divided into two teams or tracks, one focusing on restarting business based on contingency resources (e.g., alternative site, third-party capacity etc.) and another team being tasked with planning to restore to normal or new operations (Hiles, 2007). Besides being responsible for practical recovery, Cook and Andersson (2019) highlight that the recovery organisation must be prepared to manage communication to some extent.

2.1.7 Developing and implementing BCM response and Disaster Recovery

The fourth step within the BCM-lifecycle is the development and implementing BCM response and Disaster Recovery Plans. As soon as recovery requirements have been identified with the BIA's help and appropriate continuity strategies have been selected, the output is to be documented in an actionable plan (Hiles, 2007). Once the plan has been composed, it should not be considered complete, but should instead be revised and updated on a regular basis.

Deciding on how the plan is to be distributed is a trade-off between availability and security. The plan will contain sensitive information, e.g., instructions on accessing vital documentation, including passwords and/or safe combinations. The plan version should be stated clearly, and ideally, have a unique identifier to ensure that only relevant plans are in circulation. (Hiles, 2007)

Hiles (2007) recommend that the plan should include the following:

- A list of assumptions which the plan is based upon, hence making it easy to challenge these.
- The scope of the plan.
- Known weaknesses of the plan.
- Action plans for the relevant team responsible for recovery which include:
    - Contact information to team members and alternate.
    - List of priorities for recovery.
    - Recovery objectives (MTPD and MTO).
    - Recovery point objectives (if applicable).
    - What should be reported and to whom.
    - List of vital documents and materials and how to obtain them (include password, combination numbers, etc.).
    - Resource requirements and timeframe for when these should be available.
- Contact information, both internal and external.
- All necessary supporting documents and procedures, plans, maps, etc.

Further, the plan should be kept simple and relevant for recovery activities. Hence, it should not contain training and testing, nor should it include the detailed output of the BIA. (Hiles, 2007)

2.1.8 Education, testing and reviewing

Education and training are crucial factors which contribute to embed and enable Business Continuity Management in the organisational context. Training and exercises can also create awareness and competence among the staff and keep the risk culture alive during periods when disasters are rare and provide those involved in the BCM-programme with the necessary skills to carry out specific activities (FSPOS, 2019; Norrman & Wieland, 2020; Wong & Shi, 2015). Reviewing and evaluating the BCM-programme and the plans developed aims to increase the understanding among the general workforce regarding business continuity, as well as that the information is kept up to date and that the process is complied with (Wong & Shi, 2015).

2.1.8.1 Education and Training

In this sense, education is mainly about communicating with the workforce why BCM is needed; this is done by communicating the benefits and intended goals of BCM (Gibb & Buchanan, 2006). Training sessions are also needed to ensure that the communicated goals can be achieved (Gibb & Buchanan, 2006). The training sessions should also help to ensure that the organisation is prepared to handle a crisis when it takes place (Lindström et al., 2010). Training sessions can be either instructor-led or be based on self-study. Gibb and Buchanan (2006) recommend an

approach where new staff receive training as part of their introduction and then reorientation training every 6-12 months. Those in charge of critical processes should also be provided with more specific BCM training (Gibb & Buchanan, 2006). Training is an important aspect and should be conducted at different levels within the organisation and reflect the roles and needs related to BCM for the different groups (FSPOS, 2019). Those expected to be responsible for disaster recovery and business continuity, as well as those responsible for crisis communication, should receive tailored training to ensure that they can perform their assigned tasks during an incident. Gibb and Buchanan (2006) recommend to start with letting team members familiarize themselves with the continuity plans and then perform desktop exercises to train on how to respond to a possible disaster.

2.1.8.2 Testing and exercises

It is essential to continuously test and perform exercises to ensure that the business continuity plans are relevant, deliverable, and sufficient to meet the recovery requirements (Hiles, 2007). Testing also creates awareness and ensures that staff are familiar with the continuity plans (Gibb & Buchanan, 2006; FSPOS, 2019; Hiles, 2007). A test report, or similar documentation, shall be written which evaluates the test, its effectiveness, and identified gaps and improvement areas for the aspects being tested (Gibbs & Buchanan, 2006; FSPOS, 2019). Regarding the frequency of tests, Gibb and Buchanan (2006) argue that test frequency should be no longer than a year, FSPOS (2019) gives no specific timeframe but argues that the frequency should consider the criticality of the process or asset covered by the continuity plans (FSPOS, 2019).

Testing can be categorised by desk-based exercises and simulation exercises (FSPOS, 2019). Compared to a simulation exercise, a desk-based exercise requires less resources, is primarily used for learning-purposes, and is suitable for inexperienced staff in terms of business continuity (Gibb & Buchanan, 2006; FSPOS, 2019). A desktop exercise can be a plan-walkthrough where the plan is measured against a specific scenario (Hiles, 2007; FSPOS, 2019). A plan-walkthrough will allow staff to familiarise themselves with the plan, their roles and their responsibilities. It also provides a review of contents, such as contact details and procedures (Gibbs & Buchanan, 2006; Hiles, 2007). However, a simulation exercise is more suitable for experienced staff and is aimed at testing the routines and instructions in place (FSPOS, 2019). A simulation exercise can either be technology-oriented (by, for example, testing back-up generators), or process- or service-oriented where staff respond to a scenario (Gibbs & Buchanan, 2006). The scope of a simulation exercise can range from testing individual components of a plan (e.g., communication procedures or execute workarounds) to a large-scale test that incorporates multiple components or the complete plan. Hiles (2007) recommends starting with component testing to verify individual components' validity before moving up to large-scale tests that are more complex and will demand more resources.

2.1.8.3 Reviewing and Evaluation

Evaluation is highlighted as an important aspect within BCM. The purpose of evaluation is to both provide guidance and ensure compliance. This can either take place through audits or by implementing KPIs and self-assessments.

2.1.8.3.1 Audits

Audits play a crucial role in maintaining a BCM-programme (Pitt & Goyal, 2004; Hiles, 2007). One of the primary purposes of a BCM audit is to evaluate an organisation's BCM practices and related documents to identify improvement areas and offer guidance (Freestone & Lee, 2008). Compared to a financial audit, BCM audits will hardly ever become an issue for legal compliance or affect organisations financial accuracy (Hiles, 2007). Further, as auditors will rarely have the opportunity

to witness the BCM capabilities in practice, BCM audits will be based upon a What-if scenario to determine and measure BCM capabilities and an organisation's ability to handle a disruption (Freestone & Lee, 2008; Hiles, 2007).

BCM is a complex topic and requires extensive knowledge from auditors. Auditing of BCM processes should range from underlying business assumptions to testing and exercises. During the 90s, auditing of BCM was limited to the existence of a business continuity plan. Historically, however, no further review was normally conducted, and as expected, the auditors were provided with what they asked for: the existence of plans. Today, the emphasis is equally on the BCM-process and the decision-making process to produce plans and documentation. Special consideration needs to be taken regards the implementation of BIA, as this is the basis on which the plans are based (Freestone & Lee, 2008). Commonly, an audit is benchmarked towards a specific standard or best practice document. There are many standards and best practices for BCM that an audit can be benchmarked against (Freestone & Lee, 2008; Hiles, 2007). Such standards only indicate to the organisation what constitutes "good" BCM but will not provide detailed coverage (Hiles, 2007). Hence, when developing a BCM audit, several factors such as the objective of the audit, the maturity of the audit organisation, and the audit approach and scope should be discussed. These factors will form the basis for the audit framework. (Hiles, 2007)

Furthermore, the maturity of the BCM-process within the targeted audit entity will also affect the auditing process. A comprehensive BCM audit of an entity where BCM is non-existent will not provide any further insights. Similarly, a more mature BCM-programme must be coupled with an equally mature audit framework to provide meaningful contribution by feedback and findings. Hence, auditors should be wary of falling into the compliance trap, and the audit framework will have to be adapted based on the need and maturity of the target organisation. (Hiles, 2007)

2.1.8.3.2 Self-assessments

Self-assessments of BCM are a cost-efficient method used to create awareness, identify improvement areas and capture measurable output. The preference for self-assessments is to be simple and have a clear focus on specific objectives. However, the inherent limitations of self-assessments are biased findings and varying skills and knowledge which limit comparability. These limitations can be addressed by communicating expectations and purpose of the self-assessments. However, they should not be regarded as a substitute to an independent audit (Trousdale, 2015). Norrman and Wieland (2020) provide a practical example of Ericsson's monitoring of BCM implementation through quarterly self-assessments. In these assessments, Ericsson monitors BCM framework compliance rate and risk treatment (Figure 2.7). The "BCM compliance rate"-monitors: (i) whether the scope of BCM is in place and updated, (ii) if risk analysis has been conducted and documented, and (iii) if training and exercises have been conducted. The "risk treatment"-KPI monitors the development of how well different continuity risks are assessed and treated over time. Besides, BCM is included in the annual compliance reviews of Ericsson's top management where performance indicators are implemented which considers whether the managers have: (i) a BCM strategy in place, (ii) have BCM action plans in place, and (iii) if they have engaged in any tests. (Norrman & Wieland, 2020)

Figure 2.7: Ericsson's risk treatment and BCM compliance monitoring. (Source: Norrman & Wieland 2020, p. 658)

2.2 Theoretical Framework

Based on the literature review, a theoretical framework has been developed (Figure 2.8). This framework illustrates the process of developing disaster recovery plans (DRPs) within BCM theory and how DRPs connect to the management of recovery from the Covid-19 pandemic.

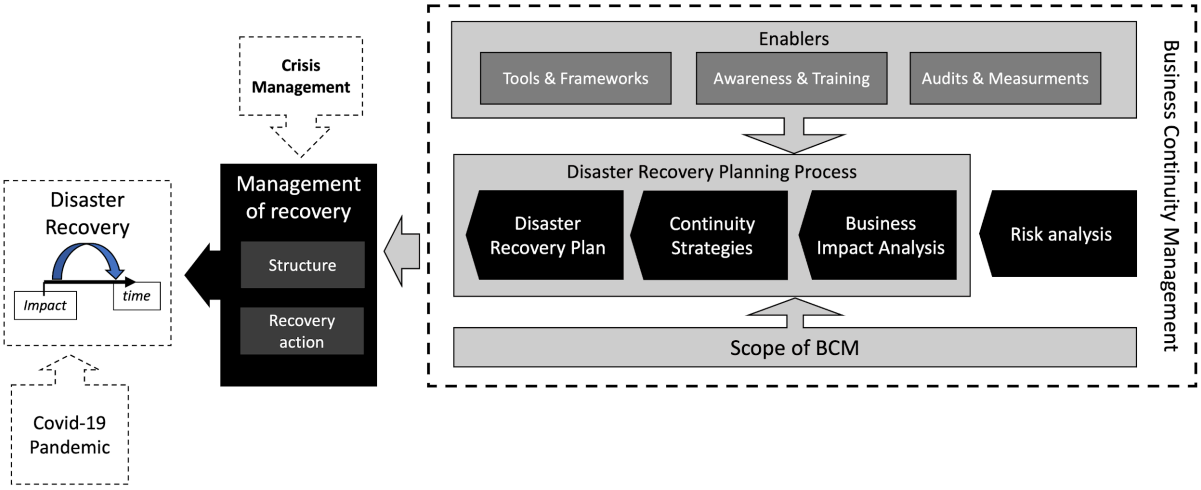


Figure 2.8: Theoretical framework adapted from the literature review. Developed by the authors.

Management of recovery is divided into structure and recovery actions. *Structure* refers to the organisation and coordination of the recovery response. The recovery actions refer to the actual recovery actions that have taken place. Here, crisis management is also taken into consideration due to its close relationship to BCM, both in theory and within the Company.

Within BCM, the "disaster recovery planning process" (called Business Continuity Planning within theory) refers to the process of developing DRPs and the components of BIA, Continuity strategies, and the final output of DRPs as described by theory. Scope of BCM refers to the scope of the BCM-programme and specifically the disaster recovery planning process.

Enablers are the prerequisites and enables the disaster recovery planning process. Besides the enablers mentioned by theory (training & education and audits & measurements) a third component, tools and frameworks, has been added. Tools and frameworks are defined as the current tools and templates that are used to develop and perform the disaster recovery planning process within the Company. This has been done to distinguish practical tools, templates and instructions from support and education in terms of training and exercises based upon learnings from the initial pilot interviews.

3 Method and Approach

This chapter sets out to address the thesis' method and approach. The thesis has applied a method for case studies for methodological approach; this is discussed in section 3.1, including the different steps within the multiple case study methodology. The measures taken to ensure the thesis's quality (by increasing the study's validity, generalisability and reliability) are discussed in section 3.2.

3.1 Case Study Approach

This thesis' methodological approach is that of a case study approach, which is suitable for less explored areas, or well-studied subjects that need an updated perspective (Eisenhardt, 1989). This is in line with the research area of business continuity management and management of disaster recovery. According to Yin (2018), researchers need to consider three different conditions before they decide on how to conduct a research study; (i) the form of the stated research questions, (ii) the degree of control the researchers have over behavioural events, and (iii) the degree of focus on contemporary (as opposed to historical) events (Yin, 2018). Yin (2018) recognises the form of the stated research questions, to be the most important. Furthermore, Yin (2018) argues that a case study approach is appropriate when the research aims to answer questions of a "how" and "why" nature (and "what" when the research is exploratory). Table 3.1 below shows how the three conditions (horizontal axis) are related to five different qualitative research methods.

Table 3.1: Relevant Situations for Different Research Methods. (Source: Yin 2018, p.39)

Method	**Form of research question**	**Requires control over behavioural events?**	**Focuses on contemporary events?**
Experiment	how, why?	yes	yes
Survey	who, what, where, how many, how much?	no	yes
Archival analysis	who, what, where, how many, how much?	no	yes/no
History	how, why?	no	no
Case study	how, why?	no	yes

Since the study's three stated research questions are of a "how" nature, all of which require no control over behavioural events and two focus on contemporary events, only two research methods remain, *case study* and *survey*. Since this study's topic requires a comprehensive and in-depth description of the situation at the Company regarding the "disaster recovery"-proceedings during the pandemic, a case study was considered superior.

The case study approach is an investigative method used in qualitative research where the researchers explore a single case or multiple cases through detailed, in-depth data collection with several sources of evidence (Creswell, 2007). According to Yin (2018), the least common denominator in all types of case studies is that they try to shed light on a case (or a phenomenon) within their real-world contexts, ranging from anything from “decisions”, “individuals” and “organisations” to “processes”, “programs” and “events”.

The process and logic applied when conducting the case study was the one suggested by Yin (2018). Yin (2018) suggest that all concluding remarks from case studies are likely to be the result of the following iterative six-step case study process: (i) Plan, (ii) Design, (iii) Prepare, (iv) Collect, (v) Analyse, and (vi) Share. The process is illustrated in Figure 3.1 below.

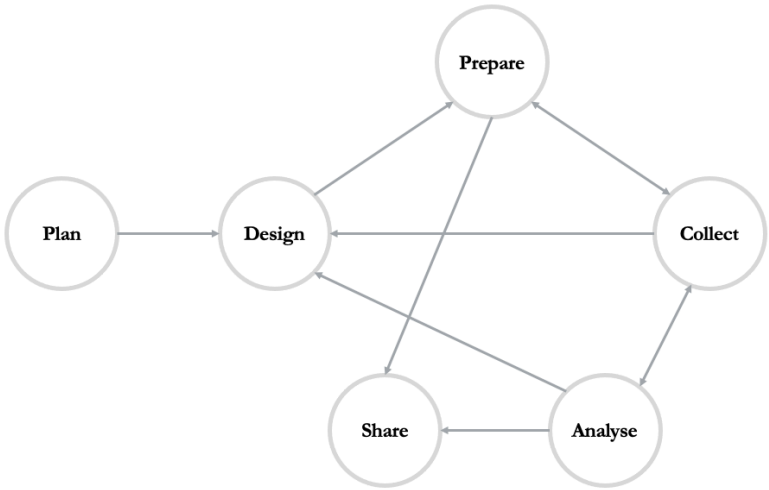


Figure 3.1: Research process for case studies. (Source: Yin 2018, p. 30)

3.1.1 Planning the case study

In the first process step, the researchers should clarify that they follow a rigorous methodological path (Yin, 2018). This step began with an initial literature review to develop relevant research questions and improve their quality. After conducting extensive literature studies, the authors of this study developed the final research questions in collaboration with the Company and LTH supervisors.

Yin (2018) addresses five significant challenges in conducting a proper case study; (i) conducting the research rigorously, (ii) avoiding confusion with non-research case studies, (iii) reaching generalizable conclusions, (iv) managing the required level of effort, and (v) understanding the comparative advantage with case study research. The former two of these challenges are considered particularly relevant by the authors and a brief explanation for how they were accounted for is provided here, primarily based on the recommendations by Yin (2018). To overcome the challenge of *"conducting the research rigorously"*, the results and conclusions are established based on systematic procedures and unequivocal evidence does not guide the conclusions' direction. To overcome the challenge of *"avoiding confusion with non-research case studies"*, the methodological procedures are highlighted. The authors' foremost intention is to report all evidence fairly and remain transparent to limit any prejudice.

Before moving on to the next step in Yin's process, a brief presentation is here provided on how the thesis' theoretical frame of reference was developed.

3.1.1.1 Theory development process

A thorough literature review was conducted to better understand the research area, support the chosen research topic, and assist the authors in the analysis, as suggested by Rowley and Slack (2004). The literature review was conducted based on the five-step approach suggested by Rowley and Slack (2004); (i) scanning documents, (ii) making notes; (iii) structuring the literature review, (iv) writing the literature review, and (v) building the bibliography. The five-step approach served as a baseline, but, a less linear approach was applied in reality, for example, scanning documents and making notes were done in parallel. The included steps are described in brief below.

3.1.1.1.1 Scanning documents

In the first step, documents were scanned to obtain a broad understanding of the research topic. This step provided the authors with knowledge about key topics and themes to include in the

literature review. Several different search engines were used to identify relevant literature, including LubSearch, Scopus Search, and Google Scholar. The search engines were mainly used to identify different types of sources, including articles from academic journals and web-based resources. Two of the four approaches suggested by Rowley and Slack (2004) were applied during the search process; *brief search* and *building blocks*. In order to obtain a representative view of the existing literature, the following keywords were used, both in separate and in different combinations: *Business Continuity Management, BCM, Covid-19, Disaster Recovery, Disaster Recovery Planning, Supply chain risk management, SCRM, Business Impact Analysis, Risk Analysis, Business Continuity Planning, Audit, Risk Management, Crisis Management, Resilience, Business Continuity*. In addition, books were bought and borrowed from the library.

3.1.1.1.2 Making notes

The second step consisted of annotating the documents with different keywords and taking notes of relevant information in the different documents. This was done to facilitate finding the relevant information at a later stage, as recommended by Rowley and Slack (2004).

3.1.1.1.3 Structuring the literature review

In this step, documents were organised based on the various identified key themes. This was done by developing a spreadsheet, with key themes (identified in the first step) along the first axis and document-names along the second axis. Then relevant information (regarding keywords etc.) was entered in the spreadsheet's corresponding cells. In addition, a common folder was created with a hierarchy-structure for the different key themes with relevant documents for each theme being stored in the corresponding folder.

3.1.1.1.4 Writing the literature review

The fourth step included writing the literature review. Per suggestion by Rowley and Slack (2004), the authors began by deciding the headings of the literature review (BCM and SCRM) and then assigned these headings different key themes. To create an overview before the actual writing process began, the documents with content relevant to a specific section of the literature review were mapped out and summarised.

3.1.1.1.5 Building the bibliography

The last step, building the bibliography, was part of the ongoing process of developing and refining the theoretical framework, as suggested by Rowley and Slack (2004). The iterative process began with the literature search and ended upon the completion of the literature review. The sources were included in parallel with the writing process.

3.1.2 Design

The second step of the study's method involves the research design of the study. The purpose of this step is to describe the overarching rationale for the decisions made throughout the thesis process. In this step, the research design is first accounted for by describing the unit of analysis and the studied cases. The design step then ends with a description of the trade-offs made to ensure the study's quality.

3.1.2.1 Unit of Analysis

The unit of analysis is defined as the element of investigation and is directly tied to the study's stated research questions (Yin, 2018). The unit of analysis in this study is "Business continuity management and management of disaster recovery" at the Company during the Covid-19

pandemic. Further, the unit of analysis should not be confused with the unit of data collection which is the particular sources of evidence (Yin, 2018).

3.1.2.2 Single or Multiple Case Study

A case study can involve both a single case as well as multiple cases (Voss et al., 2002; Yin, 2018). This thesis is conducted based on multiple cases. The main advantage with studying multiple cases is that the possibility of drawing generalised conclusions increases (Voss et al., 2002; Yin, 2018). A multiple case study of the Company is expected to be useful for an in-depth and detailed review of the Company's learnings related to disruptions and disaster recovery during the Covid-19 outbreak, where it is of interest to investigate how the different functions have operated and how recovery processes can be improved.

This thesis will be conducted as a multiple case study, with each case being a Business Unit and its corresponding Operations Department (i.e. Product Group). It was also in the authors' intention to include three different Sales Companies of the Company in the study, but these interviews turned out to be more concerned with crisis management. Although the interviews provided the authors with a better understanding of the Company's situation, their contribution to the study's purpose was perceived as very limited. Hence, it was decided to exclude the sales companies from the study. However, the sales companies served as a pilot case. The thesis will also have distinct sub-groups representing a department during various stages of either the material or information flow throughout the Company where theoretical replication will be applied between the functional groups and literal replication within the groups.

Each case is a:

- Business Unit with a corresponding Product Group with sub-groups:
    - BU-management
    - BU-sales
    - PG-management
    - PG-sourcing

Once the data was collected, it revealed that there was an important distinction within the sub-groups of PG-management and PG-sourcing between the site (or factory) level and the more strategic level for the PG. Hence, in the analysis, these were separated to better reflect the current implementation of BCM within the Company.

3.1.3 Preparing to Collect Data

To prepare for the data collection case study, Yin (2018) emphasises five subcategories to consider. The first subcategory includes that the researcher needs to have the right skillset as case study investigators. Examples of desired attributes this skillset needs to contain are to be able to: Ask the right questions (and interpret the answers fairly); be a good "listener" (not trapped by existing ideologies or preconceptions); being adaptive and flexible; have a proper understanding of the issues being studied; conduct research in a professional and unbiased manner.

The second subcategory involves preparation and training for the specific case study. According to Yin (2018), specific ethical considerations arise for all research involving human "subjects" (those who will participate in the study). As part of the ethical consideration, it is essential to conduct the case study with great care and sensitivity. This may involve: *gaining informed consent from the participants*; *protecting the integrity and confidentiality of the interviewees* and *selecting participants in an unbiased way*. Ethical consideration was accounted for by anonymising the interviewees' answers and asking for permission when recording the interviews. The subcategory also involves training

as well as protocol development and review. The training's goal was to have a thorough understanding of the basic concepts, terminology, and methodological issues considered relevant to the study. The training involved agreeing on the type of evidence sought and developing a case study protocol that acted as a template and guide during the data collection. According to Yin (2018), the purpose of the case study protocol is guiding the data collection and is especially important if the study involves multiple researchers. However, as both authors of this thesis were present at all interviews, and the overview of the case study and data collecting procedures were agreed upon and documented within this report, the case study protocol was reduced to the presentation of the case study's purpose for the interviewees and an interview guide (see appendix A).

During this phase, another important aspect is screening candidates to identify appropriate cases before the formal data collection (Yin, 2018). Yin (2018) proposes a two-phased approach when the number of eligible candidates is equal to 12 or more (as in this case). The two-phased approach involves (i) collection of quantitative information on the available candidates and (ii) the determination of appropriate criteria upon which candidates shall be selected to be qualified for the study. The selected candidates were selected to reflect the material flow for three different Business Units within the Company's divisions. The Business Units were selected based upon geographical and operational complexity. This selection process was conducted with support from the three Division Managers and the Group Risk Manager at the Company. The interviewee(s) were then selected based upon their responsibility and the sub-group being studied. Selected interviewees are illustrated in Figure 3.2. In addition to the interviewees in Figure 3.2, additional interviews were held with internal audit and sales companies. A complete list of interviews is depicted in Table 3.2.

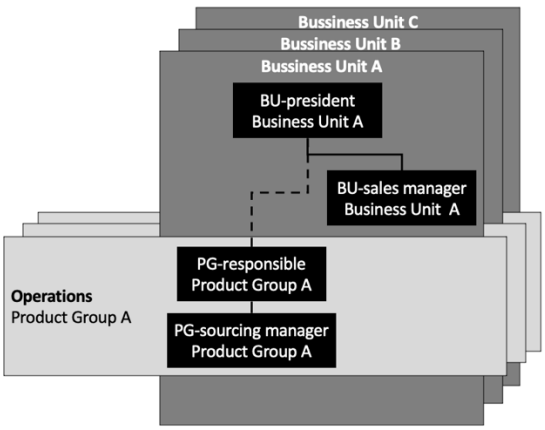


Figure 3.2: Illustration of selected interviewees within each BU and PG. Developed by the authors.

Table 3.2: List of interviewees, their positions, date and duration of interviews.

Position	**Date**	**Duration**	**Comment**
BU President - BU A	2020-11-11	90min	Case A
BU-sales manager - BU A	2020-11-09	60min	Case A
PG-responsible - PG A	2020-11-11	90min	Case A
PG-sourcing manager - PG A	2020-11-19	90min	Case A
BU-president - BU B	2020-11-05	90min	Case B
BU-sales manager - BU B	2020-11-13	90min	Case B
PG-responsible - PG B	2020-11-04	90min	Case B
PG-sourcing manager - PG B	2020-11-06	90min	Case B
BU-president - BU C	2020-11-09	90min	Case C
BU-sales manager - BU C	2020-11-10	90min	Case C
PG-responsible - PG C	2020-11-04	90min	Case C
PG-sourcing manager - PG C	2020-11-10	90min	Case C
Internal audit manager	2020-09-14	90min	
Managing Director Sales Company X	2020-10-28	90min	Pilot interview
Managing Director Sales Company Y	2020-10-30	90min	Pilot interview
Managing Director Sales Company Z	2020-11-11	90min	
Global Sourcing Manager	2020-11-24	90min	
Operations Development Manager	2020-11-17	75min	

As suggested by Yin (2018), a pilot case study was performed by interviewing two sales companies before the collection phase started (Table 3.2). While initially intended as separate cases (recall section 3.1.2.2), they were instead used to refine data collection plans such as develop relevant lines of questions and contributed with further conceptual clarifications for the research design.

3.1.4 Collect

Out of the six (primary) sources of evidence that Yin (2018) mentions in connection with case studies (documentation, archival records, interviews, direct observations, participant-observation and physical artefacts), the following two were mainly used: documents and interviews. The documents consisted of other BCM-related templates which served as a complement to the interviews; these were obtained from the Company's intranet and from the company supervisor.

The interviews were conducted as semi-structured interviews over Microsoft Teams as this was deemed practical for the interviewees due to remote work, geographical distance and an ongoing pandemic. However, a disadvantage of remote interviews is the lack of interpretable informal communication, such as body language (Creswell, 2007). Due to this, as many remote interviews as possible were conducted using a video camera. However, not all interviews were conducted with the camera activated due to an unstable internet connection and may be regarded as equivalent to a telephone interview. To obtain a more accurate reproduction of the interviews (compared to only own notes), they were recorded with permission from the interviewees and then transcribed and analysed.

To reduce the risk of misinterpretation, both authors were present during all interviews. The authors distributed the responsibility by one being responsible for asking the questions while the other kept notes, as suggested by Voss et al. (2002). In accordance with Yin (2018), the questions were posed in a way that made them meet the needs of the authors' own line of query while also being framed in a way that did not affect the interviewees' answers.

3.1.5 Analyse

According to Yin (2018), the best preparation for conducting case study research is to have an analytic strategy that states what to analyse and why to guide researchers through the analysis. The purpose of the analytic strategy is thus to provide the researchers with rigorous thinking and allow them to link the empirical data with the study's key concepts and then let this guide the analysis of the empirical data to draw empirically based conclusions (Yin, 2018). According to Yin (2018), there are four general strategies for analysing data:

1. Relying on theoretical propositions: analysis guided by theoretical orientation and frameworks (i.e. deductive approach)
2. Working with the data from the ground up, starting with the available data and then finds theoretical propositions based upon it (i.e. inductive approach)
3. Developing a case description (according to some descriptive framework)
4. Examining plausible rival explanations (works in combination with all three above).

The analytic strategy applied in this thesis combines the two first general strategies with the third, and the fourth strategy was applied informally throughout the research process. The thesis is conducted with an abductive approach, thus combining both the deductive and inductive approach. It can be viewed as a continuous process where iterations between theory and data are made throughout the study (Friedrichs & Kratochwil, 2009). Unlike the deductive or inductive approach, the abductive approach can explain, develop or change the theoretical framework before, during or after the research process. The abductive approach was considered most appropriate given the objective of identifying gaps between the "disaster recovery"-practices at the Company and what theory proposes, and the fact that the authors did not know about what to expect regarding the levels of insights from interviews, due to, for example, varying degrees of maturity for the organisation in terms of BCM.

From the initial literature review, the authors were able to obtain indications of what to expect to be brought up during the interviews, thus reminding of the deductive approach. However, from the interviews it became evident that there was a discrepancy between what theory highlighted as important and what was emphasised during the interviews. Hence, resulting in some sections of the theoretical framework and literature review to be elaborated upon (e.g. the business impact analysis, the use of maturity models, and the consideration of crisis management). In contrast, other sections were reduced (for example BCM-programme management) due to the absence of

relevant data from interviewees. Thus, combining the deductive and the inductive approach, resulting in an abductive approach (Figure 3.3).

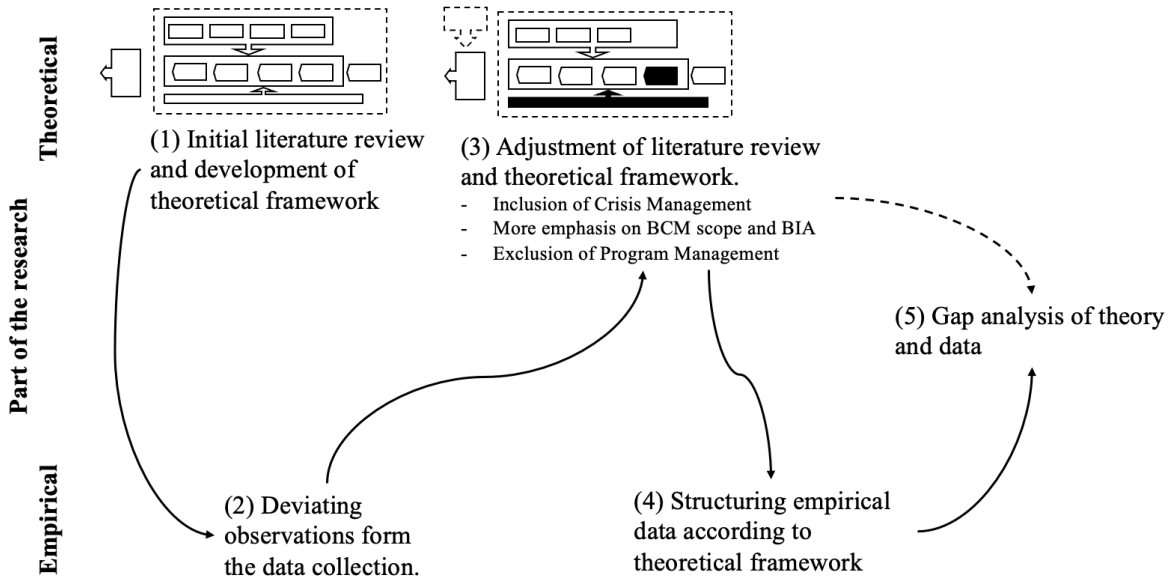


Figure 3.3: Illustration of the abductive approach used for this thesis. Developed by the authors.

A within-case analysis was then conducted to simplify the later following cross-case analysis, as recommended by Eisenhardt (1989) and Yin (2018). The within-case analysis allows unique patterns of each case to be found and requires the researcher to become more familiar with the cases; in this stage, explanation building was employed. The interview material was analysed within each case by comparing the relevant aspects of the BCM theory with the Company's situation to identify deviations and similarities between the two (i.e. explanation building). Depending on how much the findings was in line with theory, a score was given for each aspect of the theoretical framework.

Then, cross-case analysis was conducted, Eisenhardt (1989) proposes three approaches to cross-case analysis: (i) choosing categories or dimensions and looking for similarities and differences between these cases, (ii) selecting pairs of cases and looking for similarities and differences between them, and (iii) by data source, looking for similarities and differences between the cases. The first approach was applied in this thesis by identifying similarities and discrepancies across the cases regarding each aspect of the theoretical framework.

The theoretical framework was thus used as a basis for analysis where different aspects were analysed and categorised. This was done both for the single-case analysis in Appendix B, and the output was then used for the cross-case analysis in Chapter 5. The categorisation was performed according to a scale of 1 to 5:

- 1: Not in place & perceived need
- 2: Not in place, no perceived need
- 3: Partly in place (as suggested by theory) & perceived need
- 4: Partly in place (as suggested by theory), no perceived need
- 5: In place (as suggested by theory)
- "-": No info available

In addition to the categorisation, comments and findings were added to increase transparency. The categorisation of each aspect was in many cases difficult as several aspects were dealt with

informally. In such cases, this was highlighted in the comments. However, this scale is not perfect as an informal aspect which is barely in place and a rigorous formalised process which excludes a key element of theory both were categorised as *"4-Partly in place, no perceived need"* if there were no perceived need form the interviewees. Further, the categorisation was not verified with the interviewees, hence it may be possible that some aspects are in place, but that they were not mentioned or elaborated upon during the interviews.

3.1.6 Share

The final step of Yin's process is to share the case study result (Yin, 2018). According to Yin (2018), it is essential to align the language and the report's content with the intended audience knowledge. This paper's audience mainly consists of academics (and certain practitioners) with relevant knowledge within Business Continuity Management and Supply Chain Risk Management, as well as the Group Risk Management Department at the Company.

During this stage, important steps are: defining the audience, composing textual and visual materials, displaying enough evidence for the readers to draw their own conclusions, and presenting it well (Yin, 2018). In addition, the authors always strived to find a balance between the inclusion of sufficient information so that the reader could reach the same conclusions without being too detailed and risking boredom or confusing the reader. In this stage, it is also of interest to find a proper balance for the article's stakeholders, especially when it comes to definitions and phrasing as certain concepts can be defined differently for the two target groups (LTH and the Company). To find this balance, the authors worked closely with the LTH and the Company supervisors to ensure that both parties were satisfied with the result.

3.2 Research quality

The research design connects the data to be collected with the study's stated research questions. According to Yin (2018), any research design' quality can be assessed based on specific logical tests. According to Yin (2018), four tests (or criteria) are regularly used to assess (and ensure) the quality of most empirical social research, including case study research. Table 3.3 below shows the tests, the recommended case study tactics for fulfilling the tests, and a reference to the research phase where the tactics are to be used. The paragraphs following the table describe how this thesis' research has been conducted based on these criteria.

Table 3.3: Four design tests to ensure the quality of case study research (Yin, 2018, p. 79)

Criteria	**Case study Tactic**	**Phase of case study research in which tactic is addressed**
Construct validity	• Use multiple sources of evidence • maintain a chain of evidence • have key informants review draft case study report	• data collection • composition
Internal validity	• do pattern matching • do explanation building • address rival explanations • use logic models	• data analysis
External validity	• use theory in single-case studies • use replication logic in multiple-case studies	• research design
Reliability	• use case study protocol • develop case study database	• data collection

Construct validity refers to the degree to which a study investigates what it claims to investigate, i.e. the degree to which the measure provides an accurate reflection of reality (Gibbert et al., 2008). Construct validity is considered during the data collection phase. The criteria help the researchers avoid using operational measures based on the researcher's subjective judgements before the case study (Gibbert et al., 2008; Yin, 2018). Yin (2018) outlines three tactics that have crystallized to increase construct validity, all of which have been applied during the thesis process; (i) to use multiple sources of evidence, (ii) to establish a chain of evidence, and (iii) have key informants review the draft case study report. To study the phenomenon of "Business continuity management and management of disaster recovery" at the Company during the Covid-19 pandemic from different angles, several sources of evidence were used (for triangulation purposes) during the data collection phase. The sources of evidence included interviews (with several interviewees) and internal documents (mainly internal presentations and templates). Throughout the research process, it has been in the authors' utmost interest to establish a clear chain of evidence to allow for the reader to reconstruct how the conducted research went from the initially stated research questions to the conclusions presented at the end of the report. To ensure a clear chain of evidence, the report's conclusions are based on the collected empirical material in the light of relevant theory. The authors tried to be as impartial as possible during the data collection by asking similar sets of questions to all interviewees, see Appendix A.1 for the attached case study protocol. The supervisor (and other students) at Lund University has also reviewed the chain of evidence during the research process. Finally, summarised findings from each interview have been sent to the corresponding informant, to ensure an accurate portrayal of the interviews' information. The supervisor at the Company has also reviewed drafts of the report to help ensure a high degree of construct validity in the report.

Internal validity cannot be considered fulfilled if the research design causes the investigators to incorrectly conclude a causal relationship between two variables without knowing that any third event may have affected the outcome (Yin, 2018). Internal validity is thus primarily concerned with explanatory case studies, where the researchers aim to explain causal relationships. This case study is of a combined explanatory and descriptive nature, why internal validity is only discussed briefly. The report's empirical evidence is mainly gathered from interviews, and by having the respondents answer a similar set of questions to the extent possible (see Appendix A.1), the internal validity has improved. In addition, two of the four analytical tactics suggested by Yin (2018) to increase the internal validity have been applied in the analysis-phase, *pattern matching* and *addressing rival explanations* by contrasting empirical evidence with theory as well as additional empirical evidence.

External validity is mainly concerned with whether a study can be generalised beyond the case being studied. External validity is the criteria where case studies are exposed to the most criticism (Yin, 2018). Case study research is mainly focused on developing theory rather than testing it (Yin, 2018). Neither single nor multiple case studies allow for statistical generalisation (inferring conclusions about a general population), but rather analytical generalisation (where the theory is contrasted with the empirical results of the case study) (Gibbert et al., 2008; Yin, 2018). A shortcoming of this thesis is that the authors are only researching one individual company and that this company is kept anonymous. Anonymising the company makes it more difficult to analytically generalise this case study's results to other situations, as it is not possible for an outsider to fully consider the exact context in which this study was conducted. However, by describing the company and its context, the authors aim to increase the report's external validity. To increase external validity, Yin (2018) emphasises that the form of research questions can have a great impact. By using only "how"-questions and contrasting the cases with theory, the authors intend to further increase external validity.

The fourth and final test is about the *reliability* of the research. Reliability deals with whether the study's results are repeatable, i.e., if other researchers would reach the same conclusions if the study were to be repeated. Tactics for securing good reliability are mainly focused on the data collection phase of the research design where the study's documented procedures need to be well documented. To increase reliability, Yin (2018) recommends two tactics; *the use of a case study protocol (Appendix A)*, and *developing a case database*, both of which have been employed for this thesis. To further ensure the gathered material's reliability, the respondents have received a draft of the case descriptions to ensure the empirical material's trustworthiness. To further increase the research's reliability, each assessment during the analysis phase was made independently. In those cases where the authors' assessments differed, the authors discussed the differences to agree on a mutual assessment. Due to the report's time constraint, no further checks were made with anyone at the Company regarding the authors' assessments. An issue related to the report's reliability is related to the subjective nature of the categorisation scale[2] used for the single- and cross-case analysis. The categorisation scale allows for interview answers with different meanings to obtain the same score. To overcome this issue, the authors have prioritised consistency in the assessments throughout the process, ensured clarity of the categories' meaning, and condensed findings have been described as comments next to the assessments, further nuancing the final score. However, the authors also want to highlight the used scale as one of the report's strengths as it accounts for the perceived needs of those interviewed and does not only consider what theory recommends, which further supports the report's findings, not least from the examined Company's perspective. To further increase the reliability, several different stakeholders were interviewed which allowed for some triangulation during the analysis. However, due to the semi-structured format of the interviews and the informants varying degrees of involvement in BCM at the Company a large amount of the findings resulted in "no information available" and it was not possible to draw any conclusions based on these areas.

[2] Recall the classification described under 3.1.5: *(1: Not in place, perceived need; 2: Not in place, no perceived need; 3: Partly in place, perceived need; 4: Partly in place, no need; 5: In place; - No info available.)*

4 Case Description and Perceived Needs

This chapter presents the empirical data collected from interviews with the informants who belong to and represent the three cases. Each Case consists of a "Case Description"-section and a "Perceived Needs"-section. The Case Description describes the informants' organisations and roles, how BCM was conducted prior to the pandemic, the impact of the pandemic, and management of recovery. The second part of each case presents the informants' "Perceived Needs" (i.e., the desired changes) related to BCM concerning the theoretical framework (recall Figure 2.8). The contents of this chapter (primarily BCM prior to the pandemic and Perceived Needs) are then analysed based on the theoretical framework in the Single-Case Analysis in Appendix B.

4.1 Case A

4.1.1 Case Description

4.1.1.1 Organisational description

Case A consists of Business Unit A (referred to as BU within Case A) and Product Group A (referred to as PG within Case A). The BU is mainly based in Europe, and many of its constituent BU-functions share the same European site, including the BU-sales function but also parts of the associated PG. The customers mainly consist of industrial companies across the globe. The service operations are carried out in in-house service centres, by supplying customers with spare-parts and some service is performed at customers' sites. The BU-sales function is responsible for equipment sales at the BU-level, sales development and technical support in the sales process within the BU's different areas of application. The BU-sales function interacts both with the different Sales companies and with the PG. BU-sales provides the PG with rolling sales forecasts which are discussed and agreed upon through the S&OP-process. In the event of a significant supply chain disruption, the BU-sales function acts as the primary communication link between the PG and the sales companies. If the Company cannot keep its commitment to the customers, the sales companies will prioritise their own customer orders and contact the BU-sales function to make a case about why their customers should be prioritised. Then, the BU-sales function's role is to coordinate with the PG, and based upon the options available, prioritise customer orders globally based on their strategic value for the whole BU. In general, prioritisation will be based not only on direct financial impact but also on customer loyalty, long-term profits of the customer relationship, customer size, and customer type.

The PG is the operations function responsible for sourcing, manufacturing, and delivering products for the BU and is managed by the PG-responsible. The PG includes several factories located in North America, South America, Europe, Asia, and Australia. The PG-Sourcing department (managed by the PG-sourcing manager) is responsible for coordinating sourcing activities across the PG's different factories (at an aggregated level). The Sourcing department consists of a handful of strategic buyers, responsible for sourcing components and raw materials for the PG and communicating with factories about more specific needs. The Sourcing department works closely with the factories' own purchasing departments (responsible for tasks such as the factory's operational placement of orders from suppliers used locally). The Sourcing department also interacts with the "Global Sourcing"-function. Global Sourcing has the ultimate responsibility for the Company's supplier base at the global level and is responsible for developing category strategies and contractual relationships with suppliers. The author's interpretation of the organisation and reporting structure for BU A and PG A is shown in Figure 4.1.

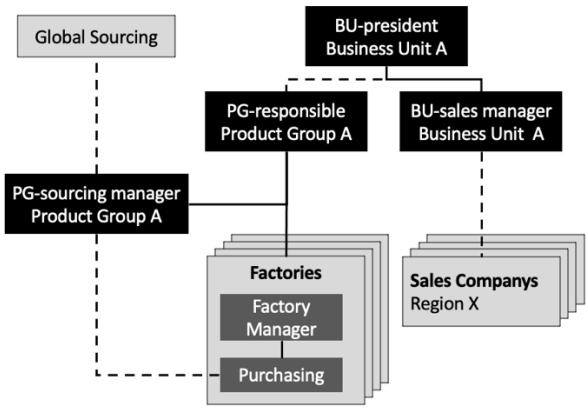


Figure 4.1: Selective organisational overview of BU A and PG A. Developed by the authors.

4.1.1.2 BCM prior to the pandemic

4.1.1.2.1 Scope and process of BCM

BCM has historically been managed at a "legal entity"-level. In practice, this implies a physical company-site (office buildings, service centres, or factories) of the BU and the PG. Hence, while every site is obliged to implement its own BCM-process, there are no plans with a more holistic BU-perspective. The focus of BCM at the site level has been "emergency response", where plans have been developed to ensure employee safety aspects and protection of infrastructure from risks such as fire and tornado storms (however, this is outside the scope of this thesis). According to the BU-president, a key driver for some of the sites has been customers' demands to conduct BCM-evaluations at different sites. The customers BCM-evaluations have been characterised by a more methodical approach to risk assessment and a more holistic business perspective, rather than a site perspective.

At the strategic level of the PG, the PG-responsible has, prior to the pandemic, been concerned with ensuring certain degrees of duplication of internal and external processes (mainly suppliers and manufacturing processes) in the event of a disruption; however, this has not been part of a formalised BCM-process. Instead, it has been based on certain identified needs, for example, when the PG has been considered too dependent on a specific supplier or manufacturing process. Identifying needs and the process of risk mitigation has been carried out at the PG-management level by running different scenarios. At the local factories, where the BCM-process is formally established, disaster recovery plans have been developed for production processes (and factory-specific purchasing processes).

Before the pandemic, the PG-Sourcing department worked with business continuity for critical components and suppliers used at the factory-level, about once a year. This process is performed in collaboration with each factory's purchasing department (responsible for driving the actual process). The primary focus of the BCM-process (within purchasing at the factory-level) is to identify single-source suppliers that are deemed too risky. Here, the PG-sourcing and factory purchasing departments have also been assisted by Global Sourcing to identify possible dual-sourcing alternatives within the Company when it has not been able to find viable alternatives within the PG. When no alternative supplier is available within the Company, the factory Purchasing department, in collaboration with the PG-Sourcing function, decides on appropriate measures to be taken (while also considering site- and component-specific requirements).

Tools and frameworks are mainly in place (and used) at the factory-level. However, the process is not so formalised (except for manufacturing processes at the factory-level). There is no regular

training on how to act when it comes to more business-specific risks, neither within the BU nor within the PG. According to the PG-responsible, there has not been any training or tests conducted on business-related risks and BCM within the PG. The PG-sourcing manager has received some training regarding the mapping of critical components and risk assessments of suppliers in the past through Global Sourcing and is: *"quite sure that some of the team members also have received some training on it"*.

In terms of evaluation, the BU-president has primarily been involved by confirming that plans have been developed at the local sites of the PG and the sales companies (to ensure compliance with audits). From the BU-president's perspective, today's auditors bring strong finance and IT-background and provide relevant input from an external perspective to today's site-perspective. Within the PG, audits are conducted at the site level. In practice, this means that the factories' purchasing and manufacturing functions are audited but not the functions at the PG's more strategic level. While the BCM-process is audited at the site-level, no one checks that the analysis is conducted in a specific way. Hence, despite a standardised process intended to be used at the different sites, the PG-sourcing manager cannot really answer if all PG-sites work in the same way. The PG-sourcing manager thinks that the feedback provided by the audits conducted at the factories are quite clear on what needs to be done to solve the discovered issues. When an issue is identified (by the auditing team) related to a supplier (or a component) used by the factory, the factory Purchasing managers work together with the PG-sourcing department to mitigate the issue in the best way possible. As described in the paragraph above, the Global Sourcing function also helps to ensure that the PG and the sites work actively with issues related to BCM and is also available if there is a need for additional support.

4.1.1.2.2 The scope of the Disaster Recovery Planning

Due to the lack of a BCM-process at the BU-level, there are no Disaster Recovery Plans (DRPs), nor are any specific tools used by neither the BU-president nor the BU-sales manager. However, the BU-sales function is used to handle problems related to customer orders on a daily basis, and instead of actual plans, the function relies on its competence, experience and reactive abilities. The BU-sales manager describes the role of BU-sales as *"part-time emergency room for business problems within the BU"*. Further, what is recognised as a critical resource within the BU-sales function is the employees' competencies. While not part of BCM, the BU-sales function has mapped key competencies and developed succession plans (if key people were to become incapacitated or quit). The BU-sales manager also has an informal strategy to never have an application area where there is one individual expert, and always works to ensure some redundancy in competencies. This does not imply exact duplicity of competence but helps to make sure that the BU-sales function has some backup support within its application areas. Apart from succession plans and informal redundancy of competence, nothing is in place within BU-sales related to disaster recovery plans.

Within the PG, the individual factories have developed DRPs based upon corporate BCM-documentation (policy and templates) and a BCM-template used in the Operations function. However, it is up to the local factory managers to structure the process of developing the actual plans. The DRP's developed at the factory level (of the PG) can mainly be divided into two different areas, manufacturing processes and suppliers. The factories consider risks related to site infrastructure (mainly manufacturing processes) in terms of, e.g., natural catastrophes and fire at the local site. For the manufacturing processes, the probabilities of different site-related risks and their impact on the factory's ability to deliver products are estimated. The duplication of manufacturing processes is then, to a varying degree, mapped in the DRPs at the factories. There is also a certain degree of awareness regarding duplication of manufacturing processes at the PG-level, although the information is not always documented. There are no explicit BCM or Supply-risk tools used on a PG-sourcing level; here, it is more about ensuring that factory-purchasing

departments use their templates. The PG-Sourcing department uses no formal frameworks for BCM for the materials and components purchased in aggregate for the PG's factories. Instead, PG-sourcing relies on common sense and experience when it comes to supply risk. The sourcing department also has suppliers with unique and expensive tooling equipment (owned by the Company but located at suppliers' sites). Before the pandemic, the Sourcing department had started to do some mapping to obtain a better overview of where the tooling equipment was located.

The factories' purchasing departments categorise critical components and map their "tier 1"-suppliers. Particular attention is given to identifying dual-supply alternatives already in place within the Company. When there are no other suppliers available within the PG, Global Sourcing is contacted to identify potential backup-suppliers within other PGs. However, according to the PG-sourcing manager, it is not clear if the findings are always documented at the sites. Whether the components are considered critical is based on how difficult the components are to get hold of. For components considered critical, a risk assessment is conducted by determining a supplier risk score. The risk score is based upon factors such as purchasing spend as a percentage of supplier turnover, and if the supplier produces the components in multiple locations. If the total risk score for a specific supplier is high enough, action plans are developed to reduce the risk through various mitigation actions. Risk mitigation primarily consists of the implementation of buffer-stocks or dual-sourcing. Dual-sourcing has historically also been used as a form of continuity strategies (i.e., increasing the supply from one supplier to compensate for when another fails to deliver). However, the factory purchasing departments do not really have any formal disaster recovery plans if a "single source"-supplier would become unavailable.

4.1.1.3 Impact of the pandemic

While few employees have been directly affected (severely) by the virus during the Covid-19 pandemic (as of November 2020), restrictions and countermeasures imposed by authorities and other actors have considerably impacted the BU and the PG's operations. The BU's most significant negative impact during the pandemic has mainly been related to disruptions that affected the PG. The disruptions that affected the PG, such as closures of factories and suppliers, restrictions on deliveries to and from countries, affected the BU by, among other things, delaying customer orders.

- Supply disruptions caused by restrictions and lockdowns have created the most significant impact according to the BU-president.
- Global transportation has been the second most significant challenge and created a considerable negative impact for the BU's business. It quickly became very complicated and expensive to move goods, both between sites and when delivering customer orders.
- Travel restrictions (governmental, internal, and imposed by customers) have affected BU-sales by not being able to visit customers, thus delaying customer projects and making it difficult to find new customers. However, both the BU and customers became accustomed to virtual meetings after some time, which reduced the impact.
- Reduced order-intake as some customers postponed the maintenance of products or temporarily shut down their operations, causing some business impact for the BU.
- White-collar workers have (to a large extent) been instructed to work from home. While this enabled processes to operate, both the PG-responsible and PG-sourcing manager mentioned that it resulted in slower work and decision-making processes. Further, work from home resulted in reduced well-being among the employees (to some extent).
- The BU and the PG had to temporarily close some sites due to restrictions and lockdowns. However, as the sites primarily served the local markets (with customers being subject to

the same restrictions and white-collars being able to work remotely), the impact was limited.

4.1.1.4 Management of recovery

When the pandemic struck, it was not something that was included in any of the existing BCM-plans used at the individual sites of the BU and PG. The sites were better prepared for disruptions related to key infrastructure at local sites. On a corporate level, the prioritisation of the employee safety, business continuity and customers businesses over long-term development projects were quickly established and communicated throughout the Company. The order of priority acted as important guidance in all decision-making within the organisation for both the BU and the PG. Within the BU-sales department, the recovery was mainly managed by adopting digital technology more extensively, as customers did the same. Within the PG, the main priority has been to ensure the employee's safety by implementing several different measures (developed on the spot), such as segregating groups of people in the factories, sending some people home and increasing the space between the workers. White-collar workers, which already had their laptops with remote connectivity, started to work remotely early on.

When the pandemic struck, the structure of establishing Crisis Management Teams (CMT) at different levels throughout the organisation was quickly established (Figure 4.2). Due to a lack of experience in dealing with global crises (such as pandemics), some minor adjustments were initially made to the communication structure between local CMTs, country CMTs, and the BU- and PG-CMT. The CMT established at the BU-level, was mainly to ensure communication between different parts of the organisation and connect the BU with other BUs.

Once the structure was in place, it quickly became part of a weekly routine. While the CMTs at the local sites focused primarily on employees' health aspects and understanding directives from local authorities, the BU and PG's strategic levels (and CMT's) were primarily concerned with the recovery of business-related aspects. Together with the PG, the BU prioritised customers, suppliers, and ensured that the supply chain was in order. A CMT was also established within the PG to deal with disruptions mainly related to internal processes, suppliers, and transportation (Figure 4.2). The PG-CMT interacted with the local CMTs during weekly meetings. A report went out to the BU-management from these weekly meetings containing information about the site's current status (considering health aspects) and status regarding issues in the supply chain. When issues materialised in the supply chain, the information was passed directly from the factories to the sales companies (in connection to the PG meetings). The sales companies then updated the customers with the new information. The sales companies received the relevant information about the supply chain issues affecting them and were also notified if any specific customer-orders would be delayed. According to the PG-responsible, the information flow from the BU and the sales companies to the PG was more limited[3]. The PG focused on the employees' health and its own response as the top priority and was not really provided with any further directives, according to the PG-responsible.

[3] Important to keep in mind is that it is a large organisation, why also the informants' experiences might differ.

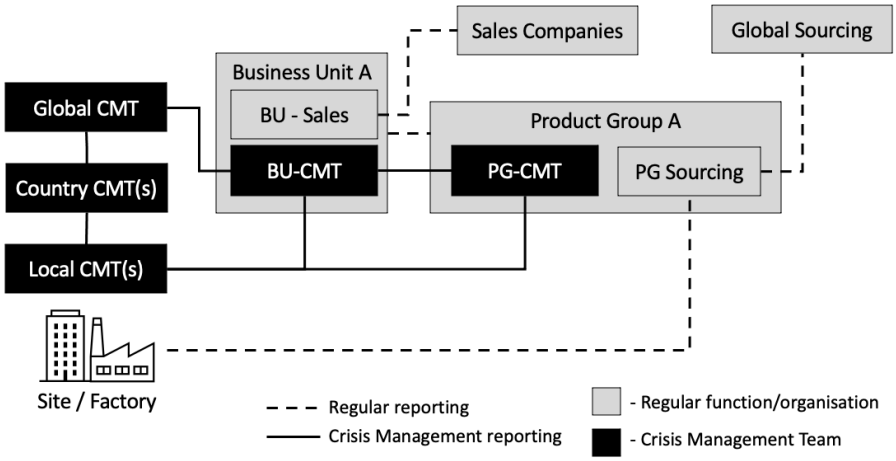


Figure 4.2: Illustration of reporting and structure of management of recovery during the Covid-19 pandemic within case A. Developed by the authors.

Within Sourcing, the structure of managing disaster recovery was largely based upon the regular structure of factory purchasing departments, PG-sourcing and Global Sourcing (Figure 4.2). In the early phase of the pandemic, Global Sourcing initiated an initiative to understand which suppliers to prioritise and how efficiently allocate the Company's resources to the most critical supply disruptions to speed up deliveries. This initiative consisted of creating and distributing a shared supplier-list where the factory purchasing managers could enter information about their suppliers, their status, and various identified risks. The PG-Sourcing Manager used the list to check the status at the individual sites.

Within the PG, different continuity strategies (prepared in advance) and mitigation strategies (invented on the spot) were used, examples being switching between factories and suppliers depending on current needs, moving components between factories (due to unavailability from suppliers). No end-customer orders were transferred between sites. The PG-CMT helped factories with moving the supply around which contributed to keeping the PG more stable (according to both PG-responsible and PG-Sourcing manager). The PG also had to move its tooling equipment (located at suppliers in lockdown zones) to suppliers that were still up and running. According to the PG-sourcing manager, this issue was facilitated (to a limited extent), thanks to the mapping of tooling equipment made before the pandemic. In the recovery phase, communication and coordination required the most attention from the PG-sourcing department (to know where to direct resources). Even if the suppliers were not located in lockdown areas, employees responsible for the suppliers still had to reach out to find out about the situation and, based on this information, make appropriate changes (such as increasing stock levels). Further, communication was also carried out between the central PG-organisation and the factories to remedy the problems that arose by discussing possible solutions (such as delivering components between factories). According to the PG-sourcing manager, extensive coordination was necessary to discuss how to prioritise inbound deliveries and further added that: *"There was no system that could provide directives such as send it to point A or B because it has higher priority."* At the PG-level, the Sourcing-department was also assisted by the S&OP team to set priorities in collaboration with the BU and the sales companies in terms of both products and customers. Sometimes priorities were set at a more operative level.

The limitations experienced when managing disaster recovery were mainly related to the lack of available contingencies related to production processes, suppliers, and transportation. The main reasons for this were either that the PG had failed to identify possible back-up alternatives, the

developed contingencies had been considered too expensive, or that the back-up alternatives in place also became unavailable during the pandemic.

According to the BU-president, the key success factors have been the clear directives from corporate, the solid structure of the CMTs (with ways of escalating responsibilities), and the maturity (in terms of experience with crisis management) of the CMTs. *"If I were to send one message to other managers, my key learning is structure, structure, structure. This helps in making rational decisions and avoiding emotions to influence the decision making."* Where difficulties were experienced in dealing with the crisis, it was mostly due to lack of experience, according to the BU-president. In some cases, the inexperience was reflected in the communication with the organisation, causing CMTs to quickly lose their credibility. The CMT-structure was highlighted as a key success factor by both the BU-president and PG-responsible when working with recovery.

4.1.1.4.1 The contribution of BCM during the pandemic

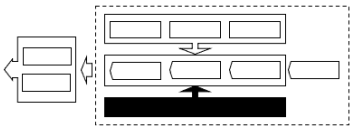
Relating to the work the Sourcing department (and the purchasing departments) did before the pandemic, the analysis regarding supplier risk and critical components (and identifying dual-sourcing alternatives) has been very helpful. Further, components for manufacturing processes, tooling equipment, and production orders have been moved between sites (partly based on work before the pandemic).

4.1.2 Perceived Needs

This section steps through the theoretical framework (recall Figure 2.8) and includes the informants' "perceived needs" (i.e., their desired changes or identified issues).

4.1.2.1 Business Continuity Management

4.1.2.1.1 Scope of BCM



Related to the current scope of BCM, the BU-president mentioned that one of the most important insights from the pandemic was the need for better consideration to global transportation and other activities taking place "between" sites. Hence, the BU-president believes that a more holistic scope is needed and describes the way BCM is currently implemented metaphorically as: *"It's like doing a risk analysis for all the rooms in an apartment building, but you forget the staircase and the elevator"*. According to the BU-president, the missing link related to BCM is the value-chain, which will enable a better focus on the activities and aspects which are important to the BU as a whole. When moving forward, the BU-president sees a need for keeping the site-perspective in terms of plan and structure and adds *"It's a relevant scope and further, some of the sites are shared by different BUs, PGs, and even corporate functions. Instead of changing the scope, the Company should add another level from a BU-perspective where the whole value chain is considered. The aim should be to understand the risks related to processes between the sites and from an aggregated BU-perspective. In terms of continuity, not all sites or stakeholders are created equal, and that should reflect where the BU focuses its efforts concerning BCM."* From the BU-president's perspective, a more holistic BU-perspective would thus create a good complement when prioritising and identifying the areas that are not covered within today's site-perspective.

When it comes to developing disaster recovery plans, the BU-president sees a need for a more pragmatic approach. It is considered more important to reflect on the responsibilities and capabilities in the event of a crisis, rather than spending time preparing for too specific risks. The

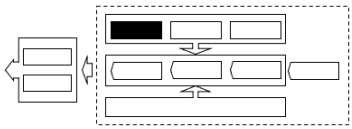
BU-sales manager also believes that one should not spend too much time trying to predict the next crisis or disruption but rather ensure that the right skills are in place to manage disruptions more reactively once they occur. Besides, the BU-president also thinks BCM can be better portrayed as value-adding to the business if customers can see that the Company can quickly recover from crises. Having a more holistic BCM in place shows the customers that the Company can support its customers in the future, which becomes a business differentiator according to the BU-president: "*If the Group Risk Management-department can communicate that the objective is not to control managers, but instead to support them and add value to the business in the process, then managers will have a completely different discussion with the Group Risk Management-department.*"

According to the PG-sourcing manager, to be better prepared for disruptions in the future, there is a need to keep focusing on the supply chains for the whole PG and not just for specific sites. Further, risk and business continuity need to be more included in the analysis when doing change initiatives in the future.

The BU-sales manager has not been involved in the process of developing or using disaster recovery plans but sees a few key areas where the organisation needs to have thorough BCM-plans, such as production capacity, data storage for R&D, product information, installed base, etc. From a BU-sales perspective, a key area is competence. Moving forward, it is considered important to ensure redundancy in competencies within the organisation, and the BU-sales manager further adds: "*We cannot accept that the business stops because someone becomes incapacitated*". Apart from the competencies, there has not been any other explicit learnings regarding disaster recovery planning within BU-sales department during the pandemic, according to the BU-sales manager.

4.1.2.1.2 Enablers

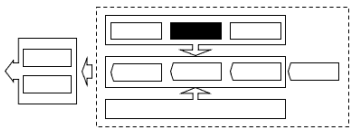
Tools & Frameworks



The PG-responsible sees a need for improved frameworks and documented routines for the risk analysis in the DRPs (and more clear directives on how to work with the mitigation aspect of different risks).

The PG-sourcing manager sees a need for the BCM process to be more formalised and rigid to make it more useful. More time needs to be set aside for the process itself, and this needs to be done on a more regular basis. The PG-sourcing manager also believes that the organisation needs to revise different assumptions and update what is meant with "risk" and "business continuity" in a more practical context, as this will influence how the evaluation-process is conducted.

Training & Testing

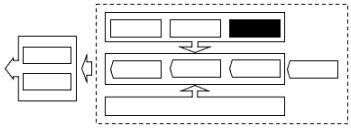


The BU-president is not aware to what exact extent training and testing is provided today but sees a need for more training. The BU-president sees a great need for the site managers to receive the right training and coaching and points out that the tools and frameworks are not what matters, and further adds: *"We don't need more templates; we need more coaching and training."*

The PG-responsible sees a need for more coaching and training for how the DRP-process is supposed to be carried out. The PG-responsible sees a need for more training and testing on BCM within the PG and states: "*Just like we do with fire drills and testing connectivity and computer systems etc., we need to do more on BCM".* The PG-responsible thinks training for parts concerning operations and the business should be introduced at the PG-level while the routines for critical infrastructure (buildings and IT) should be kept at the factory level. The PG-responsible also sees a need for training mechanisms to become more focused on working with risk analysis further up in the organisation and clearer routines for risk assessments and how to work with risk mitigation. The PG-responsible would also like the routines to become more formalised regarding what principles to use when determining what strategies to implement.

The PG-responsible would like to see the underlying principles of BCM (like risk mapping) of the templates to be retained but instead have those processes more learning-based than tick-off-based. *"Too much time is currently spent on maintaining far too detailed files, it needs to be more about ensuring that employees know what tools are available, allowing them to act independently and also ensuring possibilities for communication and collaboration"*. The PG-responsible would also like to see more flexibility with the templates' actual content, to make the BCM-process more relevant and depart from today's way of *"being something that is just there to be audited"* and further adds: *"We need to depart from just evaluating how secure a site is compared to another based on how carefully the templates are filled out at the different sites."*

Audits & Measurements



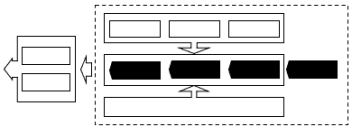
As previously mentioned, the BU-president sees a need to increase the scope to encompass the overall business perspective of BCM better and not only focus on the individual sites. However, the BU-president sees a potential problem with this from an auditing point of view as today's auditors seem less strong from a business perspective, possibly resulting in some limitations if they were to provide input in a more holistic business perspective. If the Company was to incorporate a more holistic business approach to BCM, the BU-president sees a need for a stronger business perspective when auditing the process. The BU-president believes it can be achieved by either bringing in new or external competencies or conducting cross-audits where the BUs audit each other to ensure a holistic business perspective. Regardless, it is important to retain input from a Risk or BCM professional to ensure that the right tools and questions are in place.

The BU-president also identify an improvement area by developing "solutions" that fit multiple purposes. In addition to the Company's BCM policy, a site manager will, for example, have safety requirements from local governments, requirements from customers regarding BCM, etc. According to the BU-president, the templates are just symptoms of all different requirements. If one can merge the different requirements and develop something that satisfies all stakeholder needs, the BU-president is sure that the process will become more efficient and that the plans, in the end, will provide greater value. To make this possible, the BU-president identify a need for a higher degree of freedom for the site managers to design their plans themselves. If the BCM templates become too rigid, it will probably be another "box-ticking activity" for the managers.

The PG-sourcing manager is more concerned with the Company's view on risk in terms of supply and sees a need to update it, at least in an audit point of view. Today, the outcome of audits of the factories' supplier base is largely based on whether the factory uses single or dual sourcing for its core components. According to the PG-sourcing manager, this influences the factories' view on risk (where single sourcing implies high risk and dual sourcing implies low risk). The PG-sourcing

manager sees a need to update this view to better capture risk, for example, two suppliers may be affected by the same risk, but today, this would be considered "low risk" since the factory has two suppliers in place for a given component.

4.1.2.1.3 Risk Analysis & Disaster Recovery Planning Process



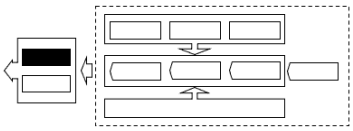
See perceived need by BU-president under 4.1.5.1.2 Scope (recall the need for adding a more holistic analysis from a BU-perspective while maintaining the site scope for the more practical development of plans). The BU-sales manager sees a need for more continuity planning in the area of competence as it is not always possible to create better redundancy.

The PG-responsible would like to see more of a training routine on conducting risk and scenario analysis for potential risks, both at the factory and the PG-level. The PG-responsible has (at the time of the interview) seen that many in the Company have started to reflect more about the process of risk mitigation and how this should be done. However, he is not convinced that this will help the organisation solve the underlying problem, but rather sees a need to decide what principle *(i.e., "what it may cost to mitigate a specific risk"*) to use when working with risk mitigation and deciding continuity strategies. Today the strategy (or principle) is more informal and based on whether the mitigation or continuity strategy makes good business sense or not. It is also not very clear if the different BUs should approach risk differently, e.g. *"should the largest BUs approach risks differently compared to smaller BUs (and so forth), if so, how?"*.

To make the process that is in place today more useful, PG-sourcing sees a need to formalise it and make it more rigid. *"More time needs to be set aside for the process itself, and this needs to be done on a more regular basis."* Furthermore, the tooling equipment (the unique tools located at suppliers) is an area where the PG-sourcing manager has identified a need for improvement, to be better prepared for future crises.

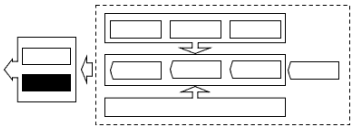
4.1.2.2 Management of recovery

4.1.2.2.1 Structure



No information available.

4.1.2.2.2 Recovery Actions



The PG-sourcing manager sees a need to better consider the location of tooling-equipment.

4.2 Case B

4.2.1 Case Description

4.2.1.1 Organisational description

Business Unit B (referred to as BU within Case B) supplies equipment for vessels. The BU has its main site in Europe, where R&D, BU-sales, and other BU-functions are located. Due to the nature of BU B's customers, the organisation has a global network of service-technicians, stationed in various regions to meet up with vessels in local ports.

Product Group B (referred to as PG within Case B) is the operations function with the global responsibility for sourcing, manufacturing, and delivery of products within the BU's product portfolio. The PG primarily has manufacturing sites in Europe, China, and India. The PG has many of its key technical capabilities and volume at the Delta site in Asia, which serves domestic and regional markets.

The PG-sourcing manager is responsible for coordinating sourcing activities across the PG and the sourcing-functions at factories. Each factory (i.e. site) within the PG has a sourcing function with dedicated Strategic Buyers - responsible for executing the agreed sourcing activities. The sourcing functions are purchasing raw materials, components and other sub-contracting services used across the PG's production sites. Further, each site also has a more operational purchasing function (responsible for handling the operational tasks of placing orders with suppliers, expediting etc.). The purchasing functions at the individual sites work closely with the local sourcing organisation. The local sourcing functions and the PG-sourcing manager also works closely with the Global Sourcing function.

The BU-sales organisation's core activities include direct sales in designated markets, global sales support to the sales companies, order execution, and engineering, application, and product support. The sales organisation at the BU-level can (for the sake of simplicity) be explained as split into two parts, *sales development to quotation* and *quotation to delivery*, the interviewed BU-sales manager is responsible for the first part (*sales development to quotation*). The BU-sales function is mainly concerned with more technically advanced projects. In contrast, the sales companies (responsible for selling the BU's products) are responsible for more generic (operational) selling to end-customers. The authors' interpretation of the organisational and reporting structure for the BU and PG is shown in Figure 4.3.

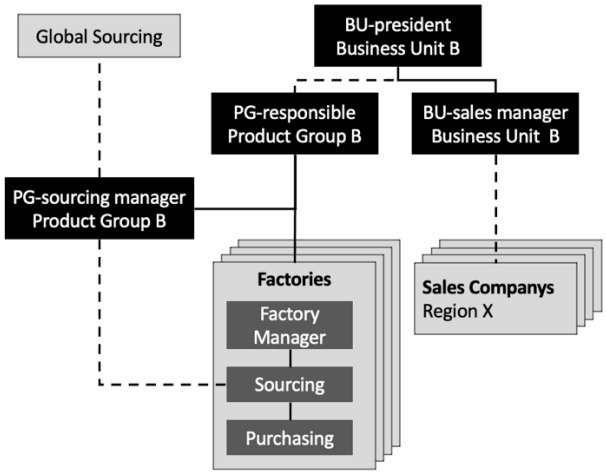


Figure 4.3: Selective organisational overview of BU B and PG B. Developed by the authors.

4.2.1.2 BCM prior to the pandemic

4.2.1.2.1 Scope and process of BCM

Everything related to BCM is centred around a legal entity; in practice, this translates to a physical site. From a BU-perspective, this complicates the tasks related to BCM as the legal structure is different from the Company's operational structure of Business Units, Product Groups, and "sales & service"-Companies. An example is how one of the BU's most significant risks is related to if one of the PG's factories in Asia is out of operations. While the BU has identified this as a major risk, it relies on the BCM-process to be functioning at the site in Asia, according to the BU-president.

BCM at the BU-level has largely been composed of BCM at the main site in Europe, which houses the BU's major functions. The policies and templates available from corporate were not considered very helpful in establishing the BCM process. Because of this, the site opted for integrating BCM as part of their Quality Management System (QMS) based on ISO-certification (where processes have been mapped and action plans have been created). By integrating it into the QMS, it is ensured that there is at least some kind of annual review. Before the pandemic, BCM was considered a lengthy process and was not really on top of anyone's agenda. Further, there was not really any pressure from senior management to make BCM a priority and develop plans, neither outspoken nor informal (even though the internal audits flagged BCM as an issue). When Internal audit listed any findings related to the DRP's that needed to be corrected, the follow-up and pressure to address the issues was perceived as very limited, at least at the main BU-site: *"We could have two or three red marks in a row without any consequences",* the BU-president explained. Additionally, according to the BU-president, there was no support or training regarding BCM except for the corporate policies.

Within the PG, DRPs are developed at the site-level. The current practices are based on both the corporate and operations templates for BCM, which constitute minimum requirements. Estimation of potential business impacts has been done from a top-level perspective and is not reviewed regularly, at least to the knowledge of the PG-responsible. However, the production managers at the sites are aware of the value of products at delivery and the revenue from different customer projects. Hence, the production managers understand the importance of ensuring that the sites are operational and capable of delivering products, at least in terms of short-term impact. Further, there is no training related to BCM within the PG.

Within Sourcing, risk assessments are performed both at the local sites and at an aggregated PG-level. At the local sites, the purchasing managers are responsible for conducting supplier risk assessments. Then, the PG-sourcing manager conducts similar assessments on a PG-level. When the PG has single sourcing from key suppliers, the PG escalates the potential risks to the Global Sourcing organisation. A decision is then made as to whether the risk is worth mitigating by implementing, for example, dual supply or a back-up supplier. Tools for risk assessments exist, but the process is not structured (at least not at the PG-level).

The BU-sales function has not been involved in the BCM process, nor has the BU-sales manager participated in any introduction or training regarding BCM. The BU-sales manager is aware of the existence of BCM but has never really looked into the process and the available plans (before participating in the interview for this thesis). The BU-sales manager explains that it is because BCM has not been of priority or emphasised by management. The BU-sales function has identified some critical components (with high impact if supply is not secured) that it has asked the PG to secure supply of. However, this has not been conducted in a very structured way, nor has any impact

analysis been conducted for specific processes. While not part of BCM, the BU-sales function has succession plans in place for key employees.

4.2.1.2.2 The scope of the Disaster Recovery Planning

In terms of risk analysis and assessing potential impact at the BU-level, while there is a general understanding of what to do if a disaster strikes, no structured methodology is in place. The BU-main site brought in a student worker who hosted workshops in the major departments where risks were identified, and action plans were developed if these were to materialise. In general, the plans currently established in the QMS are primarily focused on risks related to site infrastructure and IT.

Within the PG the DRPs primarily cover two aspects, the manufacturing process and the supply of materials. Concerning the manufacturing process, the plans cover the potential failure of critical production equipment with identified possibilities of transferring capacity within the Company or to external suppliers. Within supply of materials, recovery plans have been put in place by having backup suppliers.

Within Sourcing, risk analysis is performed ad-hoc, both at the PG and the factory level. At the factory-level, risk analysis is performed through brainstorming sessions where risks are assessed based on expected value (probability multiplied by impact in terms of purchasing spend). On a PG-level, the sourcing department conducts a similar assessment with relevant stakeholders (e.g., the factory manager, purchasing manager, and Global Sourcing), discussing aspects such as *"What can go wrong if the supplier's facilities burn down tomorrow? What do we do in that case?"*. The risk assessments are mainly used as a basic prioritisation tool, and in general, the risks are normally not treated differently depending on the expected value. With most of the purchasing spend in raw materials (where supply risks are generally considered low), the risk assessments at PG-level have not taken place regularly, but rather ad-hoc when a need has been identified. Development and implementation of continuity or mitigation strategies do not follow a structured approach but are rather based on when the team considers it to make sense. Such strategies include dual sourcing, alternative suppliers, buffer stock etc. While not part of a formal process, there is some coordination within sourcing regarding risks.

In terms of competence, while not part of the formalised BCM-process, the PG conducts a "people review" where the organisation maps key personnel and puts together a succession plan for managers' temporary replacement. According to the PG-responsible, the "people review" works well thanks to the standardised routines and processes *"we can take one factory manager and move that person to another factory, and he/she will still be familiar with how the factory is structured and managed"*. Although it is not part of the formal BCM-process, the BU (including BU-sales) also works with "succession plans" for key resources (i.e., a handful of people with unique know-how) and what to do if they were to quit or become incapacitated. The succession plans are filled in by managers within the BU and are according to the BU-sales manager *"evaluated by senior management on a somewhat regular basis."*

4.2.1.3 Impact of the Pandemic

In general, the most significant business impact has not been caused by the virus itself, but rather by the government-imposed travel-restrictions and lockdowns.

- Supply disruptions have been caused by temporary closures (caused by restrictions) and solving these issues have been aggravated by also having to solve complex issues digitally. *"Raw materials were just a question regarding cost, but more complex components really had the worst impact."*, as expressed by the PG-sourcing manager.

- A key manufacturing site (here referred to as Delta) was closed for an additional two weeks after the planned closure for the Chinese New Year. Once opened it took an additional 45 days until all backorders had been served, causing delays in customer orders.
- Due to heavy restrictions imposed in India, both the PG's sites and suppliers were affected, causing delays.
- Availability of corporate service functions (such as IT) located in Sweden were limited due to work-time reduction. This impacted functions which rely upon their support but did not implement the work-time reduction themselves.
- Service technicians have had issues with travelling and getting access to equipment installed at the customers.
- Commissioning of new equipment: When operations had resumed, the specialists from the BU were still not allowed to travel. This became the major concern for the BU as large-scale customer projects could be delayed at a very high cost. In the end, local engineers had to perform the installations with access to specialists via video link.

4.2.1.4 Management of recovery

When managing disaster recovery during the pandemic, the basis has been the crisis management structure. On a central level, the global crisis management team has coordinated the information at the global level. There have also been country-specific crisis management teams (CMT) and local CMTs at the individual sites (Figure 4.4). The country CMTs has been used to coordinate the response and compliance with regulations on a country level and ensuring that the same rules and procedures are implemented across all the Company's sites (within the country).

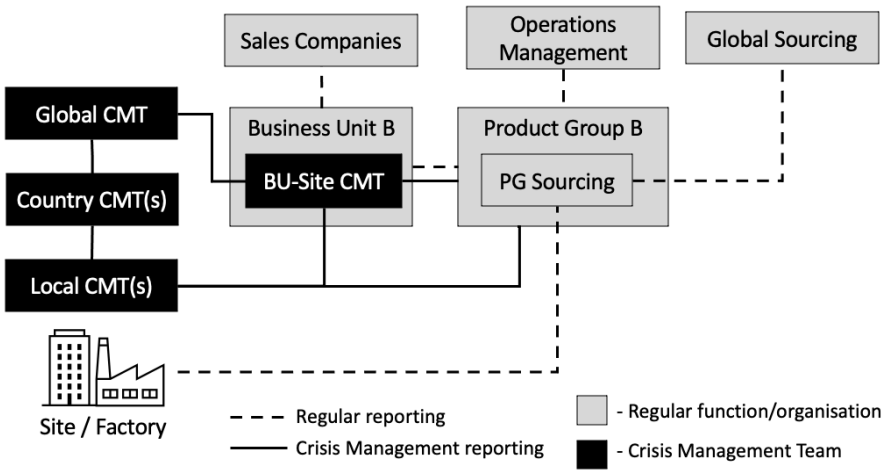


Figure 4.4: Illustration of reporting and structure of management of recovery during the Covid-19 pandemic within Case B. Developed by the authors.

For the BU's main site, the local CMT was extended to cover all major functions. The CMT met regularly and adjusted frequency as necessary to manage the situation. The CMT's role at the main BU-site were more of a coordinating nature where it was decided who should reach out to the PG and the Sales Companies. Decisions were both made on a more tactical level (e.g., "*What do we do if X happens in a week, or a month?*") down to specific operational questions (e.g. *"What is our policy of sending people to countries with travel restrictions?"*) and a large share of the planning was made on the fly. The decisions taken by the BU-site CMT can be described as guidelines and a strategic direction rather than being involved in specific cases. When disruptions occurred, autonomy was given to, e.g., the PG to coordinate with the affected party within the BU, who then reported back to the BU-site CMT to keep them informed (Figure 4.4).

Within Operations Management (consisting of all PG-responsibles and senior management for Operations in the Company), a regular meeting was set up to monitor the status at the company-sites' around the world. Between the sites, the PGs have shared experiences and best practices on how to implement safety measures (Figure 4.4). *"We received pictures from an Italian factory how they solved distancing, that we could then share with other European sites."*, as noted by the PG-responsible. The PG-responsible also highlights the crisis management procedures with the establishment of CMTs as something which was very helpful during the pandemic.

Within PG-sourcing, managing and monitoring supply disruptions took place cross-functionally through collaboration with factories and Global Sourcing (Figure 4.4). The PG-sourcing manager participated in weekly "Purchasing Improvement Meetings", hosted by Global Sourcing where sourcing could escalate issues and receive additional support from the central organisation. There have also been region-specific follow-up meetings, organised by Global Sourcing. As government restrictions have been the main cause of supplier closure, the Company (through Global Sourcing) supported its suppliers in communicating with local authorities by declaring that the BU (or the PG) supplies products for critical infrastructure. *"We haven't run around and tried to find new suppliers. Instead, we have tried to help and recover our existing supply chain."*, the PG-responsible explained. Some collaboration also took place together with the local product centres (R&D) to deal with delivery disruptions by developing more creative solutions. The sourcing functions only interacted with the sales companies sporadically during the recovery. There was not much structured prioritisation of managing the supply disruptions at the PG-level. In those cases where factories needed to speed up specific material orders, it was dealt with locally, by the factories.

Together with the BU-sales function, the PG prioritised certain products and individual customer orders. Due to high penalties of late deliveries, there was close coordination of key orders between the BU and PG of what to prioritise. E.g. When the site in China became operational, customers who had not been impacted by the pandemic and were not preoccupied with their own recovery were prioritised. No explicit calculations (in terms of impact) were made, instead prioritisation was based on market knowledge about certain key customers that the BU could not afford to let down. This was based both on the short-term and long-term consequences of delaying orders to these key customers.

4.2.1.4.1 The contribution of BCM during the pandemic

In terms of risk and business continuity, the PG was not very prepared when the pandemic struck. However, thanks to a substantial portion of the production being located in a country that recovered quickly, the PG was back on track relatively quickly, according to the PG-responsible. The PG-sourcing manager also emphasises the quick recovery of the region, rather than any specific preparatory work done before the pandemic.

However, by developing plans, the PG had already mapped key suppliers which enabled the issues to be immediately addressed when the pandemic struck, according to the PG-responsible. *"We were well prepared in how we were organised, but then we were perhaps not prepared specifically for a pandemic"*. The PG-responsible also highlighted the crisis management procedures with the establishment of CMTs.

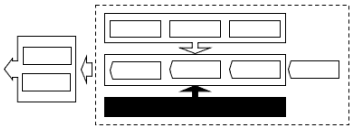
Most of the work conducted before the pandemic related to the BU was not relevant when managing the recovery, according to the BU-president; the DRPs in place before the pandemic were largely built around risks which did not materialise. Considering the disruptions that did materialise, such as suppliers being out of operations, the DRPs focused on finding individual alternative suppliers and did not account for the event that suppliers or clusters of suppliers could be impacted at the same time.

4.2.2 Perceived Needs

This section steps through the theoretical framework (recall Figure 2.8) and includes the informants' "perceived needs" (i.e., their desired changes or identified issues).

4.2.2.1 Business Continuity Management

4.2.2.1.1 Scope of BCM



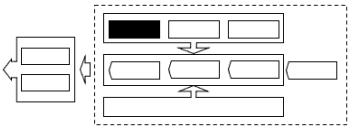
When considering the future, the BU-president has id need to conduct a more holistic analysis at the BU-level which transcends the current site structure. The BU is held accountable for the business in terms of top- and bottom-line. Hence, it should also be responsible for an overarching BCM-plan of the BU's value chain from suppliers to end-customers. According to the BU-president, the individual site-plans can then be linked into an overall plan for the BU's value chain. The BU-sales manager also sees a need to focus on BCM from a BU perspective to ensure that the organisation is better aligned and prepared for future disasters.

The PG-responsible sees sourcing as a potential improvement area where there could be a discussion regarding requirements for key suppliers and follow up on the suppliers' business continuity plans.

The BU-sales manager sees a need for looking more into the different dependencies in the organisation. "If my function, in the event of a crisis, somehow completely stops, then that will have a big impact of course on the rest of the value chain. We need to become more aware of who and what we are dependent on, I think if we were doing a mapping of critical systems and processes, then it will be easier to know what needs to be better protected and what we should spend our money on."

4.2.2.1.2 Enablers

Tools & Frameworks



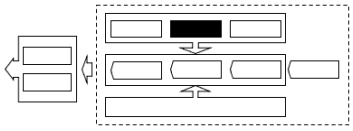
The BU-president sees a need for better tools to develop continuity plans. The current templates and general corporate policies are vague and do not really offer enough guidance. Hence, much groundwork is needed to develop the tools from scratch; *"It's not an efficient strategy to ask every legal entity to develop their own solution"*. The BU-president, PG-sourcing manager, and BU-sales manager all see a need for a more structured framework. While there must be room for adaptation to different operational models, there must be clearer boundaries and guidelines according to the BU-president. According to the BU-president, there is a need to be more consistent across the organisation if plans are to be linked together across sites to gain a value-chain perspective. Better consistency would also facilitate improved input from auditors and make the auditing process easier according to the BU-president.

The PG-sourcing manager highlights that the tools must be simple and straightforward to use and provide a clear indication if any action is needed. Further, the PG-sourcing manager believes that tools (e.g., for risk monitoring) are good for communication purposes and to know where

resources are needed. *"We want something that is measurable. Exactly how it is measured or calculated is not as important. What matters is that you get attention to the risk and that you do an active assessment. [...] You only get help if you ask for help and you only ask for help if you have a red light [i.e., a clear indication]"*. The PG-sourcing manager would also like to see a more structured and regular process for conducting risk analysis, as otherwise the daily tasks will be prioritised instead. The PG-sourcing manager and the BU-sales manager both point out that there is a need to better ensure that the BCM-process is followed, to avoid BCM being deprioritised at the expense of other tasks.

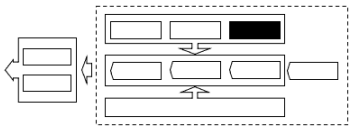
One of the things that BU-sales is working on (at the time of the interview) is a process review according to the Company's working processes. The BU-sales manager further expressed: *"There is a need for more accurate guidelines for the overall framework, that goes a little deeper into some of the things you need to reflect on and some of the things you need to include so there is a need for more support from the central organisation in this."* The BU-sales manager highlights the importance of finding the right level of detail so that the organisation can act on the information, without only creating bureaucracy.

Training & Testing



Regardless what scope the BCM-process should be carried out with, the BU-president and BU-sales manager sees a need for better guidance in terms of implementing a BCM-process. As expressed by the BU-sales manager: "*Not just a few high level-slides [on the intranet] but probably a little deeper into some of the things you need to reflect on, some of the things you need to include.*"

Audits & Measurements

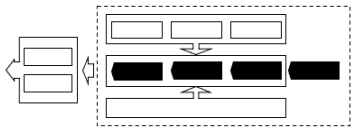


The BU-president sees a need to enforce the compliance of BCM in a better way, and a critical enabler that is missing is the prioritisation of BCM from senior management. As expressed by the BU-president: *"If BCM should be improved within the Company, leaders must walk the talk and impose firm deadlines on delivering business continuity plans. Otherwise BCM will be disregarded in favour of day-to-day operations."*

The PG-responsible believes **that** the Group Risk Management-department, together with the PG, can review the current situation, and states: *"Sometimes, it is good to get a new set of eyes regarding BCM"*. Furthermore, related to the topic of auditing the PG-responsible adds: *"Perhaps BCM should get more attention during audits, especially for the major sites with high potential impact."*

The BU-sales manager identifies a need to challenge the quality of the work, provide input and benchmarking.

4.2.2.1.3 Risk Analysis & Disaster Recovery Planning Process



The BU-president believes that the Company should work more with the "soft aspects" of BCM. When conducting the analysis, there is a need to understand what critical human capabilities and

competences that the processes depend upon. For example, by *"identifying where those competencies are located, and ensure that the BU can transfer knowledge and not be reliant on single individuals."* Also see *Scope of BCM, Perceived Need* (section 4.2.2.1.1), recall the need for a holistic perspective on impact and connecting the DRPs of the sites into a holistic DRP for the BU.

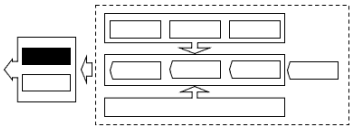
According to the PG-sourcing manager, the process of conducting risk analysis is more important than the actual output and it should rather be seen as a tool to create risk awareness in the organisation. Being able to show a representative view of the current situation for the most critical suppliers is essentially all that is needed to use resources in the most efficient way during recovery, according to the PG-sourcing manager. *"If you are not theoretically prepared for something then things can easily get out of your hands, it's difficult to control and you also need to compete with other internal priorities. When we have been able to highlight what the impact is and where the issues are, it has been much easier to prioritise resources and manage the recovery."* In hindsight, the PG-sourcing manager would have liked to see a more structured and regular process of risk analysis, as otherwise the daily tasks will be prioritised.

The BU-sales manager believes that the BU could look more into different dependencies in the organisation. There is an identified need to better understand who and what the functions are dependent on: "*There are many things that we depend on but do not control or even understand that could have a tremendous negative impact if they went down."* The BU-sales manager believes that some work has been documented on this topic in the past but needs to be updated. If the BU mapped critical systems and processes, it would be easier to know what needs to be better protected and then allocate resources accordingly. For example, a disruption of the BU-sales function would significantly impact the rest of the value chain.

According to the BU-sales manager, a DRP should more act as a framework outlining knowing where to go, whom to contact and ensure that everybody is aware of the main dependencies. The BU-sales manager believes it should not be bureaucratic and too detailed, then there is a risk to focus on too many different scenarios. Further, both the PG-sourcing manager and the BU-sales manager see a need to better understand the criticality of suppliers and customers (respectively) to better prioritise future response.

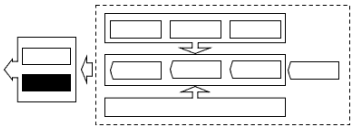
4.2.2.2 Management of recovery

4.2.2.2.1 Structure



Potential of improving timing of central communication according to the PG-responsible.

4.2.2.2.2 Recovery Actions



No information available.

4.3 Case C

4.3.1 Case Description

4.3.1.1 Organisational description

Compared to other BUs within the group, Business Unit C (referred to as BU within Case C) supplies fewer units per year but at a high value per order. The products are technically complex and are often configured or modified to specific customer needs. Further, the products are used in industrial operations by customers worldwide, hence placing high requirements on the BU's service capabilities. The BU's main office is located in Europe, which includes functions such as R&D, marketing, sales, and service. The BU-sales function consists of approximately 25 people and covers about 20 different areas of application. The BU-sales function is responsible for all sales activities and ensures a coherent strategy for all BU-related sales. Further, the BU-sales function supports operations by providing forecasts of anticipated demand and market trends. Due to the high complexity and degree of customisation in many products, the BU-sales function is often directly involved in customer sales projects. The BU-sales function also supports the sales companies across the Company with expertise and frequently visits customers.

Product Group C (referred to as PG within Case C) is the operations function responsible for sourcing, manufacturing, and delivering products on behalf of the BU. The PG has several sites (or factories) located in Europe and Asia. One of the European sites (here referred to as Bravo) produces the most complex products within the BU's assortment. The PG-sourcing function is responsible for coordinating sourcing activities across the PG and its sites. The sourcing department consists of a handful of supplier quality assurance personnel spread all over the world, these spend a considerable amount of time visiting suppliers, for example, to ensure suppliers' technical capabilities in terms of quality. The PG-sourcing function works closely with the Global Sourcing function. Global Sourcing has global accountability for the supplier base, develops category strategies and is responsible for the contractual relationship with suppliers. Local purchasing departments are situated at the factories.

Cross-functional communication for large projects is handled through follow-up meetings with operations and the BU-sales function. For high volume products, communication is handled through the ERP-system between order handlers within operations and the sales companies. In these cases, BU-sales is only contacted if any major issues occur. The author's interpretation of the organisational and reporting structure for BU and PG C is shown in Figure 4.5.

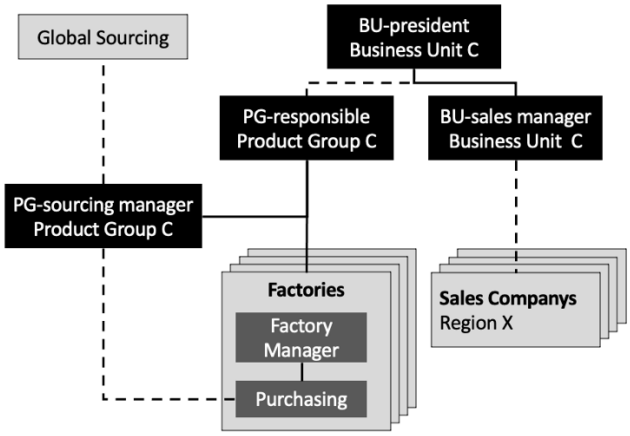


Figure 4.5: Selective organisational overview of BU C and PG C. Developed by the authors.

4.3.1.2 BCM prior to the pandemic

4.3.1.2.1 Scope and process of BCM

While BCM and the development of DRPs have not been the BU's responsibility, the BU-president has seen the end-result of the BCM-process for the individual sites (legal-entities) related to the BU. The BCM-process has mostly been done independently, and the BU relies on the individual sites to develop their plans based on the standard templates available from corporate or operations. The BU-management's involvement has primarily been related to signing-off the final plans and challenging certain aspects of the plans. This involvement has been related to how critical the different sites are for the BU. For the BU-functions, the BCM-involvement is limited to being included in the site-plans (which focus on infrastructure). For the main BU-site, the BCM-plans are reviewed annually as they are integrated into the Quality Management System.

Within the PG, the responsibility of developing BCM-plans resides with the local site manager. There is no common framework for structuring the BCM-process and reviewing the plans except for the corporate governance policy, and associated templates. For example, at the Bravo factory, the local Crisis Management teams (CMT) had scheduled quarterly meetings where revision of the DRP-plans was one of the agenda items, along with, for example, crisis management procedures, emergency response and contact lists. While not a formalised process, risk analysis is also conducted centrally within the PG.

The motivation regarding the BCM-process varies across the different sites; to some, it is an obligated task in terms of compliance, whereas other sites are more passionate about the it, according to the BU-president. When the current BCM-programme and templates were launched, there was initially a lot of focus and interest in developing BCM plans. However, over the last couple of years, the focus has been more limited. According to the PG-responsible, the primary focus within BCM has been the emergency response plans and safeguarding the employees, not the disaster recovery plans. The PG also works with blue-collar competence and key resources, however this is not included in BCM, the PG-responsible further expressed: *"Someone is always sick or has to visit the dentist, it's simply a part of regular operations."*

The greatest challenge for the BU has been related to the implementation of measures based upon the plans; *"It is one thing to understand the risks, processes, and resources, then rank them, and document the work, and another to commit to actions which reduce the impact since these actions will always come at a cost",* the BU-president expressed. Here the BU-management becomes involved in the decisions if the cost of protection is worth taking from a business perspective, for example, if a significant disaster would strike at a particular production site resulting in the BU's revenue being cut by 50% for several years. On a more strategic level, the question regarding investments in contingencies is rarely discussed. Nor is it really discussed within the Company what attitude and strategic view the organisation should have on risk. According to the BU-president, these decisions instead reside with the local management.

There is no training or testing related to disaster recovery within operations. Neither is there any training performed within the BU regarding disaster recovery planning, at least to the interviewees' knowledge. However, the BU-president highlights that the Company has a strong culture of reaching out to people for support and as an example: *"People can always reach out to each other or the RM-department in terms of support or guidance of BCM"*. The PG-responsible and the BU-president have previously also been involved in some general discussion about risk with the Group Risk Management-department.

In terms of the tools and frameworks used, the PG-responsible refers to the tools readily available, but it is up to the local managers to structure the work of developing plans. On a PG-sourcing-level, no explicit BCM tools are used, instead more classic purchasing methods such as category strategies are used where risk is also considered. Within the BU, no explicit tools are used. The internal audit process at all auditing entities includes a review of the DRPs developed at the local entity. There are no direct measurements regarding BCM for the BU.

4.3.1.2.2 The scope of the Disaster Recovery Planning

The DRPs are typically composed of two main components, the manufacturing processes and the supply of components and materials. As the production processes involve high-precision metalwork, a central aspect of the DRPs is the production equipment. The plans contain information on different machines' capacity, technical capabilities, and identified contingencies that can reduce the impact from a longer break-down or complete failure of the equipment. Potential contingencies are considered both at the local site, within the PG, and at potential external suppliers. Due to the complex nature of the PG's (or the BU's) products, the duplicity of the Company's technical production capabilities is very limited, nor is it easy to find capabilities externally. In terms of restoring production capabilities after a failure, the analysis is more limited. The estimated replacement cost and time of a machine are usually calculated, but the potential pay-off analysis by investing in different contingencies is more limited. The PG-responsible highlights that maintaining alternative production capabilities is crucial, not only the initial process and product preparation but also the continuity strategy's quality and availability. However, this requires the option to be tested regularly, which quickly increases the costs.

In terms of the supply of materials, the purchasing departments at the factories develop DRPs. In practice, the DRPs are composed of a "supplier risk-score" and mitigation actions to reduce the score if the "supplier risk-score" is considered too high. The "supplier risk-score" is set by applying a template that builds a score based on several factors such as purchasing spend, contractual status, supplier performance, etc. These scores are updated at least annually and are more of a risk monitoring nature. The impact analysis within sourcing is limited to the factories' ability to deliver products, where critical components have been identified that will force the production to stop. For some critical components, alternative suppliers have been identified. While not a formalised process, risk assessments are also conducted centrally within the PG. Before the pandemic, sourcing had already worked with the consolidation of spend across the group to reduce some risks. However, due to the product assortment of infrequent and specialised components, the cost of implementing risk mitigation strategies (such as dual sourcing) has been considered too expensive.

Top-level risk assessments are performed at the BU-level, mainly in the form of a SWOT analysis. For the BU's sites, the BCM-scope is not limited to infrastructure but also includes capabilities, key resources, and people. The BU-sales manager explains that the BU maps key resources in terms of personnel in the Quality Management System, but there are no contingency plans. *"We at least list key people, then it is another question what we do about it."*

The BU-sales function is not included in the BCM-scope except for site related risks. There are no plans on how to act if a risk materialises within the BU-sales function in terms of reactive arrangements. Instead, the organisation relies upon its experience to deal with uncertainties and the organisation is used to working reactively and solve problems as they occur. *"Circumstances change 9 out of 10 times; the customer changes its mind, something is late, etc. It is a natural way of working for us."*

4.3.1.3 Impact of the pandemic

In general, the most significant impact to the business has been caused by local governments' restrictions (rather than the virus itself). Hence, in countries with more lenient restriction, the production has continuously been operational. In general, white-collar workers have been instructed to work from home. However, the switch to digital interaction was not considered difficult as the Company already had the digital infrastructure in place (for example, with employees having their laptops).

- Company-sites in China were closed in adjunction to the Chinese New Year, and the planned closure was extended.
- The factory in India has been partly closed for two months due to government restrictions. This has caused significant delays and loss of income. To some extent, other facilities could handle orders in, e.g., Europe, but not to the full extent.
- Supply disruption as suppliers and sub-suppliers were forced to go into lockdown. This was a major issue as the Company's sites often became operational faster than their suppliers.
- Limited travel has affected the Sales & Service organisation. However, the impact has been minor thanks to the commissioning of new equipment and service could be assisted via video-link.

4.3.1.4 Management of recovery

The recovery has primarily been organised through the local Crisis Management Teams (CMT) at the individual sites. Then these teams report to country-level teams but also back to the BU (Figure 4.6). The local CMT's would update the BU on current challenges, their plans for recovery and the status of their recovery. In the beginning, this was done on a daily basis but has gradually turned into monthly reporting (by the beginning of November in 2020). Throughout the crisis, managers and CMTs have communicated and shared best practices, leveraging the Company's network in dealing with the pandemic.

The sourcing organisation has operated a bit differently. While the site-based purchasing teams have had continuous follow-up meetings with the production regarding the impact of supplier disruptions, the PG-sourcing function has primarily coordinated with the Global Sourcing organisation (Figure 4.6). There have been dedicated weekly Covid-19 meetings within Global Sourcing based on different geographical regions that have been more severely impacted (for example, initially there were meetings concerning China and later India). These meetings have been used to monitor the state of individual suppliers in the region, concerning whether they are up and running, their current capacity, and how the Company can work to ensure supply.

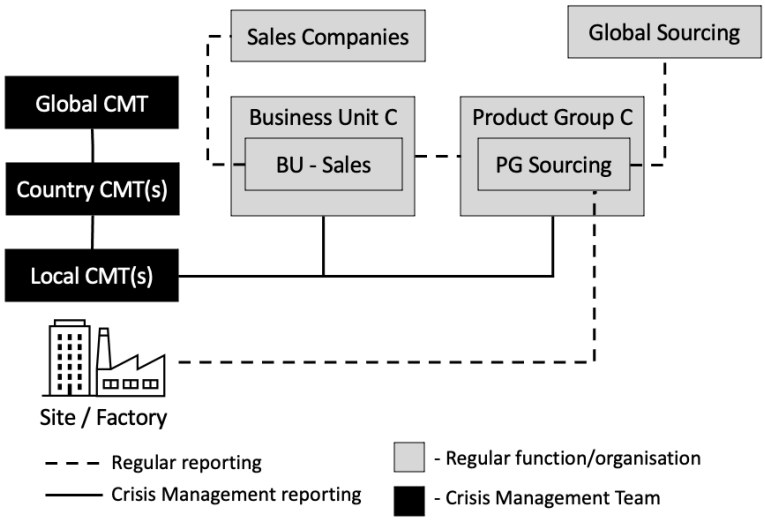


Figure 4.6: Illustration of reporting and structure of management of recovery during the Covid-19 pandemic within Case C. Developed by the authors.

During the pandemic, the BU-sales function has worked within its regular structure (in terms of roles and responsibilities) and has maintained its ordinary processes. The major shift has been implementing regular virtual meetings as the staff work from home and no longer meet naturally at the office. The BU-sales function acted as the primary communication link between operations and the sales companies. When there have been disruptions in operations, the BU-sales function is responsible for the messaging towards customers and informing the factories about necessary prioritisation of customer orders. The PG informs BU-sales regarding the current technical capabilities and what prioritisation options are available, then the decision is taken by the BU and Sales companies.

In general, the priorities have been to protect the functions that cannot work from home, such as the distribution centres and the factories, and limit the exposure to the virus for these functions. Within operations, the PG has prioritised the ability to deliver products throughout the pandemic. Hence, development projects have been postponed allocating resources to the crisis. To some extent, production orders have been moved between facilities. For example, another factory could step in and cover most of the capacity lost in India in terms of component supply to a third factory but at a higher cost. However, this was only possible for high-volume products. When facing a new disruption, and there were no back-up alternatives in place, the BU-president explains that it was quickly evaluated how long it would take to put a solution in place. However, such solutions were very costly and took over a year to get up and running, why it was decided that the Company should accept the impact.

The limited impact has mainly been thanks to the understanding, flexibility, and willingness to cooperate by the BU's customers. The primary reason is that the customers have been in the same situation as the Company. *"If the crisis had been of a different nature, it would have put the BU in a very different position."*, the BU-president stated. However, the PG-manager highlights that the customers' initial understanding and tolerance have steadily been diminishing as the world becomes accustomed to the pandemic.

4.3.1.4.1 The contribution of BCM during the pandemic

The plans developed before the pandemic have been beneficial and have been used as a script to follow regarding necessary actions and the sequence for it. In hindsight, the plans have passed the stress-test of Covid-19 and have proved their value according to the BU-president. According to

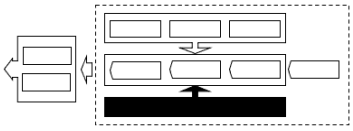
the PG-manager, production orders have been moved between sites during the pandemic and this has largely been based on identified contingencies. According to the PG-manager, the most useful aspects of the DRPs have been related to Sourcing. According to the PG-responsible, the mapping of alternative suppliers for certain critical items has been a key contributor during the recovery process. Within sourcing, there was a basic understanding of which suppliers were associated with high risk (e.g., low spend or purchasing power). These suppliers have posed the most significant challenge during the pandemic. *"If the Company is not prioritised before the pandemic, we will not be prioritised in a crisis either."* However, the PG-sourcing manager puts less emphasis on the plans and instead highlights the organisational structure within Sourcing.

4.3.2 Perceived Needs

This section steps through the theoretical framework (recall Figure 2.8) and includes the informants' "perceived needs" (i.e., their desired changes or identified issues).

4.3.2.1 Business Continuity Management

4.3.2.1.1 Scope of BCM

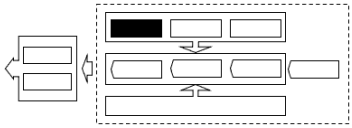


Both the BU-president and the PG-responsible identify a need for the PG and BU to evaluate its most significant risks, the cost of different options to manage them, better understand the trade-offs and the implication on the BU's competitiveness. This analysis has not been done previously according to the PG-responsible. It will not be possible to have back-up solutions for everything, and at the end of the day, what is spent on safety-nets could be used to develop new products and grow the business according to the BU-president.

In terms of scope, the BU-president highlights that the plans must be kept operational and practical. If they are developed on a more strategic level, they will become vague and lose connection with reality. Areas that have not been covered by the plans are the prolonged aspects of working from home and how to adapt business processes to work over distance. The BU-president has brought up the mental wellbeing of employees as an aspect overlooked before.

4.3.2.1.2 Enablers

Tools & Frameworks

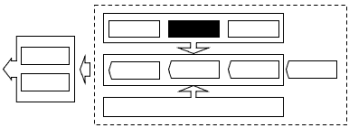


The PG-responsible highlights that the importance is not that the Company focuses on having the best tools and frameworks regarding BCM. According to the PG-responsible, it is more important that the tools and frameworks are consistent throughout the organisation to enable benchmarking and comparison. The PG-responsible adds: *"The RM-department needs to help the PGs with what should be analysed, what parameters to evaluate etc. and provide the right tools to do so"*.

According to the PG-sourcing manager, the Global Sourcing organisation could drive training or develop what is needed within sourcing. For the factories, support is needed from the management within the PGs and Operations Management. Functions like operations development can assist in developing new tools and frameworks. Regarding the overall focus on risk, the PG-sourcing

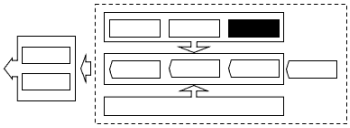
manager emphasises that it is easy to fall into daily routines. If working with risk is not part of the daily routines, the work will be postponed, and there is a risk that we will not have all pieces in place the day something happens. At the same time, the Company cannot build a completely safe supply chain, as the products would quickly become too expensive.

Training & Testing



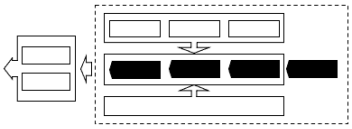
The PG-responsible sees a need for the Risk Management-department to support the organisation during the actual process better and provide the organisation with the required tools. According to the BU-president, there is room for improvement in how the Company's strategic levels support and assist the sites, but it is unclear how this is best to be done.

Audit & Measurement



The BU-president highlights measurements as a tool to ensure that BCM is implemented. Today, the BU is measured on for example growth, profitability and quality but not on BCM. "*When running a business, what's measured gets done, and if the Company wants to do something differently, KPIs and similar instruments is a good place to start.*" The BU-president also sees opportunities to benchmark its BCM-plans against other BUs within the Company or external companies. The PG-responsible also highlights benchmarking and comparison. The BU-president also sees a need for the RM-department to challenge the BU's perspective and provide guidance where gaps are identified.

4.3.2.1.3 Risk Analysis & Disaster Recovery Planning Process



According to the BU-president, if the Company is to have a common strategy regarding investments in continuity strategies, it will inevitably affect the share dividend and the share price. Hence, the end decision regarding the strategic view upon risk resides with the Company's board. According to the BU-president, it is in the end, a financial discussion and how far the Company is willing to go. There are also elements of scale and diversification, as it is unlikely that a disaster would impact more than one Business Unit. For example, the highest potential impact within Business Unit C will only affect the Company's revenue by a few percentages, but for the BU it would have a significant impact. Consequently, at different management levels, the strategic view on risk will be very different. According to the BU-president, if the Company should have a common strategic view upon risk, it must be taken by top management. However, the BU-president is not sure what strategy is best when moving forward, if the Company should have a common strategy or if the decision should rest at another management-level.

Also see section 4.3.2.1.1 Scope of BCM. Recall the need for a holistic view upon risk, understand business impact, and the need for principle regarding investments in BCM together with the PG and its implications to the business. Further, the BU-president also identifies a need to consider the human aspect (psychological wellbeing of employees), which has not really been considered within the DRPs before.

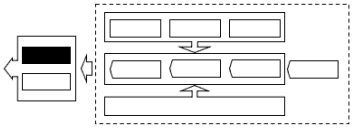
The PG-responsible see a need for a more fact-based discussion regarding trade-offs of different contingency strategies. The PG-sourcing manager also sees a need to better understand how to optimise risk and mitigating impact. Moving forward, the PG-sourcing manager emphasises that it is easy to fall into daily routines and that risk is neglected if it is not considered in a formal process.

Further, the PG-sourcing manager highlights that the risk strategy within sourcing will always have to start with the overall product strategy. If the organisation asks itself questions like: *"What products should we be able to deliver? Where do we see the risks, and how can these risks be optimised? What is tolerable shortage time for products? Is it okay to be unable to deliver for a year? The product strategy will then trickle down to the supply chain function (sourcing and the factories) and determine the overall supply strategy to satisfy the product strategy."* For sourcing, such a service level agreement would then be the foundation for determining the supplier base needed, where dual sourcing should be implemented, etc. However, developing a strategy moving forward is not easy, and the overall product strategy requires a balance between different stakeholders. The PG-sourcing manager also highlights that the Company should think about risk already at the product development stage. When developing new products, the PG and BU should try to avoid lock-in effects in terms of technology and design more towards function rather than a specific brand of components.

BU-sales sees a need to have a valuable discussion about risk. *"Not something that becomes a theoretical exercise that enables you to tick the box in the QMS."* Within BU-sales, there is a need to identify key resources and competence and better understand the risks. Additionally, there is a need to understand how to deal with competence and the cost associated with different strategies and create plans if key competence were to leave the Company.

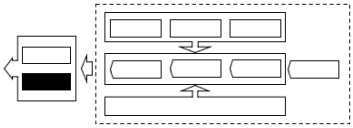
4.3.2.2 Management of recovery

4.3.2.2.1 Structure



No information available.

4.3.2.2.2 Recovery Actions



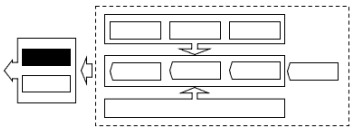
No information available.

5 Cross-case analysis

This chapter presents the cross-case analysis. The cross-case analysis is based on the output of the single-case analysis presented in Appendix B. Firstly, the management of recovery is analysed based on how it has been structured and what actions have been implemented across different cases. Then the cross-case analysis is conducted based on the BCM-related aspects of disaster recovery that were in place before the pandemic compared to relevant theory and the perceived needs identified across the cases.

5.1 Management of recovery

5.1.1 Structure



Across all cases, the primary response has been coordinated through the Crisis Management (CM) structure. The CM-procedures has formed the foundation for managing the crisis, where crisis management teams (CMTs) have been mainly responsible for implementing safety measures. Extensive information sharing has taken place within and among the crisis teams and issues that have emerged have been escalated within the structure. Local CMTs have been installed where deemed necessary (on most sites, but at different phases of the pandemic). The structure of the CMTs has been very consistent in all cases, see Table 5.1[4]. The local CMTs have been responsible for considering the regional development of the pandemic situation and based on this, implementing appropriate measures. Besides, CMTs have also been implemented at national and global level, where the CMTs have primarily been responsible for coordination, collaboration, and implementation of appropriate safety measures within their underlying structures. The generally communicated view is that this structure has worked very well, and it has always been possible to adapt as needed (e.g., frequency of meetings etc.).

Table 5.1: Cross-case analysis of Management of recovery - Structure.

	Case A		Case B		Case C		All	
Aspect	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings
Recovery organisation	4	Clear responsibilities, structured by regular management structure.	5	Clear responsibilities, structured by regular management structure.	5	Clear responsibilities, structured by regular management structure.	5	Clear responsibilities, structured by regular management structure.
Crisis management structure	5	Based on CM-policy. Highlighted as key success factor to recovery.	5	Based on CM-policy.	5	Based on CM-policy.	5	Based on CM-policy. Clear structure. Sometimes CMT on BU/PG-level.

Disruptions in the material flow have primarily been managed through the regular management structure of the BU and PG in collaboration with the local CMTs and strategic functions such as Global Sourcing and Operations Management (Table 5.1). Within most functions, regular meetings have taken place more frequently to reflect the current severity of the disruptions. In some cases, CMTs have been formed within the BU and PG, however, the responsibilities of the BU and PG-level have been similar over all cases, despite a dedicated CMT or not. While different responsibilities between the regular management structure and CMTs is a clear pattern across all

[4] Recall the classification described under 3.1.5 *(1: Not in place, perceived need; 2: Not in place, no perceived need; 3: Partly in place, perceived need; 4: Partly in place, no need; 5: In place; - No info available.)*

cases, there have also been some overlap where e.g., the BU has sometimes dealt with the topic of employee safety and the national or global CMTs have dealt with supply chain disruptions. The conceptual picture of how the recovery was managed is shown below in Figure 5.1.

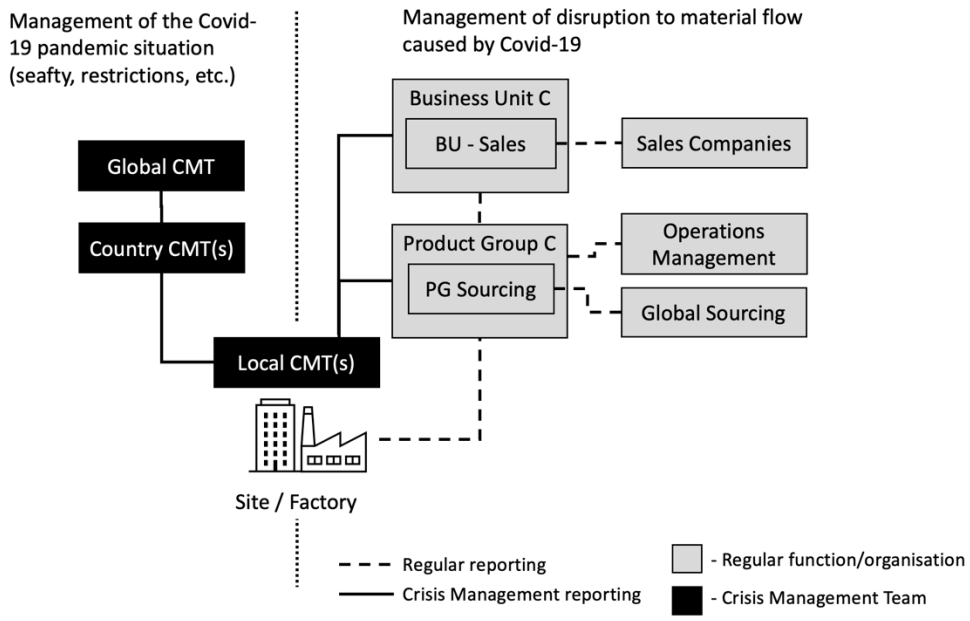
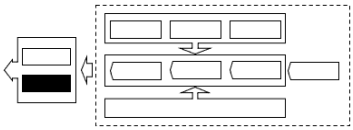


Figure 5.1: Illustration of the general structure and focus areas when managing recovery during the Covid-19 pandemic across the cases. Developed by the authors.

While BCM theory[5] recommends specific recovery teams to be defined in the DRPs, no such examples have been identified throughout the case. Furthermore, the theory[6] recommends separate teams for Crisis Management and Disaster Recovery, however, at the Company the regular management structure (or BU/PG CMT) and local CMTs have filled the role of Disaster Recovery teams. Based on interviews, everyone seems satisfied with the structure that has been in place, and even if BCM has not governed the structure, there has been a clear structure and distributions of responsibilities, aspects that are highlighted as important in both BCM and CM literature. The structure has been gradually adjusted to better adapt according to current needs and thus facilitate recovery. The reason why no dedicated Disaster Recovery teams have been introduced can probably be explained by the habit of starting from the CM-policy within the Company. However, except for calling the teams "CMT", the local CMTs (and BU/PG CMTs) have adhered to the BCM theory of clear responsibilities and structure for managing recovery.

5.1.2 Recovery actions



The DRPs' contribution to management of disaster recovery during the pandemic has been limited (Table 5.2). Instead, the recovery measures have, to a large extent, been developed reactively and relied on coordination at the strategic levels of the BU, PG, and sales companies together with CMTs at the local sites. Such measures have included: securing the material flow (by changing suppliers, moving inventories between sites, etc.), implementing safety measures to protect people from the virus (such as social distancing and "work from home"-routines), and ensuring business

[5] See section 2.1.7 Developing and implementing BCM response and Disaster Recovery
[6] See section 2.1.1 BCM and Crisis Management

continuity of the customers (by for example prioritising customers and providing remote service). The limited contribution of DRPs can probably be explained by the fact that the plans' primary focus has been related to the impact from risks (such as fire and natural disasters) to site infrastructure. During the pandemic, it has not been easy to estimate the duration of temporarily shutting down production processes, and in those cases where production has been halted, it has normally been operational again within a few weeks. Hence, what has been implemented has been limited to continuity strategies readily available within a short timeframe. For example, within BU C continuity strategies with an implementation time of a year were developed reactively but were never utilised due to the long timeframe.

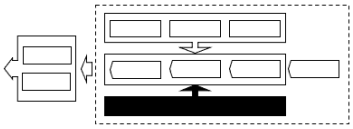
Table 5.2: Cross-case analysis of Management of recovery - Recovery actions.

	Case A		Case B		Case C		All	
Aspect	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings
Contribution of DRPs	3	Relevant plans have been used within the PG, with limited contribution.	4	Only contribution were supplier risk analysis.	4	Contribution of alternative suppliers and production capabilities but limited coverage.	3	Dual-capacity and supplier risk mapping. In practice limited contribution.

The components in the DRPs that have been used during disaster recovery have been directly related to processes within the PGs. The contribution of mapping suppliers and critical components has been mentioned in all cases. Further, the identification of internal dual production capabilities to be implemented at short notice has been utilised within PG A and PG C (Table 5.2). Within PG B, no such capabilities exist, thus explaining why moving orders has not taken place despite temporary site closure. With experience of the pandemic, the PG-sourcing managers in both Case A and Case B, and the BU-sales manager in case B identifies a need to better understand the criticality of suppliers and customers to better prioritise future recovery. However, the perceived need to better understand criticality should, according to theory[7], be covered by the BIA's output. Hence, the lack of a BIA that considers the business impact identified below (section 5.2.3) may explain why DRPs do not provide this input. With a more business-oriented BIA, information about appropriate priorities can be received from the plans instead of other people within the organisation, an observation that the BU-sales manager in Case B also makes.

5.2 Business Continuity Management

5.2.1 Scope of BCM



The current scope of legal entities does not necessarily pose any problems in itself (as all the legal entities combined encompasses the whole Company). However, based on the empirical findings, the scope of legal entities (i.e. sites) influences the scope of the conducted risk analysis and BIA. Since the legal entity structure does not reflect the functional structure and processes within the Company, it creates limitations in the analysis regarding aspects related to the processes and collaboration across both functions and sites (Table 5.3). The current legal entity-scope which is extended to the BIA enforces a logic where aspects deemed critical at the site are identified, but

[7] See section 2.1.5.2 Business Impact Analysis

this does not necessarily correspond to what is critical to the business. In contrast, as the approval of continuity strategies is conducted at a more strategic level (if investments are required), the decisions will instead be based on what is critical to the business. The misalignment of what should be considered critical results in an inefficient BCM-process at the site-level which requires an extensive analysis and documentation but seldom leads to the development of continuity strategies which are also approved for implementation.

Table 5.3: Cross-case analysis of Scope.

	Case A		Case B		Case C		All	
Aspect	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings
Infrastructure	4	Limited to site and equipment. Informal at PG-level.	3	Limited to site and production equipment.	4	Site infrastructure.	4	Site infrastructure and equipment included.
People	3	Succession plans are in place for BU-Sales but not BCM.	4	Succession plans at the BU&PG-level but not BCM.	3	Succession plans at the BU and manufacturing but not part of BCM. Need to include mental wellbeing.	3	Partly in place but not part of BCM. Limited understanding of impacts.
Processes	3	Supplier/component and manufacturing processes are covered on a site level.	3	Suppliers and production processes.	3	Production processes and suppliers. Need to consider white-collar processes.	3	Supplier and production process covered (at the sites). Need to be extended.
Value chain	1	Great need for improvement according to both BU-president and PG-sourcing manager.	1	Strong need for value-chain perspective on criticality of BU. Supply chain from PG-responsible.	1	Risk considered, but not formal BCM. Need to evaluate.	1	Clear need for a more holistic perspective. Especially from strategic levels.

Across all cases, strategic managers claims that the BCM-process fails to consider what is important to the business (Table 5.3). This, in turn, results in a BCM-process rooted in what the authors argue is "site continuity planning" rather than "business continuity planning". However, the current site perspective is not unique to the Company; this issue is recognised in the BCM-preparedness the model proposed by Marsh Risk Consulting (Supriadi & Sui Pheng, 2018). When evaluating the Company's current scope based on Marsh "BCM Preparedness Model" (Supriadi & Sui Pheng, 2018), the scope complies with Level 2 - "Formalizing BCM" as there is a corporate policy driving a (partly) consistent approach at the site-level. However, Level 4 - "Integrated BCM" demonstrates that the scope should consider the value/supply chain dependencies at the Company level. According to the model's fourth level, BCM should help ensure that the *"organisation understands its business processes and has the ability to deal with crises and recover processes across sites and into the supply chain"*, however, this is not something that today's "legal entity"-scope of BCM at the Company really considers.

This gap has also been identified within all cases, especially at the strategic levels of the BUs (Table 5.3). While there are some examples of ad-hoc discussions regarding risk from a business perspective, there is a perceived need from all the BU-presidents to take this analysis further by better understanding what is critical from a business perspective and being able to prioritise their resources based on the analysis. Two of the BU-presidents take this further and identifies a need for a formalised process that takes business impact into account and considers processes that transcend sites (Table 5.3). Within the PGs, there is less of a perceived need for extending the scope of BCM. This can probably be explained by the fact that the current site-oriented scope is

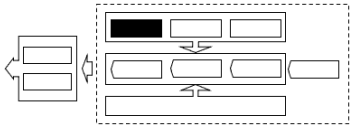
focused on operational processes, taking place at the site-level. From the empirical findings, it is also clear that duplicity in production capacity has already been mapped within the Product Groups, and to some extent, the risk is considered from a PG perspective. However, it is not clear to which extent it is preformed through a formal process or is conducted informally.

During the pandemic, infrastructure has rarely been subject to disaster recovery, whereas the recovery of business processes has required significant resources. Where process have been included in the scope (particularly the PGs), is also where the greatest contribution of BCM to the recovery has been observed (see section 5.1.2 Recovery Actions above). However, the pandemic has caused a significant impact on cross-site-processes, but no continuity strategies were developed in this area before the pandemic. Hence, it is considered of great interest to investigate how a more business-oriented scope can facilitate disaster recovery in future crises.

People are considered within all cases, however, this is not part of the formal BCM-process (Table 5.3). While succession plans are in place in many functions, people are not considered in the risk analysis or BIA. Hence, while key competence is partly protected, there is a limited understanding of the potential business impact. If the Company's BCM-scope were to be expanded in the future (to encompass business processes throughout the supply chain better), it is considered by the authors to be important to reflect on how the people-aspect is best to be considered.

5.2.2 Enablers

5.2.2.1 Tools & Frameworks



While the tools and templates provide guidance for specific planning components, there is no consistent framework for structuring the overall BCM-process (Table 5.4). Instead, it is up to the Managing Director of the legal entity to structure the process. Here, there is a perceived need within all cases for a more structured framework on implementing the BCM process. It has been stressed that a structured process is a prerequisite to ensure that BCM is not neglected in favour of other daily tasks.

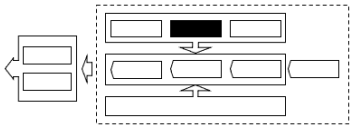
Table 5.4: Cross-case analysis for Tools & Frameworks.

	Case A		Case B		Case C		All	
Aspect	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings
BCM-process	3	In place at site level, need to formalize within purchasing	3	No structure for BU & PG-level. In place at factories.	3	Need for consistency within PG	3	Need for better guidance and consistency of the BCM-process
Risk Analysis	3	Done to some extent but clear need for a more structured approach	3	Lacking structure when partly in place. Need to formalise	3	Need for consistency within PG	3	Need to formalise to a structured process
BIA	-		3	BU-president (BUP) sees need for improvement. In place at factories.	3	Need for consistency within PG	3	Need for consistency and can be improved
Continuity strategies	3	Better input and guidance of when to implement	1	BUP sees need for improvement	2	No tools at BU+PG-level. But no info on site	1	Very limited guidance of how and when to develop.
Disaster recovery plans	4	In place for site manufacturing.	3	BUP sees need for improvement. In place at factories.	2	No tools at BU+PG-level. But no info on site	4	Not in place at BU/PG-level. In place at factories

From a legal entity-perspective, there are in-house developed tools to support the BCM-process in estimating impact, establishing criticality of processes, developing continuity strategies, and developing DRPs that reflect BCM-theory. However, the perception of the current templates varies across the cases. The variety of different methods and definitions (for example, within sourcing, impact is either based on deliverability, purchasing spend, or difficulty to replace) suggests that the tools do not provide adequate guidance and are either modified or not used within all cases. This variety is recognised at the strategic level within Case B and C, and there is a perceived need for increased consistency to enable benchmarking and comparison (see Table 5.4). However, this view is not shared by all interviewees, the BU-president in Case A instead advocates for modifications to suit local objectives and needs.

Within functions which are not included within the BCM-process (BU-management, BU-sales, and PG-management), Risk Management and BCM is considered informally as part of the daily activities and is conducted ad-hoc (Table 5.4). Therefore, there are no explicit tools in place that are used by the BU-presidents, PG-responsibles, or BU-sales managers. Further, within sourcing, tools have been developed reactivity during the pandemic upon a strategic level to monitor supplier status.

5.2.2.2 Training & Testing



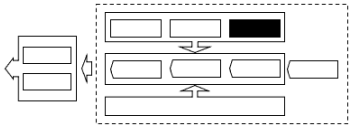
Within BCM literature, training is highlighted as an important enabler of BCM, and it is suggested that the different levels of the organisation should participate in training on BCM regularly[8]. However, at the Company, there is no regular training related to BCM, as indicated in Table 5.5. The lack of training suggests that either the importance of training within BCM has not been understood or that there have not been sufficient resources to provide training. There is only one person (Sourcing manager in case A) who can recall participating in training on developing DRPs; this was provided by Global Sourcing. The only material currently available related to training is the brief instructions in the document "Business Continuity Management Instruction" found within the "Business Continuity Management Policy" on the Company's intranet. The identified gap between what is currently in place at the Company and what the theory recommends is identified as an issue within all cases. There is a clear perceived need for better guidance and training related to the BCM-process identified at the management level within the BUs and PGs (Table 5.5). The lack of training and support is presumed to result in a limited knowledge regarding how and why one should work with BCM. The limited knowledge about the need for BCM itself is identified as a possible root cause for why significant gaps are identified in terms of the Disaster Recover Planning-process and the overall purpose and objectives of the BCM program.

[8] See section 2.1.8.1 Education and Training

Table 5.5: Cross-case analysis for Training & Testing.

	Case A		Case B		Case C		All	
Aspect	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings
Training or education	1	Emphasised need by BU-President and PG-Responsible.	1	No education regarding BCM, need for better guidance.	3	Risk discussion on strategic level with RM-dep. Need for better guidance.	1	Strong need of better guidance and support from most.
Testing or exercises	1	Emphasised need by PG-responsible.	-	No information	-	No information	1	Only brought up by PGR case A.

5.2.2.3 Auditing & Measurements



Auditing is highlighted as an important aspect in BCM theory, where providing guidance and input to the organisation is emphasised[9]. However, compared to theory, the Company's auditing process is primarily concerned with comparing BCM-documentation to the corporate governance policies and templates. It does not provide any evaluation or guidance in terms of BCM-quality, as suggested by theory. This gap is identified within both Case B and C (although BU C refers to the Group Risk Management-department rather than Internal audit) (Table 5.6). Further, the perceived need for benchmarking or comparison identified within PG C, BU C and BU B, also suggests a perceived gap in terms of input regarding the quality of the BCM-process. The lack of input in terms of BCM quality from current audits, as identified within all three cases. According to BCM theory, this gap could be explained by the maturity of the auditing process and auditor's knowledge of BCM as suggested by theory[10]. However, the authors do not have adequate information to draw any conclusions regarding the current BCM knowledge of auditors.

Table 5.6: Cross-case analysis of Audit & Measurements.

	Case A		Case B		Case C		All	
Aspect	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings	Total	Comments & findings
BCM audit	3	Audited on site-level, not the strategic level	3	Need for increased focus on BCM in audits	4	In place at site level, but quality not considered	3	Need for increased focus and consider quality
Measurements	-	No indication that measurements exists	2	No formal or informal pressure from management	1	Need for more measurement and follow-up	1	Suggests low priority. Must be stressed from the top
Guidance	4	Feedback is clear, but quality of process not assessed	1	Need for more input and benchmarking	1	Need for benchmarking	1	Strong need for more input and comparison/bench-marking

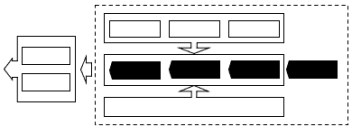
Further, within Case B, the consequences of failing are perceived as minimal. In combination with a lack of KPIs on BCM (Case B and C), this suggests that the evaluation and improvement of BCM is not a top priority for the business (Table 5.6). As expressed by the BU-president in Case C: *"What gets measured gets done, and if the Company wants to change something, KPIs is a good place to start"*, this is also in line with what theory recommends. An evaluation process by auditors is however

[9] See section 2.1.8.3.1 Audits

[10] Recall the importance of BCM knowledge of auditors as described under section 2.1.8.3.1

not the only way forward. Self-assessments are proposed by BCM literature[11] as a cost efficient alternative and provide opportunities of comparison between peers and create awareness. Continuous evaluation and comparison among peers may also create awareness and incentives to conduct work related to BCM, a possibility which has been identified within BU B and PG C.

5.2.3 Risk Analysis and Disaster Recovery Planning process



5.2.3.1 Sourcing

The primary focus of BCM within sourcing across all cases is risk analysis. The risk analysis is, however, performed differently in all cases. While Case B defines impact as purchasing spend, Case A and C define impact in terms of causing the production to halt due to shortage of material (Table 5.7). All cases determine the probability of risk based on numerous factors: Case A and C have predetermined factors for supplier risk scoring, whereas Case B instead relies on ad-hoc brainstorming sessions to identify risks and determine probability. The risk analysis primarily takes place within the local purchasing teams at the sites and is performed from a site-perspective, however informal or ad-hoc risk assessments are performed on the PG-level within all cases (where there is perceived need to formalise the process). The output from the risk analysis (site or PG-level) is then used to motivate risk mitigation strategies. This is carried out with the help of the purchasing improvement process together with Global Sourcing, however the inclusion of risk in this process is not formalised and is treated ad-hoc (at least to some extent). Hence, compared to theory, the risk analysis is regarded as partly in place, although it does not provide a clear indication of appropriate actions as proposed by theory[12].

Table 5.7: Cross-case analysis of Risk Analysis and Disaster Recovery Planning process within sourcing.

	Case A			Case B			Case C			All	
Aspect	PG	Site	Findings / Comment	PG	Site	Findings / Comment	PG	Site	Findings / Comment	Total	Findings / Comment
Risk Analysis	4	3	Supplier risk scoring. Ad-hoc on PG-level, need to formalise.	3	3	Impact is based on spend. Ad-hoc at both site and PG, need to formalise.	3	5	In place at sites, informal at PG. Need to formalise and improve mitigation.	3	Site perspective. Informal at PG, partly at site. Need to formalise. Used to motivate mitigation.
BIA	2	4	Impact on site deliverability, no recovery objectives.	2	2	No BIA, only risk analysis.	1	3	Site perspective. Need to establish cross-functional BIA for products.	3	No recovery objectives or business criticality. Site perspective.
Continuity strategies	2	2	Risk mitigation, not continuity.	4	4	Alternative suppliers, ad-hoc.	-	3	Alternative suppliers, but need to optimize.	3	Primarily risk mitigation, some alternative suppliers.
Disaster recovery plans	-	2	No recovery plans.	-	-	No BCM, instead SCRM. No info on plans.	2	3	In place at factories, but primarily risk mapping.	2	No true DRPs, primarily contain risk mitigation and SCRM.

In terms of BIA, there is no formal process with the purpose of estimating business impact or criticality (e.g. recovery objectives) as proposed by BCM theory[13] (Table 5.7). Within case A, some degree of formal BIAs are conducted based on how difficult the components are to obtain, reflecting recovery time as proposed by theory, however, this is used as qualification for whether

[11] See section 2.1.8.3.2 Self-assessments
[12] See section 2.1.5.1 Risk Analysis
[13] See section 2.1.5.2 Business Impact Analysis.

or not to perform risk analysis but is not used to benchmark continuity strategies against as proposed by BCM theory.

Compared to theory, the BCM-process within sourcing can be described as Supply Chain Risk Management, rather than BCM[14]. While continuity strategies are developed by identifying alternative suppliers, the emphasis is on risk analysis and implementation of proactive risk mitigation strategies. This is further reflected in the perceived need within all cases, where improvement areas are identified in terms of formalisation and improvement of the risk analysis process (Table 5.7). Further, the emphasis is on mitigation of supply risks and supplier risk, not the key resources, processes, and continuity strategies, neither for materials supply nor the sourcing process itself.

The gap between the current BCM-process within sourcing and BCM theory is the absence of a BIA, both in terms of business impact and the establishment of business criticality and recovery time objectives. This gap is highlighted in Case C, where the PG-sourcing manager explains that if continuity strategies are to be developed, there is a need to first agree upon tolerable outages (one of the key outputs of a BIA) for specific products from a strategic business perspective (Table 5.7). In other words, the PG-sourcing manager identifies a need for a BIA on a product level, which would be based upon business impact rather than "site-impact" which is the predominant measurement of impact within sourcing today.

5.2.3.2 Manufacturing (Product Group Responsible)

Within the Product Groups (sourcing excluded), the primary focus of the BCM-process is site infrastructure and production equipment, this is also what all three cases are concerned with in terms of the Risk analysis and disaster recovery planning process. Aspects such as competence (white collar and blue collar) are considered, but not within the scope of BCM. Risk analysis is performed at the factory-level within all cases (Table 5.8), where the impact of different site-related risks (mainly natural disasters and fire) is estimated in terms of local manufacturing processes.

Table 5.8: Cross-case analysis of Risk Analysis and Disaster Recovery Planning process within manufacturing.

	Case A			Case B			Case C			All	
Aspect	PG	Site	Findings / Comment	PG	Site	Findings / Comment	PG	Site	Findings / Comment	Total	Findings / Comment
Risk Analysis	3	3	Informal at PG-level, need for more guidance and training for both site and PG.	2	5	In place at the factories.	2	5	In place at factories, but site perspective.	4	In place at factories, not PG. Focus on infrastructure.
BIA	4	4	Site perspective, no recovery objectives.	2	4	Site perspective, no recovery objectives.	2	3	No recovery objectives or business perspective.	3	Partly in palace at sites. Site perspective of impact, no recovery objectives.
Continuity strategies	3	4	Need for guidance or principle of when to invest.	2	5	In place at the factories, but limited coverage.	2	3	Considered based on assumptions, need for fact based.	3	Exists for infrastructure. Need to better understand when to invest.
Disaster recovery plans	-	4	Partly in place at sites.	2	4	Limited coverage.	2	5	Identifies dual-capabilities.	4	Limited to dual-capabilities when available in the company.

In terms of the BIA, the impact is estimated differently across the cases. These are mainly concerned with the impact to the local site and the ability to deliver products. While the analysis outputs potential impact, there are no indications of established recovery objectives (Table 5.8). Further, there is no indication that the estimated impact is related to business impact, with the

[14] See section 2.1.5.1 Risk Analysis.

exemption of short-term impact of specific customer projects in case B. In comparison to theory[15], there is a considerable gap in terms of BIA across all cases as business criticality is not considered, nor are any recovery objectives established. Within PG A and C, there is a perceived need to improve how to consider the cost and benefit of continuity strategies and when to invest. Further, PG C identifies the need for a more fact-based discussion regarding the pay-off of continuity strategies. There is some evidence that business impact, rather than "site impact" are considered informally between the PGs and BUs (case A and C). This is more of a strategic discussion of overall supply chain strategy rather than a formalised BCM-process according to the BU-president of Case C. However, the perceived need related to evaluation of continuity strategies suggests that these discussions are not based upon a thorough analysis.

Continuity strategies are considered within all cases (Table 5.8) as proposed by theory[16]. In practice, the continuity strategies primarily focus on technical production capabilities. While the external (Case B and C) and internal production capabilities (all cases) are considered, the implementation of continuity strategies within all cases is limited to when dual capabilities are already available internally. Besides duplicity, the replacement cost and time of equipment are considered in some cases. Hence, while the DRPs contain the output of implemented continuity strategies, the coverage is limited (Table 5.8).

5.2.3.3 BU-sales

Across all cases, the BU-sales functions does not have a formal BCM-process (Table 5.9), nor is the function actively involved in the BCM process for other functions with the exemption of site related risks where the functions are located. While BU-sales are not included in the scope of any disaster recovery planning process, the BU-sales function has played a key role during the recovery phase in terms of prioritisation of deliveries and communication between PGs, sales companies, and customers. Hence, the exclusion of BU-sales from the BCM-process further suggests that the current scope of BCM fails to include processes transcending across legal entities.

Table 5.9: Cross-case analysis of Risk Analysis and Disaster Recovery Planning process within BU-sales.

	Case A		Case B		Case C		All	
Aspect	BU-Sales	Findings / Comment	BU-Sales	Findings / Comment	BU-Sales	Findings / Comment	Total	Findings / Comment
Risk Analysis	-		-		3	Top-level SWOT, need to move from "box-ticking".	-	
BIA	2	Not in place.	3	Ad-hoc and limited, but tolerable outage.	3	Informal (only functional perspective), need to better understand impact.	3	Informal and ad-hoc, some awareness of criticality exists. Need to better understand impact.
Continuity strategies	3	Informal duplicity of competence.	2	Not in place.	1	Competence identified, but need for a strategy.	3	Competence partly protected, but need to better ensure continuity.
Disaster recovery plans	1	Need for continuity plans for competence.	2	Not in place.	2	Not in place.	1	Not in place. Need to develop plans, especially for competence.

Further, while informants within the Product Groups and the BU have indicated that the BU-sales function is the function with knowledge of criticality from a business perspective, the BU-sales functions have not been consulted in any formal BIA performed within the Company. This further emphasises that the BIA at site-level does not consider business impact but rather estimates "site-

[15] See section 2.1.5.2 Business Impact Analysis.
[16] See section 2.1.6 Developing and determining Business Continuity Strategies.

impact". There is, however, an example in Case B, where BU-sales has identified critical components from a business perspective (Table 5.9). However, the BU-sales manager highlights that this is not a structured process and was conducted on the initiative of the BU-sales function.

Despite BCM not being a formalised process, all BU-sales managers recognise their employees' competence as a key resource (Table 5.9). These are protected to a varying degree by the duplicity of competence and/or succession plans. Further, there is a perceived need to better understand internal dependencies and how to ensure better continuity of key resources as suggested by BCM theory[17], which indicates a perceived need to include BU-sales within the current BCM-process.

5.2.3.4 BU-Management

Across all cases, the inclusion of the BU-presidents is limited to their inclusion in the site-based BCM-process at the legal entities. The BU-presidents in Cases B and C have provided examples of the inclusion of BU-functions within the site-based plans (e.g. test equipment within R&D). However, the empirical evidence from the BU-sales functions suggests that this inclusion is limited to succession planning and site infrastructure, however, the authors are unwilling to draw any conclusions about other BU-functions due to limited information. Although the BU is not the focus of BCM at the Company, the BU-presidents are involved in the BCM-process. In both Case A and C, the BU-presidents sign-off upon the result of the planning process. Further, in Case C, the BU-president is also involved in the investment decisions of continuity strategies, which he highlighted as the most challenging aspect of BCM.

While there is a high degree of awareness in terms of business-related risks, there is no structured procedure related to risk analysis or business impact analysis from a more holistic business-perspective (Table 5.10). Instead, this is dealt with ad-hoc and integrated into the general strategic work. All BU-presidents conducts some form of informal risk assessment and have good knowledge (at least according to themselves) about what sites are most important.

Table 5.10: Cross-case analysis of Risk Analysis and Disaster Recovery Planning process within BU-Management.

	Case A		Case B		Case C		All	
Aspect	BU	Findings / Comment	BU	Findings / Comment	BU	Findings / Comment	Total	Findings / Comment
Risk Analysis	3	Informal, need to formalise and consider "cross-site" processes.	3	Ad-hoc and need to formalise.	4	Conducted from a site-infrastructure perspective.	3	Informal and ad-hoc. Need to formalise.
BIA	1	Not in place, strong need for a holistic analysis.	1	Not in place, need for a holistic perspective.	1	Need holistic view and link sites to business impact.	1	Missing. Need for holistic perspective on criticality and impact.
Continuity strategies	2	Should be developed at the sites.	3	Partly in place at BU-functions. Based on risk analysis.	1	Need for better principle of when to consider together with PG.	1	Not in place, need for principle of when to consider strategies.
Disaster recovery plans	2	Should be developed at the sites.	1	Need to connect site-level plans within the BU. Performed at BU-functions but not strategic perspective.	-		1	Not in place. Practical work should rest at the sites, site-plans may be connected.

All the BU-Presidents identify a need for a more holistic approach to risk analysis. However, most seem to think that the development of DRPs and the practical work related to BCM should remain at the site level (Table 5.10). Further, all the BU-presidents see a need for a more business-oriented BIA to obtain a strategic business perspective. This need follows the pattern seen across currently implemented BCM-process which does not consider criticality from a business perspective as

[17] See section 2.1.5.2 Business Impact Analysis

proposed by theory[18]. The BU-president of BU B further identifies a need for DRPs considering the BU perspective by connecting the site-based DRPs into an overarching BU-oriented DRP. Further, the BU-president of BU A also identifies a need to better consider the processes taking place between the sites (involved in the material flow) while keeping the site plans in place. The more holistic BU perspective can, according to the authors, be interpreted as a perceived need for reaching to level 4 in the Marsh BCM Preparedness model by performing BIA upon a strategic level and understanding risk from a value- and supply chain perspective (Supriadi & Sui Pheng, 2018).

5.2.3.5 Overall Risk Analysis & Disaster Recovery Planning Process

Considering patterns across all cases and functions, risk analysis is primarily conducted at the sites regarding infrastructure and suppliers. On a strategic level, informal processes exist within sourcing and BU-management; however, both identifies a need to formalise the process (Table 5.11).

Table 5.11: Cross-case analysis of Risk Analysis and Disaster Recovery Planning process.

	Sourcing		Manufacturing		BU-Sales		BU-management		Overall	
Aspect	Total	Findings / Comment	Total	Findings / Comment	Total	Findings / Comment	Total	Findings / Comment	Total	Findings / Comment
Risk Analysis	3	Site perspective. Informal at PG, partly at site. Need to formalise. Used to motivate mitigation.	4	In place at factories, not PG. Focus on infrastructure.	-		3	Informal and ad-hoc. Need to formalise.	3	Primarily conducted at the sites with focus upon infrastructure or suppliers.
BIA	3	No recovery objectives or business criticality. Site perspective.	3	Partly in palace at sites. Site perspective of impact, no recovery objectives.	3	Informal and ad-hoc, some awareness of criticality exists. Need to better understand impact.	1	Missing. Need for holistic perspective on criticality and impact.	3	Site perspective. No recovery objectives. Strong need to gain a holistic perspective on criticality and impact form strategic levels.
Continuity strategies	3	Primarily risk mitigation, some alternative suppliers.	3	Exists for infrastructure. Need to better understand when to invest.	3	Competence partly protected, but need to better ensure continuity.	1	Not in place, need for principle of when to consider strategies.	3	Strategies exists to some extent, but general need for principle of what to protect.
Disaster recovery plans	2	No true DRPs, primarily contain risk mitigation and SCRM.	4	Limited to dual-capabilities when available in the company.	1	Not in place. Need to develop plans, especially for competence.	1	Not in place. Practical work should rest at the sites, site-plans may be connected.	3	Compared to theory, there are only DRPs for manufacturing at the sites. Sourcing has plans, but these are focused on SCRM.

Considering the Disaster Recovery Planning Process across all cases, the current site perspective and lack of recovery objectives is a clear pattern across all BUs and PGs (Table 5.11). The lack of recovery objectives constitutes a clear gap to BCM-theory[19] of BIA. Further, the current site perspective seems to explain many of the gaps and perceived needs within the disaster recovery planning process (especially the BIA) as the analysis does not identify what is critical to the business, but only the sites. This becomes particularly evident when considering the need from BU and PG-management for better guidance (or a principle) on when to invest in continuity strategies (Table 5.11). This further suggests a misalignment between what the BIAs identifies as critical (and what continuity plans are developed for) and the Company's appetite for investing in business continuity. According to the authors, this can explain why continuity strategies within manufacturing are in essence limited to the identification of already existing duplicate capacity. However, this gap is identified across all cases by BU-management, and there is a clear need to conduct a BIA from a holistic perspective (Table 5.11).

In terms of the Disaster Recovery Plans (DRPs) developed, these primarily cover production equipment at the factories. The plans developed within sourcing contains some elements of

[18] See section 2.1.5.2 Business Impact Analysis.
[19] See section 2.1.5.2 Business Impact Analysis

continuity strategies (alternative or dual suppliers), however the emphasis on risk mitigation has closer resemblance with SCRM theory[20] than BCM.

[20] See section 2.1.5.1 Risk Analysis.

6 Conclusion

This chapter provides a summary of the findings of this study. First, a discussion is provided regarding the achievement of the study's purpose, together with the answers to the stated research questions. Secondly, the study's contribution to research is presented, followed by the study's limitations. Lastly, proposals for further research, within the Company, the academic literature and the practice-oriented BCM-literature, are also considered.

6.1 Summary of findings

The purpose of this thesis can be seen from two perspectives; (i) as an attempt to develop the field of research within Business Continuity Management (BCM), with a focus on disaster recovery, from a material flow perspective by studying a live case during an ongoing pandemic; and (ii) to assist the Company in their journey towards further developing their work with BCM to manage disaster recovery in future crises better. The theoretical framework, which the case analysis was based on, was developed with the help of research within BCM and Supply Chain Risk Management. The three research questions will be answered below to fulfil the study's purpose (*"provide suggestions on how the Company can improve Business Continuity Management to improve future disaster recovery"*).

How has the organisation managed disaster recovery from disruptions during the Covid-19 crisis and what has been the key learnings?

Disaster recovery has mainly been coordinated through the crisis management structure. The theory recommends separate recovery teams, but the Crisis Management Teams (CMT) have instead also filled that role at the Company. The Crisis Management structure has been very consistent throughout all three cases where CMTs have been introduced at different organisation levels (with responsibility for organisations at sites, country-level and at the global level). The structure and the adaptability of the CMTs and extensive coordination have been emphasised as the main contributing factor to disaster recovery in all cases. Except for calling the teams "CMT", the local CMTs have followed the BCM theory of recovery teams with clear responsibilities and structure for managing recovery.

Recovery of disruptions in the material flow (which have caused the most significant impact to the business during the pandemic) has for the most part been managed within the regular management structure and collaboration with other functions within the Company's organisation. Additionally, issues have been escalated in the organisations' already existing reporting structure, such as Global Sourcing and Operations Management. The measures have, to a certain extent, been developed reactively. The measures have included: securing the material flow (by changing suppliers, moving inventories between sites, etc.), implementing safety measures to protect people from the virus (such as social distancing and "work from home"-routines), and ensuring business continuity of the customers (by for example prioritising customers and providing remote service). The Disaster Recovery Plans (DRP) components that have been used during disaster recovery have been directly related to the material flow within the PGs. The contribution of mapping suppliers and critical components has been mentioned in all cases. Further, the identification of internal dual production capabilities to be implemented at short notice have been utilised. However, the challenges raised in the interviews have primarily been related to difficulties in determining appropriate priorities, which indicates a need to further develop the disaster recovery planning processes for future crises. The perceived limitations of the DRPs can probably be explained by the fact that the plans' main focus has been related to the impact of risks such as fire and natural disasters to site infrastructure.

How has the current BCM-programme and policies affected management of disruptions related to the Covid-19 crisis?

In all cases, the existing BCM-programme has contributed to the recovery from the pandemic. However, since the interviewed individuals have not been directly involved in the actual development of plans (at least not to a great extent), it is difficult to determine to what degree the BCM-programme has facilitated disaster recovery.

Disruptions in the supply chain have had a major impact on the supply of materials and components and manufacturing. However, these areas are also where the preparatory work has been of the greatest use. In the cases where the BCM-process has been implemented, the organisation has been forced to conduct the analysis and at least identify existing contingencies which have been of help during the crisis (although impossible to determine the exact difference it has made). The results also suggest that the continuity strategies that have been developed have also been used to manage the process disruptions (despite being developed to manage disruptions related to infrastructure).

How can the "management of disaster recovery" be improved to manage future disasters better?

Figure 6.1 illustrates the improvement areas identified in the analysis. Determining criticality is one of the key aspects and fundamentals within BCM theory, yet this is one of the company's key challenges. As the Business Impact Analysis (BIA) has been conducted from a site-perspective, the identified critical resources or processes do not reflect criticality from the Company perspective. This has been explained as a consequence of the current BCM-scope of legal entities being applied to the BIA. This can explain why managers across the PGs and BUs struggle with funding and implementation of continuity strategies, as there is very limited analysis whether the process is actually critical to the business or not, just critical in terms of the site/factory delivering products or services. Improving the BIA by determining recovery objectives and criticality from a business perspective would provide better input for the continued planning process. Thus, providing a benchmark and principle for developing and implementing continuity strategies.

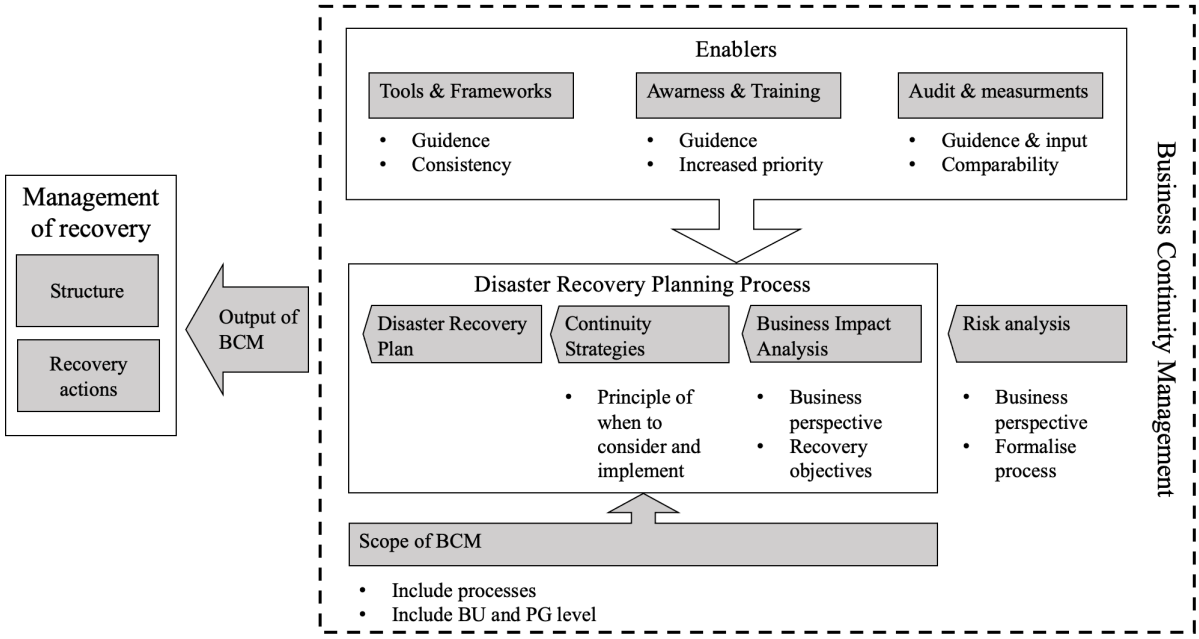


Figure 6.1: Identified improvement areas to increase the contribution of BCM to management of recovery for future disasters. Developed by the authors.

While improving the BIA would enable the organisation to move from "site criticality" to "business criticality", the current scope of BCM does not consider processes or resources beyond the individual sites and fails to incorporate functions and processes on the BU and PG-level. To evolve from the current state of "site continuity management", the scope of BCM within the Company also needs to include functions and processes that transcend the current scope of individual sites.

In terms of enablers, within Tools & Frameworks, there is room for improvement regarding how to structure and formalise the BCM-process, increasing guidance on how to perform the analysis and achieve consistency across the organisation. While many interviewees have mentioned the practical templates as an area of improvement, according to the authors (and a few interviewees), the root cause of these concerns is the lack of training and understanding of the actual purpose of BCM. Training or education has been emphasised as an improvement area across all cases, especially from more strategic managers. In terms of Auditing and Measurements, there is a lack of input on the quality of BCM from audits, need for more comparability among peers and increased priority of the BCM-process to ensure that it is not neglected (in favour for day-to-day activities). To the authors, the combined impression across the enablers suggests a general lack of knowledge about BCM and how to conduct the disaster recovery planning process. Further, the gaps within the enablers indicate an overall lack of priority, top management support, and commitment of the BCM-programme and its implementation within the Company. This is further emphasised by the impression that BCM has become a matter of compliance or "box-ticking activity", a common pitfall described by Hiles (2007) and change management literature in general due to lack of priority and top management support. If the resources and top management support were in place, these gaps would (likely) not exist. With that said, these gaps can be bridged, but it will require time, resources, and a long-term commitment.

In terms of the structure for management of recovery, no improvement areas have been identified. While there have not been any explicit "Disaster recovery teams", this has been managed through either the Crisis Management-structure or regular management structure. Further, this has worked well according to all interviewees except for minor issues related to the inexperience of dealing with a global crisis. Similarly, when relevant, the Disaster Recovery Plans have worked as intended.

6.2 Contribution

This study's contribution can be divided into the contribution to the Company and the contribution to research. Furthermore, can the contribution to research can (just like the purpose) be divided into the two following parts: (i) disaster recovery planning within BCM and the actual disaster recovery of a manufacturing organisation during an ongoing pandemic, where both parts were regarded from a supply chain perspective.

6.2.1 Contribution to the Company

The main contribution towards the Company is the answer to the third research question and the associated recommendations (presented in the thesis' final chapter) which were presented to the Company's "Group Risk Management"-department. The "Group Risk Management" department had realized that the current scope (focusing on the Company's legal entities) failed to consider the Company's business processes. The conclusions (and the following recommendations) provide relevant suggestions for areas which can be improved mainly related to the disaster recovery planning process. The recommendations provide a more structured and systematic approach to provide a more relevant disaster recovery planning process, by considering the following three

main components: Scope (and Objective), the actual disaster recovery planning process and different enablers which aims to enable a more relevant and useful process.

6.2.2 Contribution to research

As stated above, the contribution to research can be divided into two parts: (i) disaster recovery planning and (ii) actual disaster recovery of a manufacturing company during an ongoing pandemic.

The part concerning planning for disaster recovery is more descriptive in nature, and although it is based on the case company, the authors believe that the report's findings (and the accompanying recommendations in chapter 7) are somewhat generalisable to other organisations. As the presented conclusions and recommendations aim to help the company deal with future crises in a general sense (not only pandemics), the generalisability of the report's findings is further improved. The developed theoretical framework is also considered to be of contribution to both researchers and practitioners. However, the validity of the model has not been validated. However, since the framework is of general nature, it should be applicable in different BCM-settings, it should also provide value in a broader research context.

Furthermore, BCM maturity models have proven to be a useful evaluation method for organisations to understand what has been achieved in the addressed area and gain insight into what needs to be addressed to achieve the necessary improvement (Supriadi & Sui Pheng, 2018). When it comes to implementing BCM in an organisation, many different actors have developed assessment tools for maturity within BCM (e.g. Rai and Mohan, 2006; Tammineedi, 2010; Randeree et al., 2012). These assessment tools are useful for assessing whether an organisation has adopted a complete BCM concept or not. By understanding the organisation's position within these levels, the organisation receives feedback from its current BCM readiness level and can increase its efforts for a better BCM maturity level. There is, however, a limited amount of research where maturity models are used in an actual context, and prior examples can be found in the world of finance and IT. Rai & Mohan (2006) developed a framework to address the issues related to Business Continuity Management (BCM) and applied it to the BCM-programmes of banks in India. Randeree et al. (2012) developed a tailored BCM maturity model for the UAE banking sector and validated it through focus groups with BCM experts at ten banks in the UAE. However, this study's authors have yet to come across a study where any of these maturity models are applied in a manufacturing context; this is one of this study's more significant contributions.

Furthermore, the authors conducted a study at the cross-section of BCM and SCRM, where a limited amount of research has been found. Based on the authors' brief investigation, only a few studies have been conducted in this area and especially when it comes to case studies. Among the few case-studies identified are Norrman & Jansson (2004) and Norrman & Wieland (2020), however, these are more SCRM-oriented. From a methodological standpoint, no study has been identified using a supply chain approach with informants throughout an organisation's supply chain (when focusing on BCM).

Furthermore, through a case study, the authors provided insight into how a leading multinational company has been affected by Covid-19. The disaster recovery of the company during the ongoing pandemic has been very reactive. However, the authors believe that there is an interest for other organisations and academia to learn from different organisations (although within a single company) experience of managing disaster recovery during Covid-19. Further, this thesis provides an in-depth case study of the contribution of BCM in a manufacturing company during the global pandemic of Covid-19, which at least to the authors' knowledge is the first of its kind.

6.3 Limitations

This study has certain limitations which also affect the thesis' degree of reliability; these are accounted for here below. One explicit limitation of this thesis is the generalisability of the results. Since the study only considers one company, the generalisability of the study's results are probably also very limited. The study also only considers three different Business Units (and their associated Product Groups). However, as mentioned in the introduction, there are more than ten Business Units at the Company. The generalisability of the results would have been higher if additional cases were investigated; however, due to the thesis' time limit of 20 weeks, this was not considered possible. The generalisability is further negatively affected by the authors' need to anonymise the company. However, with a relatively detailed description of the cases, the results' generalisability should be improved.

The categorisation scale used in both the single-case and cross-case analysis also entailed certain limitations, as pointed out in the thesis third chapter (section 3.2 Research Quality). Since the analysis was based on subjective assessments, other researchers might arrive at different categorisations despite the same empirical data. This, of course, impacts the study's reliability negatively. However, as demonstrated in the method (section 3.2 Research Quality), the authors have applied several different strategies to counteract this to the greatest possible extent. However, the categorisation scale's purpose was not to obtain objective assessments but rather to apply a structured approach for identifying patterns within and across cases. Regardless of what other researchers' application of the categorisation scale would have resulted in, they would eventually (presumably) identify corresponding patterns. The reliability (regarding the categorisation of aspects) could have been increased by someone at the Company validating the authors' assessments. However, no validation was conducted with anyone at the Company, mainly due to the thesis' time constraint (20 weeks). It was also considered not viable to have someone from the Company be sufficiently acquainted with the theoretical framework while also being familiar with the empirical material.

The third limitation is related to the thesis's scope only being concerned with evaluating how the Company can improve Business Continuity Management to improve future disaster recovery. The thesis findings have neither been tested nor implemented, and therefore decisions regarding the following steps are not discussed. This limits the conclusions' feasibility and the practical recommendations' reliability (presented in the next chapter).

Another limitation is related to the thesis strategic scope of BCM and disaster recovery at the Company. Few of the interviewees are actually involved in the practical BCM-process at the Company, why their insights into the practical process are also limited. However, the interviewees have provided a more strategic perspective on the Company's BCM process, its contribution to disaster recovery, and the lessons learned and perceived needs with the overall process. The interviewees' limited involvement in the practical process has been an important observation in itself.

The final limitation is related to the ongoing pandemic. Due to covid-19, the authors had limited access to office sites to conduct interviews in person. This contributed to the data collection work becoming somewhat more challenging than the authors first imagined in virtual interviews. Due to the virtual interviews, it was difficult to read body-language and to sometimes interrupt the interviewees in a natural and polite manner.

6.4 Future Research

When writing this thesis, the authors have identified several different areas with a need for further research. While the literature of BCM is relatively extensive, there is limited literature and "case study"-research highlighting how to align the objectives of BCM with determining processes criticality-levels. The BCM literature also presupposes a centralised approach to determining criticality on a process or activity basis. With this kept in mind, a need for research has been identified to determine processes criticality in decentralised organisations. Therefore, future research is suggested on the topic of driving BCM implementation within large decentralised (manufacturing) companies. Here, Norrrman and Wieland (2020) provide an example; however, most BCM literature is primarily concerned with the objective and practical elements of the planning process rather than the establishment and implementation of a BCM-program.

The shortcomings identified in many companies' supply chains during the pandemic indicate a somewhat inadequate disaster recovery configuration in today's supply chains. Thus, there is a great need to link and nuance the methods for BCM, Risk Management and SCRM in the context of supply and value chains. Traditional BCM has a clear corporate entity focus and does not really consider the processes in between the organisational entities (indirectly or directly) included in the supply chain. The authors see a significant lack of research at the intersection of BCM and SCRM and have only been able to come across one academic article that sets out to synthesise and position the two subjects against each other (Suresh et al., 2020). There is also a minimal amount of "case study"-research in the intersection of BCM and SCRM which takes a more holistic approach to the impact of business disruptions (see Norrman & Jansson, 2004; Norrman & Wieland, 2020).

The authors have also identified a need for more research on the practical use of BCM in the context of disaster recovery. Furthermore, it is of interest to make more detailed analyses by monitoring BCM implementation over time to understand further how BCM implementation can be adjusted to become more in line with the intended purpose. Thus, it is of academic interest to make a case revisit at the Company to understand further what changes were made to make the BCM-programme more useful during disaster recovery.

This study has provided a theoretical framework for evaluating proactive and reactive aspects of disaster recovery in the context of a manufacturing company. Future studies can apply the developed theoretical framework in other organisational contexts by using it in case-study research. Validation of the theoretical framework within other companies and contexts would also add credibility to the framework.

7 Recommendations and Discussion

This chapter presents and discusses the more practical recommendations to the Company based on the study's findings. On a general note, the interviewees participating in this project have held strategic positions within the Company. This has likely affected the results and gaps identified, especially in terms of strategic perspective of BCM. This section is written with the purpose of providing recommendations to bridge the identified gaps (compared to theory) but also takes the current maturity of BCM at the Company into consideration.

7.1 Scope of BCM

7.1.1 Recommendation

- Pay more attention to the entire business process (i.e. the supply or value chain) rather than the individual legal entities.
- Increase the degree of information sharing between BU (and corporate) management with the legal entities regarding what processes are considered critical for the business.

7.1.2 Discussion

As identified in the empirical material and the identified gaps in the third research question, there is currently a large gap in the current BCM process regarding the scope of BCM, where there is a need to take better account of the business processes (instead of deciding what is critical at the legal entity level which seems to be the case as of today).

There is also a clear gap between what the theory advocates compared to what is happening today in terms of commitment from BU and corporate management. As strategic decision-making (regarding what is considered critical from a management perspective) and investment decisions are made higher up in the organisation, there is a need for more extensive information sharing between BU-management (or corporate management) and management (and other employees) at the "legal entity" level to better identify which recovery objectives the later developed continuity strategies should take into account.

7.2 Risk Analysis

7.2.1 Recommendation

- The RM-department in conjunction with other strategic functions (e.g. Global Sourcing, Operations Management, or global Sales & service) can develop relevant tools for performing risk assessments. For example, a probability impact matrix (see section 2.1.5.1 Risk Analysis) where thresholds are defined which qualify a specific risk to be escalated to Business Continuity Planning, rather than risk mitigation.
- Formalise the risk analysis process. Here it is more important that the risks are considered to create awareness and that low hanging fruit in terms of risk mitigation is addressed, rather than having the best tools in place.

7.2.2 Discussion

As described by theory, risk analysis (and risk management in general) should be regarded as a complement to continuity planning, not a substitute. Further, within non-critical processes or activities (hence excluded from the DRPs), risk analysis can still serve as an important tool to manage risk. Further, (as described under 2.1.5.1 Risk Analysis) risk assessments may be used to

identify specific risks which have a significant impact and cannot be managed through risk mitigation, thus qualifying for continuity planning.

The risk scoring tools used by the purchasing functions at the individual factories provides an example of a tailored process of how to estimate probability. Ideally, such a tool should also provide guidance of estimating impact (not present in supplier risk scoring) and provide clear guidance of appropriate actions to either manage the risk within the scope of risk management (or SCRM) or qualify the risk for continuity planning. (e.g. Norrman and Jansson, 2004; Hiles, 2007; Wong & Shi, 2015). For detailed theory on how to develop risk assessment tools and mitigation strategies, the reader is referred to Supply Chain Risk Management Literature (e.g. Manuj & Mentzer, 2008b).

7.3 Disaster Recovery Planning Process

7.3.1 Business Impact Analysis

7.3.1.1 Recommendation

As described by the theory[21] the primary output of the BIA should establish recovery requirements (what is needed to achieve recovery) and recovery objectives (how fast recovery must be achieved). While a BIA can be performed in different ways, as suggested by (Wong & Shi, 2015), it's recommended that the Company works backwards from the products and services delivered.

As many of the Company's processes coexist (in-line or parallel) to ultimately deliver a service or product. Hence, the recovery objectives, MTPD (maximum tolerable period of disruption) and MTO (maximum tolerable outage) will in practice be shared across many processes and functions. Thus, this will eliminate the need to perform an in-depth impact analysis for every single process. This approach has also been suggested by the PG-sourcing manager within Case C as an effective strategy to clearly communicate recovery objectives throughout the organisation to achieve alignment.

To ensure that the output of the BIA reflects criticality from a strategic business perspective, it is recommended that this analysis is initially performed at the BU-level. The BUs are well equipped to perform the required analysis as they possess the required knowledge of products and services and understanding of the strategic importance of these to the business.

7.3.1.1.1 Proposed Solution

The recommended BIA-process is illustrated in Figure 7.1. Below follows a more detailed description of the process flow.

[21] See section 2.1.5.2 Business Impact Analysis

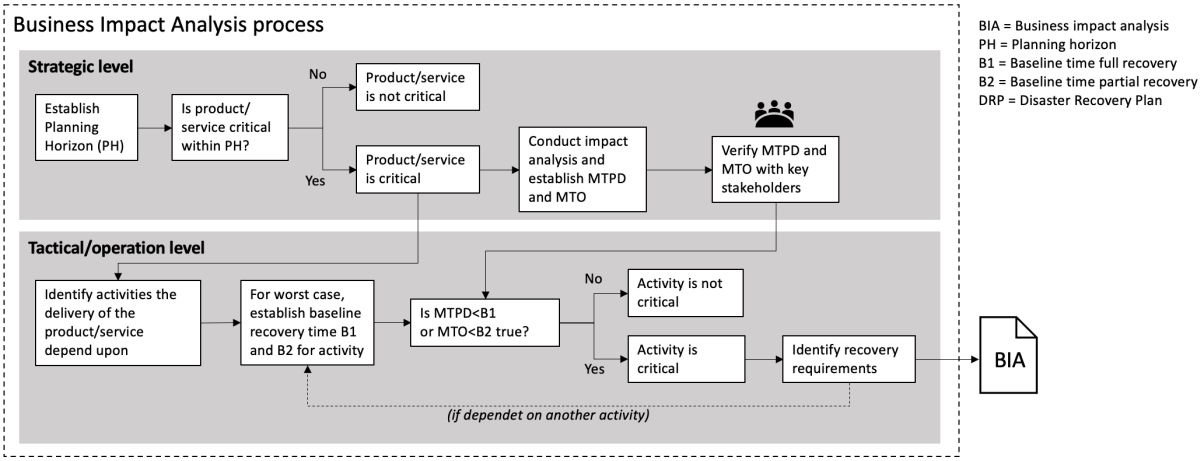


Figure 7.1: Illustration of recommended BIA and its relation to the development of continuity strategies and disaster recovery plans. Developed by the authors.

Before asking the business what is critical in the event of a disaster, there is a need to ensure clarity regarding the time-frame that needs to be taken into account. To help with this, Hiles (2007) recommends developing a "planning horizon" to decide on the period of potential disruption that should be taken into account in the BIA. The planning horizon will function as an initial filtering process and reduce the workload by eliminating non-critical products and services at an early stage that are not considered critical to recover within the planning horizon.

Once the initial filtering process is complete, the next step is to establish recovery objectives (MTPD and MTO) for products and services delivered within the BU. This could either be based on a product segment or individual products. It is advisable to group products which share many common traits and components, thus sharing many activities downstream. Here, it may be specified that the disruption of the whole segment is considerably shorter than the recovery objectives of each individual product. Important within this phase is to distinguish between MTPD (full recovery) and MTO (partial recovery to an acceptable level), where the MTO could be set to reflect the capability of serving a group of strategic customers or segments. The recovery objectives should consider both financial and non-financial impact[22]. To ensure that the established recovery objectives do reflect business criticality, they can be peer-reviewed by key stakeholders within the organisation, as proposed by Hiles (2007).

When MTPD and MTO have been established, they will be used as benchmarks to further extend the BIA-process to activities upon which the delivery of these products or services depends on. In order to assess if an activity is critical, an initial baseline (a worst case) for expected recovery time for the activity needs to be established, both to achieve acceptable partial recovery and full recovery. The time for baseline recovery is then compared to the established MTPD and MTO to determine if the activity is critical (Figure 7.2). In practice, any activity which requires careful planning to meet the established MTPD and MTO will be defined as critical.

[22] See section 2.1.5.2 Business Impact Analysis

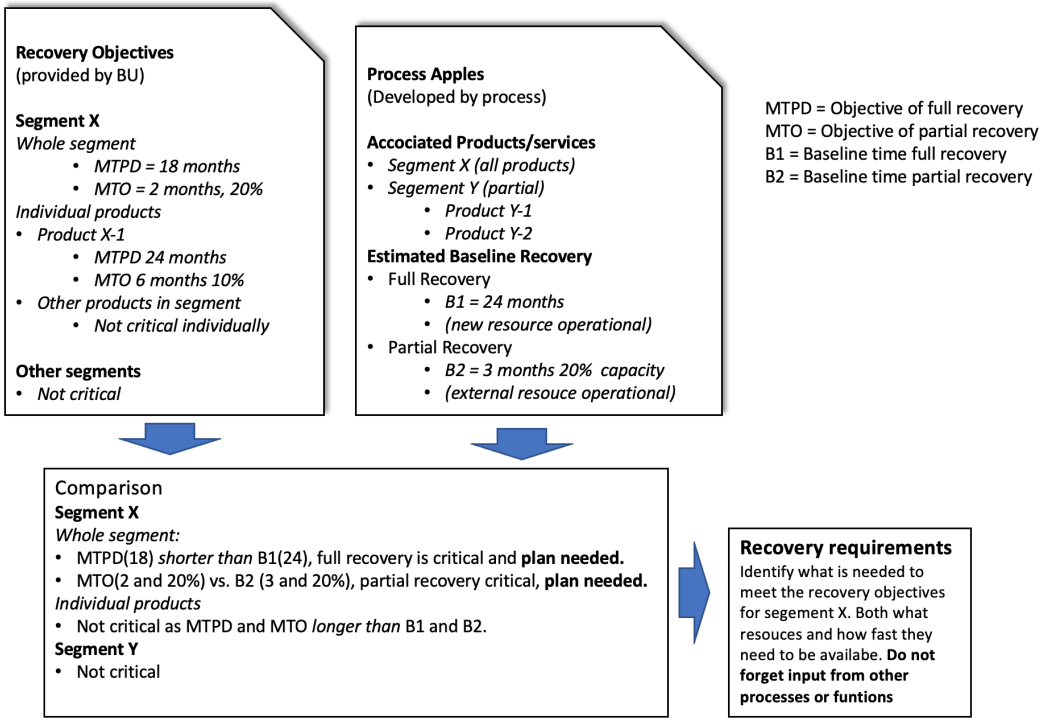


Figure 7.2: Example of a comparison of recovery objectives established by the BU and the baseline recovery of a process to determine criticality. Developed by the authors.

To establish a baseline for recovery, and later develop recovery requirements for critical activities, will (as described by theory) require in-depth knowledge of the specific activities. Hence, it's recommended that these steps are performed at the more tactical or operative level rather than at the strategic BU-level where MTPD and MTO are established.

Once an activity has been defined as critical, it shall be subject to further analysis (as described under section 2.1.5.2 Business Impact Analysis) to establish recovery requirements (identify resources and other dependencies needed to restore the activity). Together with the MTPD and MTO, the recovery requirements will then form the output of the BIA for the specific activity, thus creating a complete set of requirements to be met when developing continuity strategies.

7.3.1.2 Discussion

Advantages of a BIA, where MTPD and MTO is established on a BU-level, is that the focus will be on protecting what is actually critical to the business, not the individual site. These recovery objectives can be clearly communicated to managers throughout the organisation which do not share the strategic perspective of the BU. Further, it will clarify the purpose of the BCM-process and its expected output. This will also create cross-functional (or cross-site) alignment of developing continuity strategies further down the organisation.

An inherent risk of performing BIA from a BU-perspective, while achieving a business perspective, is that the current limitations with the site-perspective will be present with a BU-based BIA i.e. that criticality determined by the BIA does not reflect criticality to the Company, just the specific BU. This issue is discussed by the BU-president in Case C and PG-responsible in Case A, which highlights that to achieve a common principle of when to invest in BCM, this must be rooted on a group level. This issue can however be addressed by a peer-review process together with key stakeholders upon a group level.

While BCM theory recommends the recovery objectives to be developed with regard to the viability of the Company and mission critical processes, what this constitutes in practice will inevitably be left to management to define. Important to keep in mind is that the more narrow recovery objectives are set, it will likely result in the developed continuity strategies to be more expensive, and thus less likely to be approved for implementation. Further, the authors of this thesis believe that requesting managers to develop continuity strategies which will rarely be implemented will likely decrease the motivation of participating in the BCM-programme as it will be difficult to understand the value it creates beyond compliance as a "box-ticking"-activity. Hence, to minimize unnecessary work and ensure motivation, it is recommended to carefully set the recovery objectives (MTPD and MTO) in alignment with the objective of the BCM-programme to ensure that the Company is prepared to act upon the strategies later developed.

A critical pitfall of the process could be that activities and functions which are not directly connected to the delivery of products and services will be disregarded. Hence, the importance of mapping dependencies when establishing recovery requirements should be stressed. For example, sourcing may be unable to establish a new supplier without the assistance from R&D.

7.3.2 Development of Continuity Strategies and Disaster recovery plans

7.3.2.1 Recommendation

- It is suggested by the authors that people with more technical knowledge of the actual processes and their needs (as well as knowledge for current capabilities within the organisation) should be responsible for developing different continuity strategies which meet the recovery objectives stated in the BIA, see Figure 7.3 below.
- The appropriate management-level within the organisation will then be provided the list of developed continuity strategies and decide on the appropriate strategy to be implemented in the DRP, with regard to the attached cost-benefit analysis, see Figure 7.3 below.

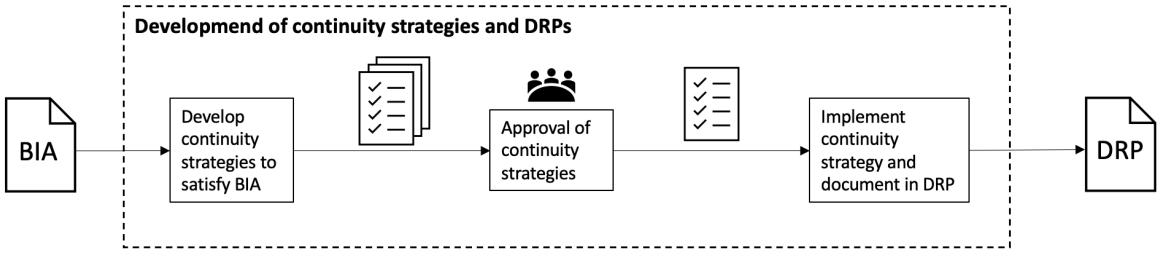


Figure 7.3: Illustration of proposed process of developing continuity strategies and disaster recovery plans. Developed by the authors.

7.3.2.2 Discussion

When there is a gap between current capabilities and the identified recovery objectives (MTPD and MTO, established with the BIA) for a critical process (or activity), it is important to brainstorm possible continuity strategies which can bridge this gap. When developing these strategies, it is important to explore as many strategies as possible. For each process (or activity), there are many possible strategies to consider. Hiles (2007) recommends at least three different proposals of strategies to be developed (with different emphasis on speed of recovery and cost, although all should satisfy the recovery requirements) and considered.

Once the list of potential strategies has been narrowed down to a few different strategies, cost (and resources) to implement these strategies should be developed and used for conducting a cost-benefit analysis. In the cost/benefit-analysis the cost and complexity of different alternatives are compared with the estimated time for recovery. The cost-benefit analysis will then be used to guide the decision on which strategy that will be implemented in the disaster recovery plans. The trade-off between cost of impact and recovery time is an important aspect to consider (Norrman and Jansson, 2004).

In order to keep the plans updated and relevant, it is important to regularly review the DRPs and possibly update the required recovery objectives (as well as the required continuity strategies). It is also recommended that the plans (including those already approved) are regularly reviewed regarding their content and the objectives set. In terms of how regularly the developed plans and BIA should be reviewed, there is no clear consensus within the literature. However, while there should be a clear frequency, it's recommended to also include a trigger for review when significant changes are made to the organisation which may affect the plans or BIA.

7.4 Enablers

7.4.1 Recommendations

7.4.1.1 Tools & Frameworks

- Implementation of proposed BIA-process

7.4.1.2 Training & Testing

- Establish and communicate a more clear purpose for why disaster recovery plans should be developed. The stated purpose then needs to be reflected in the amount of resources dedicated to the BCM-process (for example in terms of: commitment from the central organisation, time being set aside to carry out the process and resources are made available for training and education).
- Implement more training and education

7.4.1.3 Audit & Measurements

- Self-assessments
- Implement better tools for monitoring the actual implementation of DRPs
- If the BCM scope is adjusted to become more business-oriented, it is recommended to implement a more extensive auditing-process (e.g by having the BUs cross-audit each other).

7.4.2 Discussion

7.4.2.1 Tools & Frameworks

There are currently tools available to all legal entities which adhere to BCM-theory, however these are not used as intended. Hence, while there are identified improvement areas within tools and frameworks (guidance and consistency), the authors of this report argue that this is a symptom of lacking knowledge and understanding of the objectives and purpose of BCM within the Company rather than the tools and frameworks developed.

7.4.2.2 Training & Testing

Before further diving into the different enablers, there are some indications that a clearer purpose for disaster recovery planning (at the Company) needs to be concretized and communicated. Risk management (and especially SCRM) and BCM (i.e. disaster recovery planning) are to a large extent used synonymously throughout the interviews, which indicates that there is a need to understand their differences.

In order to facilitate improvements of the BCM-program, whether it is to improve the current process or re-define the scope and objective, the gap in terms of guidance for how to drive and improve the process will be a key factor. Training and education is an important aspect of BCM and should be carried out at different levels within the organisation according to theory (FSPOS, 2019). Gibb and Buchanan (2006) recommend communicating the benefits and goals of BCM to the organisation, and having training sessions (either instructor-led or self-study). Training and exercises can also aim at creating awareness and competence among the staff (FSPOS, 2019), and ensure that the risk culture is kept alive during periods when disasters are more rare (Norrman & Wieland, 2020).

7.4.2.3 Audit & Measurements

Regarding the auditing process, there are perceived needs for more guidance on how to close the identified gaps and someone who questions how the actual DRP-process has been conducted. The authors do not really have any explicit recommendations within this area, the only recommendation is to further investigate if self-assessment is something to implement. Self-assessments in terms of BCM (while not a substitution to an independent audit), can be a cost efficient method to create awareness, identify improvement areas and capture measurable output. The self-assessments need to be simple and have a clear focus on specific objectives. The inherent limitations of self-assessments are biased findings and varying skills and knowledge which limit comparability, these can be addressed by communicating expectations and the purpose of the self-assessments (Trousdale, 2015).

Another recommendation is to implement better tools for monitoring the actual BCM implementation. See, for example, Norrman and Wieland (2020) where Ericsson uses self-assessments to monitor BCM compliance and risk management. In the case of Ericsson, the following aspects are monitored (i) the BCM compliance rate (and its currency?), (ii) whether risk analysis has been carried out and documented, (iii) and whether training and exercises have been carried out (Norrman and Wieland, 2020)

Furthermore, if a business-oriented BCM scope is to be implemented, there is a need for more extensive business knowledge from auditors. An effective solution could be to let the BUs cross-audit each other. Thus, providing feedback not only on the process and output, but also the reasoning behind decisions of determining criticality and how to prioritise resources.

References

Ambulkar, S., Blackhurst, J. & Grawe, S. (2015). Firm's Resilience to Supply Chain Disruptions: Scale Development and Empirical Examination. *Journal of Operations Management*, 33, pp. 111-122.

BSI Group (2008). *BS 25999-1:2006: Business continuity management. Code of practice.* London: BSI.

Christopher, M. & Peck, H. (2004). Building the Resilient Supply Chain. *The International Journal of Logistics Management,* 15(2), pp. 1-14.

Cook, R. S. & Anderson, R. (2020). Transitioning from incident to crisis management to continuity of operations. *Journal of Business Continuity & Emergency Planning*, 14(1), pp. 46–54.

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches.* 2nd ed. Thousand Oaks, California: Sage Publications Inc.

Davoudi, S., Brooks, E. & Mehmood, A. (2013). Evolutionary Resilience and Strategies for Climate Adaptation. *Planning Practice & Research*, 28(3), pp. 307-322.

Deloitte (2020). *Delivering customer service during COVID-19.* https://www2.deloitte.com/uk/en/pages/digital-transformation/articles/delivering-customer-service-during-COVID-19.html [Accessed: 2020-10-10]

Donthu, N. & Gustafsson, A. (2020). Effects of COVID-19 on business and research. *Journal of Business Research*, 117, pp. 284-289.

Eisenhardt, K. M. (1989). Building Theories from Case Study Research, *The Academy of Management Review*, 14(4), pp. 532-550

Eisenhardt, K. M. & Graebner, M. E. (2007). Theory building from cases: opportunities and challenges. *Academy of Management Journal,* 50(1), pp. 25-32.

European Union (2020). *Recovery plan for Europe.* https://ec.europa.eu/info/strategy/recovery-plan-europe_en [Accessed 2020-12-20].

Fan, Y. & Stevenson, M. (2018). A review of supply chain risk management: definition, theory, and research agenda. *International Journal of Physical Distribution & Logistics Management,* 48(3), pp. 205-230.

Finansiella Sektorns Privat-Offentliga Samverkan (FSPOS) (2019). *FSPOS Vägledning för kontinuitetshantering.* Stockholm: FSPOS. https://www.msb.se/contentassets/4c5e7fa0da054a5a83f935d828f5ce15/fspos-vagledning-for-kontinuitetshantering.pdf [Accessed 2020-11-13]

Freestone, M. & Lee, M. (2008). Planning for and surviving a BCM audit. *Journal of Business Continuity & Emergency Planning*, 2(2), pp. 138–151.

Friedrichs, J. & Kratochwil, F. (2009). On Acting and Knowing: How Pragmatism Can Advance International Relations Research and Methodology. *International Organization* 63(3), pp. 701–731.

Gibb, F. & Buchanan, S. (2006). A framework for business continuity management. *International Journal of Information Management*, 26, pp. 128–141.

Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study?. *Strategic Management Journal*, 29(13), pp. 1465-1474.

Hora, M. & Klassen, R. D. (2013). Learning from others' misfortune: Factors influencing knowledge acquisition to reduce operational risk. *Journal of Operations Management*, 31(1-2), pp. 52-61.

Heckmann, I., Comes, T. & Nickel, S. (2015). A critical review on supply chain risk – Definition, measure and modeling. *Omega*, 52, pp. 119-132.

Herbane, B. (2010). The evolution of business continuity management: A historical review of practices and drivers. *Business History*, 52(6), pp. 978-1002.

Hiles, A. (2007). *The Definitive Handbook of Business Continuity Management*. 3rd ed. Chichester: John Wiley & Sons Ltd.

Hiles, A. (2014). *Business Continuity Management: Global Best Practices*. 4th ed. Brookfield, Connecticut: Rothstein Associates.

Ho, W., Zheng, T., Yildiz, H. & Talluri, S. (2015). Supply chain risk management: a literature review. *International Journal of Production Research*, 53(16), pp. 5031-5069.

ISO. (2002). Risk management vocabulary. *ISO/IEC Guide 73*. Geneva: ISO.

Ivanov, D. (2020). Predicting the impacts of epidemic outbreaks on global supply chains: A simulation-based analysis on the coronavirus outbreak (COVID-19/SARS-CoV-2) case. *Transportation Research Part E*, 136(E), pp. 1-14.

Ivanov, D. & Dolgui, A. (2020). Viability of intertwined supply networks: extending the supply chain resilience angles towards survivability. A position paper motivated by COVID-19 outbreak. *International Journal of Production Economics*, 58(4), pp. 1-12.

Jüttner, U. (2005). Supply Chain Risk Management: Understanding the Business Requirements from a Practitioner Perspective. *The International Journal of Logistics Management*, 16(1), pp. 120-141.

Kamalahmadi, M. & Parast, M. M. (2016). A review of the literature on the principles of enterprise and supply chain resilience: Major findings and directions for future research. *International Journal of Production Economics*, 171(1), pp. 116-133.

Knemeyer, M. A., Zinn, W. & Eroglu, C. (2009). Proactive planning for catastrophic events in supply chains. *Journal of Operations Management*, 27(2), pp. 141-153.

Lavastre, O., Gunasekaran, A. & Spalanzani, A. (2012). Supply chain risk management in French companies. *Decision Support Systems*, 52(4), pp. 828-838.

Lindström, J., Samuelsson, S. & Hägerfors, A. (2010). Business Continuity Planning Methodology. *Disaster Prevention & Management*, 19(2). pp. 243-255.

Manuj, I. & Mentzer, J. T. (2008a). Global supply chain risk management. *Journal of Business Logistics,* 29(1), pp.133-155.

Manuj, I. & Mentzer, J. T. (2008b). Global supply chain risk management strategies. *International Journal of Physical Distribution & Logistics Management,* 38(3), pp.192-223.

McKinsey & Company (2015). How to beat the transformation odds. https://www.mckinsey.com/business-functions/organization/our-insights/how-to-beat-the-transformation-odds [accessed 2020-11-10]

McKinsey Global Institute, 2020. *Risk, resilience, and rebalancing in global value chains*, New York: McKinsey & Company.

Mitroff, I., Pauchant, T. & Shrivastava, P. (1988). The structure of man-made organizational crises: Conceptual and empirical issues in the development of a general theory of crisis management. *Technological Forecasting & Social Change,* 33(2), pp. 83-107.

Norrman, A. & Jansson, U. (2004). Ericsson's proactive supply chain risk management approach after a serious sub-supplier accident. *International Journal of Physical Distribution & Logistics Management,* 34(5), pp.434-456.

Norrman, A. & Wieland, A. (2020). The development of supply chain risk management over time: revisiting Ericsson, *International Journal of Physical Distribution & Logistics Management* 50(6), pp. 641-666.

OECD (2020). The COVID-19 Crisis in Montenegro. https://www.oecd.org/south-east-europe/COVID-19-Crisis-in-Montenegro.pdf [Accessed: 2020-09-03].

Paunescu, C., Popescu, M. C. & Bild, L. (2014). Business impact analysis for business continuity: Evidence from Romanian enterprises on critical functions. *Management & Marketing. Challenges for the Knowledge Society*, 13(3), pp. 1035-1050.

Pearson, C. & Clair, J. (1998). Reframing Crisis Management. *The Academy of Management Review*, 23(1), pp. 59-76.

Peng, P., Snyder, L.V., Lim, A. & Liu, Z. (2011). Reliable Logistics Networks Design with Facility Disruptions. *Transportation Research Part B: Methodological,* 45(8), pp. 1190–1211.

Pitt, M. & Goyal, S. (2004). Business continuity planning as a facilities management tool, *Facilities*, 22, pp. 87-99.

Ponomarov, S. Y. & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *The International Journal of Logistics Management,* 20(1), pp. 124-143.

Rai, S. & Mohan, L. (2006). Business continuity model: a reality check for banks in India. *Journal of Internet Banking & Commerce*, 11(2).

Randeree, K, Mahal, A & Narwani, A. (2012). A business continuity management maturity model for the UAE banking sector. *Business Process Management Journal*, 18(3), pp. 472-492.

Rowley, J. (2002). Using case studies in research, *Management Research News*, 25(1), pp. 16-27.

Rowley, J. & Slack, F. (2004). Conducting a Literature Review. *Management Research News*, 27(6), pp. 31-39.

Sharma, A., Adhikary, A. & Borah, S. B. (2020). Covid-19's impact on supply chain decisions: Strategic insights from NASDAQ 100 firms using Twitter data. *Journal of Business Research*, 117, pp. 443-449.

Sheffi, Y. (2015). *The power of resilience: how the best companies manage the unexpected*. Cambridge, Massachusetts: The MIT Press.

Sheffi, Y. (2020). *The New (Ab)Normal: Reshaping Business and Supply Chain Strategy beyond Covid-19*. 1st ed. Cambridge, Massachusetts: MIT Center for Transportation and Logistics.

Smith, D. (2003). Business continuity and crisis management. *Management Quarterly*, (1), pp. 27-33.

Stevanovic, B. (2011). Maturity Models in Information Security. *International Journal of Information & Communication Technology Research*, 1(2), pp. 44-47.

Supriadi, L. & Sui Pheng, L. (2018). *Business Continuity Management in Construction*. 1st ed. Singapore: Springer.

Suresh, N. C., Sanders, G. L. & Braunscheidel, M. J. (2020). Business Continuity Management for Supply Chains Facing Catastrophic Events. *IEEE Engineering Management Review*, pp. 129-138.

Tammineedi, R. L. (2010). Business continuity management: A standards-based approach. *Information Security Journal: A Global Perspective*, 19(1), 36-50.

The Legislative Assemblies Business Continuity Network (2019). *Managing Disruption: Business Continuity for Legislatures*, N.A.: The Legislative Assemblies Business Continuity Network (LABCoN).
https://labcon.network/wp-content/uploads/2019/04/LABCoN-EN-2019-03-15.pdf
[Accessed: 2020-11-10]

Tjoa, S., Jakoubi, S. & Quirchmayr, G. (2008). Enhancing Business Impact Analysis and Risk Assessment Applying a Risk-Aware Business Process Modeling and Simulation Methodology. *2008 Third International Conference on Availability, Reliability and Security*, Barcelona, 2008, pp. 179-186.

Torabi, S.A., Rezaei Soufi, H. & Sahebjamnia, N. (2014). A new framework for business impact analysis in business continuity management (with a case study). *Safety Science,* 68, pp. 309-323.

Trousdale, L. (2015). Using self-assessments to enhance business continuity programmes. *Journal of Business Continuity & Emergency Planning*, 9(1), pp. 6–9.

Tucker, E. (2015). Business continuity from preparedness to recovery. A standards based approach. Amsterdam: Elsevier.

Voss, C., Tsikriktsis, N. & Frohlich, M. (2002). Case Research in Operations Management. *International Journal of Operations & Production Management*, 22(2), pp. 195–219.

Wakolbinger, T. & Cruz, J. (2011). Supply chain disruption risk management through strategic information acquisition and sharing and risk-sharing contracts. *International Journal of Production Research*, 49(13), pp. 4063-4084.

Wieland, A. & Wallenburg, C. M. (2013). The influence of relational competencies on supply chain resilience: a relational view. *International Journal of Physical Distribution & Logistics Management*, 43(4), pp. 300-320.

Wong, W.N.Z. & Shi, J. (2015). *Business Continuity Management System: A complete guide to implementing ISO 22301*. London: Kogan Page Ltd.

World Health Organization, 2020. *Coronavirus disease 2019 (COVID-19): Situation Report – 94*, Genève: World Health Organization.

Yin, R. K. (2018). *Case study research and applications: design and methods.* 6th ed. Thousand Oaks, California: Sage Publications Inc.

Appendix A – Case Study Protocol

This section includes the reduced Case Study Protocol as described under section 3.1.3 Preparing to collect data.

A.1 Case introduction

The purpose of this project is, in context of the Covid-19 outbreak, to understand what tools, support, and resources that Corporate can provide to help strengthen your organisation's resilience when facing future disruptions.

As we briefly mentioned in our initial email, Business Continuity project at the Company, we together with our supervisor at the Company and the Vice President of Group Risk Management, want to understand how business continuity practices can be simplified and improved at the Company.

This project is limited to the Disaster Recovery phase of BCM at the company (The recovery of business after a disruption and the development of Disaster Recovery Plans). Hence, the interview will not cover any aspects of Emergency Response and Emergency Response Plans (e.g. evacuation plans) within the Company (Figure A.1).

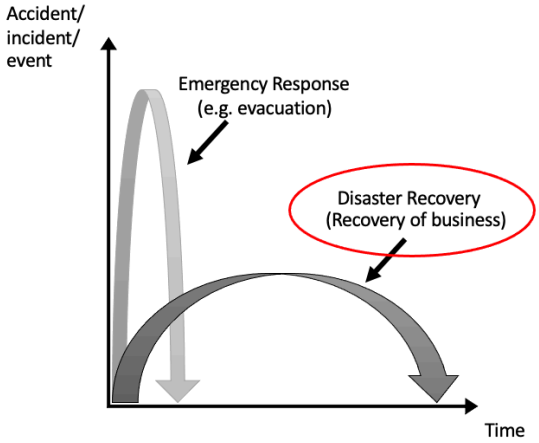


Figure A.1: Illustration of focus on Disaster Recovery to interviewees.

The interview will be structured around five major parts:

1. **Introduction:** A short introduction about us, yourself and your organisation
2. **Before the Pandemic:** This will be a brief section discussing work related to risk and business continuity before the pandemic. In other words, we want to understand the starting point.
3. **Impact of the pandemic:** A brief section about what has happened. How has your business been impacted?
4. **Recovering from impact :** A more detailed section regarding how you have returned to business after disruptions. This will cover the structure of recovery, how the process has been managed, and your learnings and insights.
5. **Looking Ahead:** This section will focus on how to improve BCM in the future. What are the key-takeaways for the future? What would you do differently when facing a crisis in the future?

We are also well aware of the fact that some of you who we will interview may currently be in the midst of the crisis while others have it coming or have left it behind. With this in mind, the questions we intend to ask will need to be set in relation to your own experience and current situation.

This interview will partly be structured around BCM-vocabulary. As definitions often are used interchangeably, to make sure that we have a common understanding and make the interview more efficient, we have included a few explanations below. You should of course feel free to challenge these.

- **Disruption:** Any disturbance or problem which interrupts an activity or process.
- **Business Continuity Management:** A management system with the objective of ensuring business continuity. This includes programme management, conducting risk and business impact analysis, creating action plans in the event of a disaster, evaluation of the program, and training modules.
- **Business Continuity Plans:** Plans created with the objective of primarily reducing the impact to the business from potential disasters.
    - **Emergency response**: Planning for immediate action and damage control. E.g. evacuation plans, save lives, starting sprinkler systems. (will not be the focus of this interview)
    - **Disaster Recovery:** Planning for recovery of business after a disaster/disruption.
- **Risk Management:** The process of identifying specific risks and creating appropriate strategies to mitigate these. The primary objective is to reduce the probability of an event that may cause a disruption. (While reducing the impact of specific risks may be included, it is not the core of risk management.)
- E.g. Installing an alarm reduces the likelihood of burglary, but not the impact. (Risk Management)
- E.g. back-up of R&D data will not reduce the likelihood of laptop theft, but will reduce the impact if a laptop is stolen. (Business Continuity)

A.2 Interview Guide

Introduction

1. Short description about ourselves (Fredrik and Filip) and our project
2. Can you tell us about yourself and your role at The Company? (Areas of responsibility and main responsibilities)
3. What does your organizational structure look like?

Before the Pandemic

4. How did you work with risk and business continuity before the pandemic?
    4.1. Did you create any plans and supportive structure? Why, or why not?
        - Identify critical business processes and capabilities
        - Risk mapping
        - Creating action plans for recovery
            - What was your organisation's perception of this beforehand?
                - Were you aware of its existence?
                - What level of support and/or training have you received regarding plan development?
        - Assigning responsibility and governance

- What was the scope of these, only within your organisation, together with other functions of the Company? Together with external partners (customers and suppliers)

4.2. Conduct training and testing? Why, or why not?

5. Are there any directives from senior management when it comes to attitude towards risk? (Is risk and business continuity brought up in evaluation and talks with your superiors?)
6. How would you describe the risk culture at:
   6.1. at The Company in general
   6.2. For yourself and your management team
   6.3. Within your organisation
   6.4. From your superiors
7. What were you prepared for when the pandemic struck and what were you not prepared for?
   7.1. Continuity of business?
   7.2. Continuity of management?
8. What parts of the current BCM-practices have been used during Covid?

Impact of the pandemic

9. What major disruptions have you experienced during the pandemic outbreak?
   9.1. Did you estimate the impact (financial and non-financial e.g. customer relations, reputation etc.)? How?
   9.2. Expected examples: White collars having to work from home, manufacturing, suppliers, (lockdowns)
   9.3. For what amount of time did these disruptions sustain and how was the development over time?

Recovery from impact - *the structure*

10. How has the management of disaster recovery been structured?
    10.1. Has any team been formed? Why did you choose this structure?
11. To what extent did you work cross-functionally with other organizations, for example with other BUs, PGs and sales organisations? (Is this something that has changed over time?)
12. How has communication been managed?
    - With Corporate
    - With your organisation
    - With other organisations
    - With people/teams with similar responsibility at the Company
13. What directives have you been provided with? (And from who?)

Recovery from impact - *The recovery process*

14. What type of decisions have you taken in terms of achieving recovery?
    14.1. How have these types of decisions changed over time?
15. What were your priorities during the outbreak? (In terms of (critical) processes, resources etc.)
    15.1. What were these based on?
    15.2. Did your priorities change from the early phase of the crisis to the more recent phase?
        15.2.1. How did they change?
        15.2.2. Why did they change?
16. Have the different organisations (either that you are part of or that you are managing) handled recovery in different ways?
    16.1. What has worked well and what has worked not so well?

Recovery from impact - *Reflections and insights*

17. What have been the main challenges for you and your organisation?

17.1. How have these changed over time?

18. What limitations have you faced when managing disaster recovery?
    18.1. Are you still facing the same limitations as in the early phase? Are there any new limitations today or any limitations that do not exist anymore?
19. What are your learnings with regard to your work role and what are the learnings with regard to the organisation?
    19.1. (What learnings have you already implemented and what are you planning on implementing in the future)
        19.1.1. Documenting / Compiling information
        19.1.2. Governance
        19.1.3. Information sharing
20. Which key factors contributed to the final outcome? Could those factors have been managed differently?
21. What can other managers within the Company learn from your experiences of managing disaster recovery during the Covid-19 pandemic?

Looking ahead - *Disaster Recovery in the future*

22. In the short term, what changes and initiatives are you likely to pursue to better enable Business Continuity? - Both in terms of disaster recovery after a crisis, but also preparation.
23. Based on your experience from Covid-19, what long term changes do you see necessary in order to better manage disruptions in the future? relating to your organization, procedures, and support?
24. How do you plan to work with risk and business continuity in the future?
    24.1. Structure for understanding potential impact?
        24.1.1. What should be the scope?
            - Organisational scope (internal, external partners)
            - What should be the objective? General or specific to certain impacts and risks?
    24.2. Action plans to minimize impact if a disaster materialises?
        24.2.1. What should be the scope?
            - Organisational scope (internal, external partners)
            - What should be the objective? General plan to address all risks?
                - Avoid major disruptions that can have a severe impact on the Company?
                - Create a culture of risk-awareness within the organisation?
    24.3. Assigning responsibilities and governance structure?
    24.4. Conducting training and testing?
25. How would you describe the risk culture now at:
    25.1. The Company in general
    25.2. For yourself and your management team
    25.3. Within your organisation

Other

- Is there anything that you would like to add?

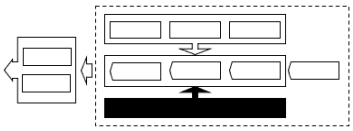
Appendix B - Single-Case Analysis

Within this section, each case is analysed based on the theoretical framework (recall Figure 2.8). A grading (based on the categorisation described in section 3.1.5) was made for each aspect within the theoretical framework. The grading of each aspect is described in tables with adhering comments and/or findings from the case. These tables and comments are used as input for the cross-case analysis in Chapter 5. The analysis considers what is currently in place (regarding the aspects) compared to relevant theory in Chapter 2 and whether the informants have expressed any "perceived needs" related to the aspects.

B.1 Case A

B.1.1 Business Continuity Management

B.1.1.1 Scope of BCM



According to the PG-responsible, there are DRPs in place for restoring infrastructure (i.e., production equipment) at the factory-level. The interviewees themselves have however not been responsible for the actual development of DRP's at their own sites, which is why some information is lacking (see Table B.1)[23].

Table B.1: Scope-analysis of Case A.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Infrastructure	-	-	-	5	-	2	4	Limited to site and equipment. Informal at PG-level
People	-	-	-	-	-	3	3	Succession plans are in place for BU-Sales but not BCM
Processes	1	4	1	5	5	2	3	Supplier/component and manufacturing processes are covered on a site level
Value chain	1	-	-	1	2	2	1	Great need for improvement according to both BU-president and Sourcing manager

Succession plans for key people are in place at least within BU-sales (Table B.1). Based on the understanding of the authors, the succession plans are, however, not part of a formalised BCM-process at the Company. There are no DRPs at the BU-level for restoring processes and activities related to the business, which is noted in Table B.1. The BU-president's perceived need of extending the scope of BCM is well in line with what theory suggests, and it can also be compared with advancing to the fourth level of "Integrated BCM" in Marsh BCM Preparedness model[24]. In addition, there are also perceived needs for better consideration of value-creating processes between the sites, e.g., transportation. This is also in line with what the theory recommends, where

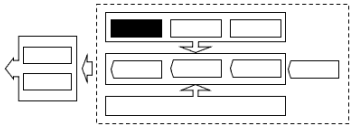
[23] Recall the categorization scale described under Section 3.1.5: (*1: Not in place, perceived need; 2: Not in place, no perceived need; 3: Partly in place, perceived need; 4: Partly in place, no need; 5: In place; - No info available.)*
[24] See section 2.1.2.2 Scope of BCM

it is argued that the BIA aims to identify critical business processes and resources to understand the consequences and damages in case of a disruptive event[25]. A properly conducted BIA would presumably have helped the organisation to prioritise what processes to recover during the pandemic.

According to the PG-responsible (and the PG-sourcing manager), there are DRPs in place for restoring processes at the factories, this includes both production processes and purchasing processes, this is also illustrated in Table B.1 below. At the strategic level of the PG, the PG-responsible has worked informally with BCM by ensuring redundancy in processes in the event of a disruption in any of its manufacturing or supply processes. Although there is a gap related to theory regarding the formalization of the process, it is not expressed by the PG-responsible as a concern that this procedure needs to be more formalized. No formal disaster recovery plans are developed at the Sourcing level of the PG. The Sourcing function at the PG-level (responsible for purchasing raw materials and certain components used in more than one factory), is thus not part of any formalized Disaster Recovery Planning process. However, the PG-sourcing manager sees a need to expand the scope to the entire PG and not just work with risk and BCM at the individual sites, this would help to make the scope more process-oriented.

B.1.1.2 Enablers

B.1.1.2.1 Tools & Frameworks



In terms of the BCM framework of structuring the process, this is only in place at a site level. Here, there is a perceived need from the PG-sourcing manager to formalise the process. The same can be applied for risk analysis where tools are in place for the factories (manufacturing processes and supplier risk scoring) but a perceived need to have a more structured approach from the PG-responsible and PG-sourcing manager (Table B.2). In terms of Business Impact Analysis, there is not enough data to draw any general conclusions beyond that no formal BIA is conducted at the BU and PG-level.

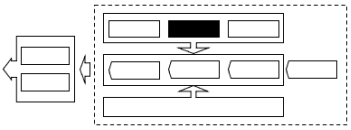
Table B.2: Tools & Frameworks-analysis of Case A.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
BCM-process framework	2	-	2	5	3	2	3	In place at site level, need to formalize within purchasing
Risk Analysis	2	2	2	3	3	-	3	Done to some extent but clear need for a more structured approach
BIA	2	-	2	-	-	-	-	
Continuity strategies	2	1	2	3	-	4	3	Better input and guidance of when to implement
Disaster recovery plans	2	-	2	5	2	-	4	In place for site manufacturing.

[25] See section 2.1.5.2 Business Impact Analysis

In terms of continuity strategies, there are templates in place for manufacturing. However, there is a strong perceived need from the PG-responsible for better input and guidance on considering investment-related trade-offs within continuity strategies; this is also reflected in Table B.2. Within BU-sales, there are informal continuity strategies by having duplicity of competence, but a need to improve continuity of competence. While there are DRP-templates within sourcing, as these consist of supplier risk scoring at the factories, the authors argue that this should be regarded as documentation of the risk analysis rather than DRPs. The only example of DRP-template is related to site manufacturing.

B.1.1.2.2 Training & Testing

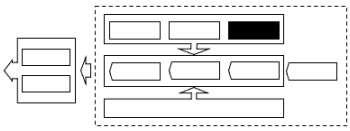


According to Marsh BCM Preparedness model, training and exercises should be embedded in the organisation[26]. However, this is not the case today within Case A, which is also indicated by Table B.3 below. According to theory, training should be conducted at different levels of the organisation, and those responsible for BCM should receive tailored training to ensure that they can perform their tasks accordingly[27]. There is no regular training on developing DRPs at the site level neither within the BU or the PG. Nor is there any regular training on more business-specific risks, neither within the BU nor within the PG. This gap is identified and emphasised by both the BU-president and PG-responsible. However, the PG-sourcing manager has received some training regarding the mapping of critical components and risk assessments of the suppliers in the past through Global Sourcing and believes (but is not completely sure) that the local purchasing managers have also received some training on it. Considering the interviewees' expressed needs and what is recommended by theory, it further indicates that training and testing (within BCM) should be of high priority to implement throughout the organisation in the future.

Table B.3: Training & Testing-analysis of Case A.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Training or education	1	1	4	1	2	-	1	Emphasised need by BU-President and PG-Responsible.
Testing or exercises	-	1	1	1	1	-	1	Emphasised need by PG-responsible

B.1.1.2.3 Audits & Measurements



Audits are conducted at the sites-level by Internal Audit, including manufacturing and purchasing at the factories (but not PG-sourcing) (Table B.4). While the auditors' feedback is generally considered clear from the PG and BU, the audits do not question the quality of the analysis,

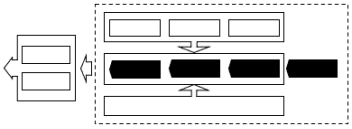
[26] See section 2.1.2.2 Scope of BCM
[27] See section 2.1.8 Learning, training, and evaluation

although this is highlighted as an important aspect according to BCM theory[28]. The BU-president stresses the need for more business perspective and input from a BCM or Risk professional (or other BUs) if the scope is extended to the BU-level (Table B.4). Further, the effects of audits on how to view risk[29] by the PG-sourcing manager suggests a perceived need for improving the auditing of BCM. There is no indication that anything exists in terms of measurements, but no adequate information was gathered to draw any general conclusions.

Table B.4: Audit & measurements-analysis of Case A.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
BCM audit	1	-	2	5	3	-	3	Audited on site-level, not the strategic level
Measurements	-	-	-	-	-	-	-	No indication that measurements exists
Guidance	-	-	-	-	4	-	4	Feedback is clear, but quality of process not assessed

B.1.1.3 Risk Analysis & Disaster Recovery Planning Process



The BU-president, has in the same way as the BU-sales manager, not been involved in developing plans at site level (Table B.5). While there is no structured procedure for conducting risk analysis for a more holistic business-perspective at the BU-level, the risk analysis is conducted ad hoc and informally by the BU-president. The lack of a formal BCM process at the BU-level also explains why no BIA, continuity strategies, and DRPs have been developed within neither BU-management nor BU-sales. However, the BU-sales manager recognises the competences of the employees within the BU-sales organisation as key resources. Despite having informally worked with continuity, the perceived need for more continuity planning suggests that current succession plans and informal continuity strategy for competence does not provide adequate protection for the function (Table B.5).

[28] See section 2.1.8.3 Reviewing and Evaluation

[29] Recall the focus on dual-sourcing of the factories because dual-sourcing is stressed within the audits. (Section 4.1.2.1.2.3 – Perceived Need, Audits & Measurements)

Table B.5: Analysis of Risk Analysis and Disaster Recovery Planning process within Case A.

Aspect	BU-Management	Findings / Comment	PG-Management	Site-Manufacturing	Findings / Comment	PG-Sourcing	Site - purchasing	Findings / Comment	BU-Sales	Findings / Comment	Total	Findings / Comment
Risk Analysis	3	Informal, need to formalise and consider "cross-site" processes	3	3	Informal at PG-level, need for more guidance and training for both	4	3	Supplier risk scoring. Ad-hoc on PG-level, need to formalise	-		3	Risk analysis is performed from a site perspective. Informal at strategic levels.
BIA	1	Not in place, strong need for a holistic analysis	4	4	Site perspective, no recovery objectives	2	4	Impact on site deliverability, no recovery	2	Not in place	3	Impact estimated from site perspective but only in PG, no recovery
Continuity strategies	2	Should be developed at the sites	3	4	Need for guidance or principle of when to invest	2	2	Risk mitigation, not continuity	3	Informal duplicity of competence	3	Strategies exists to a varying degree
Disaster recovery plans	2	Should be developed at the sites	-	4	Partly in place at sites	-	2	No recovery plans	1	Need for continuity plans for competence.	3	Limited coverage. Only for manufacturing processes

The BU-president's primary concern is related to the scope of BCM within the Company. The site-perspective causes risks and processes not directly related to a specific site and its infrastructure to be overlooked in terms of BCM according to the BU-president. Nor does the current scope facilitate a business perspective upon BCM and what to protect (Table B.5). However, the BU-president stresses that the practical plans should be developed at the sites. The gap identified by the BU-president also reflects BCM-theory which emphasises the identification of processes which are critical for the organisation through the BIA[30].

While risks are considered at the factories in terms of infrastructure (mainly manufacturing processes), the perceived need for more (and better) training, both at factory- and PG-level suggests that this is an area of improvement (Table B.5). Further, the perceived need of better guidance when considering both risk mitigation and continuity strategies suggests that the risk analysis does not provide clear indication of appropriate actions as suggested by theory[31], nor does the BIA (developed from a site perspective) provide any clear guidance in terms of business criticality and recovery objectives (as opposed to theory)[32]. Risks and site/process criticality is considered from a strategic perspective within PG-management; however, it is more of an informal and ad-hoc process. In terms of the DRPs, they are developed at the sites (i.e. factories), however duplicity of capacity is not always documented in the plans (Table B.5).

Within sourcing, there is an established process at the factory-level. Risk analysis is also conducted at the PG-level, but this is done more informally and ad-hoc. However, compared to PG-management, there is a clear need to formalise and prioritise the process at the PG-level. The risk analysis (recall "supplier risk scoring" at the factory-level) only considers the probability of a supply disruption and not impact as suggested by theory. Further, the BIA only identifies critical components (rooted in impact on deliverability of the sites), but there is no indication of recovery objectives, which BCM theory suggest[33] as a key output of the BIA (Table B.5). However, as the BIA is used to qualify suppliers for the risk analysis, the authors argue that impact is considered, although it might not provide a clear comparability as suggested by e.g., Norrman and Jansson (2004). Based on the empirical evidence, the purpose of the disaster recovery planning process within sourcing (by factory purchasing departments) seems to be for the purpose of risk mitigation.

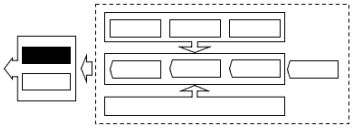
[30] See section 2.1.5.2 Business Impact Analysis
[31] See section 2.1.5.1 Risk Analysis. Recall the use of a probability-impact matrix with clear indications of what type of actions to consider.
[32] See section 2.1.5.1 Risk Analysis
[33] See section 2.1.5.2 Business Impact Analysis

It can be argued that dual-sourcing is used as a continuity strategy (if also intended as an alternative supplier in the event of a disaster), however it is not clear if this is always documented. While the overall process takes place under the name of BCM and disaster recovery plans, it has closer resemblance to (and may be categorised as) Supply Chain Risk Management[34]. For example, the "BIA", is in practice used to motivate risk mitigation (not continuity) strategies.

Considering patterns across Case A, risk analysis is partly in place from a site perspective and is conducted informally by PG-management and BU-management (Table B.5). Further, BIA is performed from a site perspective within the PG, however no recovery objectives have been developed. At the BU-level, no BIA is developed and there is a strong need from the BU-president to conduct a holistic analysis. Continuity strategies are developed to a varying degree and are primarily in place within the PG (Table B.5). However, the authors argue that the continuity strategies within sourcing should be regarded as risk mitigation (and SCRM) rather than BCM. Hence, in terms of the disaster recovery plans developed, these are only in place at the factories and cover manufacturing processes.

B.1.2 Management of recovery

B.1.2.1 Structure



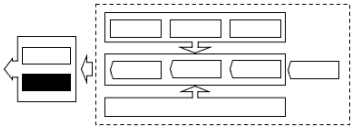
The recovery structure has primarily been based on the Company's crisis management policy combined with the functional structure, rather than disaster recovery plans (Table B.6). The CMT-structure was highlighted as a key success factor by both the BU-president and PG-responsible. The BU and PG-CMTs have managed the recovery at the strategic level, and no explicit recovery teams have been implemented at the strategic level of the BU and PG. Further, PG-sourcing and BU-sales have also relied upon their functional structure and escalation procedures to the strategic level (especially Operations Management and Global Sourcing). As theory suggests, clear responsibilities have been established with the objective of business recovery (although this has been done with CMT's help and not disaster recovery teams)[35]. The fact that CMT's have been used as the basis for both Crisis Management (CM) and disaster recovery may suggest a gap in current DRPs in terms of how to structure the management of recovery compared to theory; this is also reflected in Table B.6. However, with its long duration and fluctuating impact, the pandemic has resulted in crisis management and disaster recovery to be managed in parallel. Hence, the potential benefit of having separate CM and disaster recovery teams, as some literature suggests, can be discussed. None of the interviewees expressed any need for changes to the Crisis Management policy (which acts as the foundation for the CMT structure).

[34] See section 2.1.5.1 Risk Analysis.
[35] See section 2.1.7 Developing and implementing BCM response and Disaster Recovery

Table B.6: Analysis of Management of recovery - Structure within Case A.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Recovery organisation	2	2	5	-	5	5	4	Clear responsibilities, structured by regular management structure.
Crisis management structure	5	5	5	-	-	-	5	Based on CM-policy. Highlighted as key success factor to recovery

B.1.2.2 Recovery Actions



As there are no DRPs at the BU-level, there has not been any contribution of DRPs within BU-management and BU-sales. However, as mentioned above (section B.1.1.3), the BU-president identifies a need to include processes that transcend sites in future plans (Table B.7). Within the PG, the movement of components, tooling equipment, and production orders between sites was partly based on plans developed before the pandemic. Thus, indicating partial contribution since some actions have also been developed reactively. Related to the preparatory work within sourcing (and the purchasing departments) before the pandemic, the analysis of supplier risk and critical components has contributed to the recovery. However, it did not provide concrete action plans based on continuity strategies as suggested by BCM theory[36]. Here, the PG-sourcing manager highlights a need for more consideration to Company-owned tooling equipment in future DRP's at the PG-level (Table B.7). The informal strategies developed within the BU-sales function of key competencies has not been utilised during the pandemic.

Table B.7: Analysis of Management of recovery - Actions within Case A.

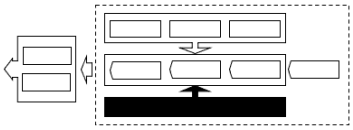
Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Contribution of DRPs	1	4	3	4	4	2	3	Relevant plans have been used within the PG, with limited contribution.

[36] See section 2.1.7 Developing and implementing BCM response and Disaster Recovery.

B.2 Case B

B.2.1 Business Continuity Management

B.2.1.1 Scope of BCM



The current scope of BCM in case B is the legal entities (but as the BU-president explains, this is in practice a physical site or a factory). The scope of BCM mainly cover two aspects, the manufacturing processes and the supply of materials (Table B.8). In the manufacturing process, the plans cover the potential failure of critical production equipment and identify opportunities to transfer capacity within the Company or external suppliers. Within Sourcing (and the PG) the work with BCM (primarily risk mitigation) is coordinated (to some extent) with other sites, but this is not part of a formal process. The BU-sales manager is not part of the formal BCM process but is aware that plans were made (several years ago) for risks mainly related to infrastructure. The main reason why the BU-sales manager has not looked into it has mainly been that he has *"not understood the benefit of it, been busy with other work-tasks and that no one else seems to have focused on it either"*.

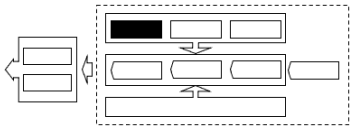
Table B.8: Scope-analysis for Case B.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Infrastructure	3	-	-	5	-	2	3	Limited to site and production equipment
People	4	4	-	-	-	4	4	Succession plans at the BU&PG-level but not BCM
Processes	-	2	5	5	5	1	3	Suppliers and production processes
Value chain	1	1	-	2	2	1	1	Strong need for a value-chain perspective on criticality of BU. Supply chain from PG-responsible

At the PG-management, BU-management, and BU-sales, a "people review" is conducted (by mapping key people and compiling succession plans). While not formally part of the BCM-process, the authors argue that the succession plans do adhere to the principles of continuity planning (hence included in Table B.8). Even though the value chain perspective is not included in the scope of BCM at neither the BU nor the PG, both the BU-president and BU-sales manager identifies a need obtain a BU-perspective on criticality to be better prepared for future crises. Further, the perceived need of the BU-president to conduct the analysis on a BU-level with a value chain-perspective and link local-DRPs is interpreted by the authors as a need to move towards level 3 (established BCM) and 4 (integrated BCM) outlined in the BCM-preparedness model by Marsh Risk Consulting (2010) (see section 2.1.2.2). From the PG-responsible, there is also a need to need to expand the BCM scope (although within the boundaries of operations) in terms of the supply chain by placing requirements of BCM on critical suppliers. Thus, there is a clear need (at the strategic level) to better adapt BCM at the Company to the value or supply chain perspective as suggested by theory.

B.2.1.2 Enablers

B.2.1.2.1 Tools & Frameworks



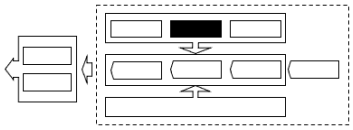
Within the BU, there are no explicit tools or frameworks except for succession planning. The BU-president and BU-sales manager both see a need for more structured frameworks (Table B.9). According to the BU-president, the current templates and general corporate policies for BCM are vague and do not offer enough guidance; *"While there must be room for adaptation to different operational models, there must be clearer boundaries and guidelines"*. The BU-president sees a need for more consistency across the organisation, especially if plans are to be linked together across sites to get a more holistic perspective. The BU-president also believes that more consistency in the frameworks would facilitate the auditing process and enable more useful input from the audits. The BU-sales manager highlights the importance of finding the right balance between usefulness and maintenance, enough detail so the organisation can act on the information but avoid filling in information that will not be used anyway.

Table B.9: Tools & Framework-analysis of Case B.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
BCM-process	1	2	1	5	-	1	3	No structure for BU & PG-level. In place at factories.
Risk Analysis	1	2	3	-	-	-	3	Lacking structure when partly in place. Need to formalise
BIA	1	2	-	4	-	-	3	BU-president (BUP) sees need for improvement. In place at factories.
Continuity strategies	1	-	-	-	-	-	1	BUP sees need for improvement
Disaster recovery plans	1	2	-	4	-	-	3	BUP sees need for improvement. In place at factories.

The PG has developed BCM based on the corporate policy and templates available within operations and from corporate. Within sourcing, this translates to non-structured risk assessments (Table B.9). However, the PG-sourcing manager sees a need for more structured tools and frameworks to enable a more structured process. The PG-sourcing manager highlights that risk analysis tools *"must be simple to use and provide a clear indication if any action is needed"*. Furthermore, the PG-sourcing manager believes that different tools (for risk analysis for example) are useful for communication purposes and tracking progress within the organisation.

B.2.1.2.2 Training & Testing



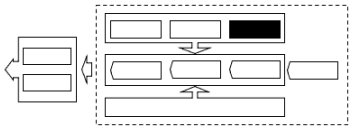
There is no training or education related to BCM within the BU and PG (no info was obtained regarding sourcing and purchasing), although this is highlighted as a key aspect within BCM

theory[37] (Table B.10). According to the BU-president, there is currently no support or training regarding BCM other than the corporate policy and templates. This gap is identified by both the BU-president and the BU-sales manager, who both stress the need for more training regarding the implementation of the entire BCM process and development of continuity plans (Table B.10). The empirical material indicates a certain degree of awareness about BCM within the organisation. However, since no training is implemented, problems arise when the actual DRPs are to be filled in. No information was gathered from the interviews within Case B concerning if tests or exercises are implemented (as noted in Table B.10).

Table B.10: Training & Testing-analysis for Case B.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Training or education	1	2	-	2	-	1	1	No education regarding BCM, need for better guidance
Testing or exercises	-	-	-	-	-	-	-	No information

B.2.1.2.3 Audit & Measurements



While audits are performed at the sites (or legal entities), the BU-president is also audited due to being responsible for the legal entity of the BU-main site. The BU-president, PG-responsible, and BU-sales manager all identify a need for more guidance from the audits, an aspect which is also highlighted within BCM[38]. Both the BU-sales manager and PG-responsible also identify the need for benchmarking, which can be compared with self-assessments as proposed [39].

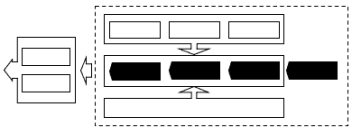
The lack of pressure to correct audit findings as described by the BU-president suggests a general lack of prioritisation of BCM by senior management, an aspect which is highlighted as a key enabler for a functioning BCM-process by Hiles (2007) (see section 2.1.4). The PG-responsible also sees a great need for more guidance at the site level regarding the content of the DRPs and suggests that this might be something which the Group Risk Management-department can help with. As illustrated in Table B.11, the lack of guidance is an issue highlighted during the interviews. According to theory, guidance is a central building block for a well-functioning BCM-process.

[37] See section 2.1.8.1 Education and Training.
[38] See section 2.1.8.3.1 Audits
[39] See section 2.1.8.3.2 Self-assessments

Table B.11: Audit & measurements-analysis for Case B.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
BCM audit	3	-	-	3	5	1	3	Need for increased focus on BCM in audits
Measurements	2	-	-	-	-	-	2	No formal or informal pressure from management
Guidance	1	-	-	1	-	1	1	Need for more input and benchmarking

B.2.1.3 Risk Analysis & Disaster Recovery Planning Process



The unstructured BCM-process described by the BU-president, by performing risk assessment within major departments and creating action plans if these were to materialise, contains BCM theory elements. This process resembles the use of risk-specific continuity planning as an alternative to risk mitigation, as described by Norrman and Jansson (2004) within Ericsson's SCRM process, rather than basing continuity plans based upon a BIA as proposed within BCM literature (see, for example, Hiles, 2007). Further, these plans are not developed for the BU as a whole, only the individual BU-functions. However, the lack of BIA suggests a considerable gap compared to BCM theory. However, the BU-president identifies this gap and recognises the need to perform a holistic analysis and even connect the site-DRPs into a holistic DRP for the BU (Table B.12). While the BU-president explains that key competencies have been mapped, the perceived need to further understand the dependence on competence in processes and how to ensure continuity suggests gaps in understanding the potential impact and developing continuity strategies (Table B.12).

Table B.12: Analysis of Risk Analysis and Disaster Recovery Planning process within Case B.

Aspect	BU-Management	Findings / Comment	PG-Management	Site-Manufacturing	Findings / Comment	PG-Sourcing	Site - purchasing	Findings / Comment	BU-Sales	Findings / Comment	Total	Findings / Comment
Risk Analysis	3	Ad-hoc and need to formalise.	2	5	In place at the factories.	3	3	Impact is based on spend. Ad-hoc at both site and PG, need to formalise.	-		3	Lack of structure and need for formalise, exception for manufacturing
BIA	1	Not in place, need for a holistic perspective.	2	4	Site perspective, no recovery objectives.	2	2	No BIA, only risk analysis.	3	Ad-hoc and limited, but tolerable outage	3	Site perspective and no recovery objectives. Exception of ad-hoc at BU-Sales.
Continuity strategies	3	Partly in place at BU-functions. Based on risk analysis.	2	5	In place at the factories, but limited coverage	4	4	Alternative suppliers, ad-hoc.	2	Not in place	3	In place at sites, but SCRM within sourcing. Ad-hoc at both BU and sourcing.
Disaster recovery plans	1	Need to connect site-level plans within the BU. Performed at BU-functions but not strategic perspective.	2	4	Limited coverage.	-	-	No BCM, instead SCRM. No info on plans.	2	Not in place	3	Limited coverage, primarily infrastructure. Need to connect sites from BU

Within the PG, there is an established disaster recovery planning process at the individual sites but not on a PG-management level. At the factories, the risk analysis considers risks such as fire and natural disasters, which suggests a focus on general site access and infrastructure (Table B.12). The

current Business Impact Analysis is based upon the delivery value of products and relative importance of ensuring delivery in the short term. This indicates that factory managers do not extend the analysis to overall business impact, which is a prerequisite for establishing recovery objectives to benchmark continuity strategies against as proposed by BCM theory[40]. While critical production equipment has been identified, few continuity strategies have been implemented (Table B.12). According to the PG-responsible, such options are considered too expensive (this further indicates that the definition of criticality used at the factory-level is not in line with business criticality).

While not part of BCM, the succession planning and ensuring that factory management can be replaced thanks to standardised processes indicates that continuity of business processes have been considered on a strategic level within the PG. The authors decided not to include these aspects into Table B.12 due to a strong emphasis on lean- and six-sigma initiatives rather than BCM by the PG-responsible, although it facilitates some continuity of factory management. The exclusion of these aspects in the Disaster Recovery Planning process is likely a consequence of the current BCM-scope of individual sites and infrastructure focus.

Within sourcing, compared to manufacturing, BCM is considered at both the PG-level (although informal) and at the factory-level. The risk analysis conducted within sourcing assesses probability and impact as proposed by theory[41]. However, the impact does not reflect business impact (a consequence of the site-scope according to the PG-sourcing manager), nor is there a structured way of determining actions to be taken as proposed by theory[42]. The PG-sourcing manager recognises these gaps, and there is a perceived need to formalise the risk assessments to ensure a structured process at the PG-level (Table B.12). Further, while sourcing has implemented continuity strategies, such as alternative or back-up suppliers, these are based upon the risk analysis rather than a Business Impact Analysis (similar as for the BU-functions). The expressed need by the PG-sourcing manager primarily concerns risk analysis to gain a better overview of risk exposure within the supply base. This, in combination with a lack of BIA, further emphasises the authors view that the BCM-practices within sourcing can rather be described as SCRM than BCM.

Currently, the inclusion of BU-sales in the BCM-process is limited to being included in the site-based plans. The observation that the BU-sales manager first discovered the process mapping and scope of risk analysis on the local site's IT-platform during the interview for this thesis highlights the limited inclusion of the BU-sales function in the BCM process. This further suggests a focus on infrastructure rather than business processes, as the function is only (technically) included in the legal entity's scope. While there is no formal BCM-process within the function, BU-sales has identified critical components (in terms of business impact) and has asked the PG to secure supply for these components. Despite being done ad-hoc, this presents the only example within the BU and PG which resembles criticality and maximum tolerable outage (Table B.12) from a business perspective, as proposed by BCM theory[43]. Considering the fact that BU-sales has not been involved or consulted in the formal BCM process, despite being the function with strategic responsibility of sales within the BU, further proves that the current BIAs (and definitions of criticality throughout the BU and PG) are not derived based on business impact for the BU.

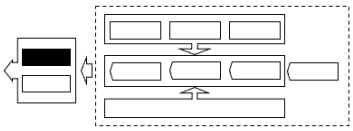
---

[40] See section 2.1.5.2 Business Impact Analysis
[41] See section 2.1.5.1 Risk Analysis
[42] See section 2.1.5.1 Risk Analysis
[43] See section 2.1.5.2 Business Impact Analysis. Recall Maximum Tolerable Outage (MTO) as a key output of the BIA according to Tjoa et al. (2008).

When considering the patterns across Case B, there is a general lack of structure at both the BU-level and within sourcing (Table B.12). Further, in both cases, it is the risk analysis rather than the BIA which is used to motivate either mitigation or continuity strategies. When there is a BIA in place, it is limited to site impact (except for the ad-hoc identification of critical components by BU-sales). Further, while there are continuity strategies in place for manufacturing processes at the sites, they offer limited coverage in terms of implemented continuity strategies, and there is an expressed need by the BU-president to connect the plans to gain a more holistic BU-perspective (Table B.12).

B.2.2 Management of recovery

B.2.2.1 Structure

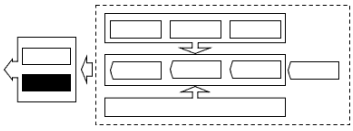


The structure of managing disaster recovery has been split between the Crisis Management Teams (CMTs) and the regular organisation (Table B.13). However, the foundations have been the local CMTs at the individual sites. The CMTs has met on regular basis. At the BU-main site, the composition was adjusted to better reflect the needs for disaster recovery throughout the pandemic, as suggested by Crisis Management literature. The PG-management, sourcing, and BU-sales have primarily managed disaster recovery within their regular structure (with some additional meetings), however there have been clear responsibilities of recovery, as suggested by BCM-theory[44], but no dedicated "recovery team" was established.

Table B.13: Analysis of Management of recovery - Structure within Case B.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Recovery organisation	-	5	5	-	5	5	5	Clear responsibilities, structured by regular management structure.
Crisis management structure	5	5	-	5	-	5	5	Based on CM-policy.

B.2.2.2 Recovery Actions



Most of the BCM-activities conducted before the pandemic related to BU B did not contribute when dealing with the recovery (Table B.14). However, by having mapped key suppliers in advance, it enabled the supply disruptions to be immediately addressed when they occurred during the pandemic, according to the PG-responsible. Hence, while the DRPs did not always provide concrete action plans, they contributed to better prioritisation of recovery as suggested by theory[45].

[44] See section 2.1.7 Developing and implementing BCM response and Disaster Recovery
[45] See section 2.1.8.3.1 Audits

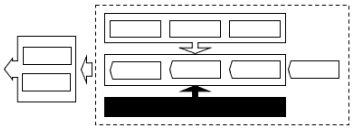
Table B.14: Analysis of Management of recovery - Actions within Case B.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Contribution of DRPs	2	2	4	2	4	2	4	Only contribution was supplier risk analysis.

B.3 Case C

B.3.1 Business Continuity Management

B.3.1.1 Scope of BCM



According to the BU-president, at the BU-site level, the scope of BCM is not limited to infrastructure but also considers capabilities, key resources, and people (Table B.15). The BU-sales function is not included in the BCM-scope except for site-related risks. The BU-sales manager has succession plans in place, but these are not part of the formal BCM process. The PG works with blue-collar competence and key resources, but this is neither part of a formal BCM process. Within the PG, the scope of BCM is production equipment and processes (manufacturing and purchasing) at the local sites. Based on the gathered information, no practical involvement seems to occur by the PG's strategic level related to the BCM process. The BU-president sees a need to encompass the wellbeing of employees better. While the transition to working from home has been rapid, the lack of planning to facilitate white-collar processes off-site further indicates that the current DRPs have been limited to site-aspects and not considered other business processes and people-aspects off-site.

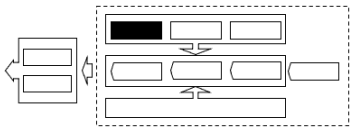
Table B.15: Scope-analysis within Case C.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Infrastructure	4	-	-	5	-	-	4	Site infrastructure
People	3	-	2	4	2	4	3	Succession plans at the BU and manufacturing but not part of BCM. Need to include mental wellbeing.
Processes	1	2	2	5	5	2	3	Production processes and suppliers. Need to consider white-collar processes.
Value chain	1	1	2	-	2	2	1	Risk considered, but not formal BCM. Need to evaluate.

The BCM literature does not provide a clear consensus of the appropriate organisational scope of BCM, although the BCM-preparedness model proposed by Marsh Risk Consulting (2010) (see section 2.1.2.2) advises a holistic business scope. The existing perceived need by the PG-responsible and the BU-president to extend the analysis and consider criticality and risks from a more holistic business perspective would be closer to the purpose of BCM, as suggested by theory and this is reflected in Table B.15. However, as the BU-president points out, this would still only consider the criticality for the BU, of which there are 13 in total. From a Group perspective, a major disruption within the BU would probably only have a marginal impact on the Company's total revenues.

B.3.1.2 Enablers

B.3.1.2.1 Tools & Frameworks



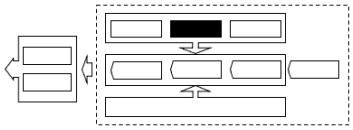
No one of the informants are directly involved and using the tools and templates for BCM; hence there is limited information and perceived needs related to the practical tools used throughout the disaster recovery planning process (Table B.16). However, to a varying degree, the managers have knowledge and insights regarding the overall structure of the BCM-process, its output, challenges, and relevance within the organisation.

Table B.16: Tools & Framework-analysis within Case C.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
BCM-process	2	2	2	3	3	2	3	Need for consistency within PG
Risk Analysis	2	2	2	3	3	2	3	Need for consistency within PG
BIA	2	2	2	3	-	2	3	Need for consistency within PG
Continuity strategies	2	2	2	-	-	2	2	No tools at BU+PG-level. But no info on site
Disaster recovery plans	2	2	2	-	-	2	2	No tools at BU+PG-level. But no info on site

Within the BU and at a PG-management-level, there is no specific framework for working with BCM; business continuity and risk are instead part of the overall strategic processes, such as purchasing improvement with Global Sourcing and overall supply chain strategy between the PG and BU. The PG-sourcing manager's perceived need to include risk within daily routines suggests that risk is currently managed ad-hoc on a strategic level. The responsibility of developing the BCM-process resides with local site-managers. The perceived need from the PG-responsible for consistency of tools and frameworks across sites to enable benchmarking and comparison suggests that the BCM-process differs across the PG and current frameworks provided by corporate offers limited guidance of how to structure and organise the practical BCM-process.

B.3.1.2.2 Training & Testing

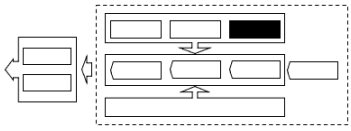


Training and education is highlighted as an essential aspect of by BCM literature[46] and should reflect the roles and needs related to BCM. As far as the interviewees are aware, there is no training in place regarding disaster recovery planning. The Group Risk Management-department has been involved in general discussions of risk with the PG-responsible and the BU-president. However, the perceived need suggests that there is still room for improvement, especially to better support the development of the BCM-process. The lack of training regarding disaster recovery planning could explain the perceived need for a better BCM-framework, templates and audit & measurement (which will be further accounted for in the next section). While the BU-sales manager did not explicitly mention training or testing, the fact that the authors had to explain the purpose of BCM during the interview suggests that no training or testing has been conducted.

Table B.17: Training & Testing-analysis within Case C.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Training or education	3	3	2	1	1	2	3	Risk discussion on strategic level with RM-dep. Need for better guidance.
Testing or exercises	-	-	-	-	-	2		

B.3.1.2.3 Audit & Measurement



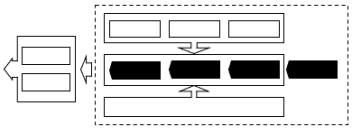
The literature identifies auditing and measuring BCM compliance to play a vital role in measuring compliance, identifying improvement areas, and providing guidance[47]. Currently, BCM is included as a part of the internal audit process where the DRP developed at the legal entity (i.e. site) is benchmarked against the contents of the corporate BCM policy and templates. This results in the sites being part of the audit process itself but not the more strategic level of BU and PG, see Table B.18. The lack of KPIs or measurements regarding BCM for the BU indicates that BCM is not regarded as a topic to prioritize. There are no measurements of BCM-implementation for the BU or within the PG. The perceived need for more benchmarking of BCM-plans, expressed by both the PG-responsible and the BU-president, suggests that the current auditing process does not provide the desired input and guidance.

[46] See section 2.1.8.1 Education and Training.
[47] See section 2.1.8.3.1 Audits

Table B.18: Audit & measurements-analysis within Case C.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
BCM audit	2	2	2	4	4	2	4	In place at site level, but quality not considered
Measurements	1	-	-	-	-	-	1	Need for more measurement and follow-up
Guidance	1	-	-	1	-	-	1	Need for benchmarking

B.3.1.3 Risk Analysis & Disaster Recovery Planning Process



The BU-president is not directly involved in the BCM-process, and the inclusion of the BU has been limited to site perspective (Table B.19). Further, within the BU, risk analysis is performed from a business perspective; however, the perceived need from the BU-sales manager to develop the analysis beyond *"theoretical box-ticking activity within the Quality Management System*" indicates that the current practices add limited practical value to the organisation (Table B.19). The BU-president highlights the challenges of deciding when to invest in continuity strategies and sees a need for better guidance or principles when considering these investments. According to the authors, this can be caused by a misalignment between defining critical business processes (as the output of the BIAs conducted at the site-level) and the Company's appetite for investing in continuity strategies. More concretely, this gap can be derived from the site-perspective of impact because of the BCM-scope of legal entities. This gap is identified by the BU-president and there is also a need to conduct an analysis together with the PG with a more holistic perspective on risk (Table B.19). However, as the BU-president also points out, such an analysis will still be limited to the "PG and BU"-perspective, not criticality at the group level. Further, the absence of a discussion around the strategic view upon risk and BCM from group management indicates that BCM is not of top priority.

Table B.19: Analysis of Risk Analysis and Disaster Recovery Planning process within Case C.

Aspect	BU-Management	Findings / Comment	PG-Management	Site-Manufacturing	Findings / Comment	PG-Sourcing	Site - purchasing	Findings / Comment	BU-Sales	Findings / Comment	Total	Findings / Comment
Risk Analysis	4	Conducted from a site-infrastructure perspective.	2	5	In place at factories, but site perspective.	3	5	In place at sites, informal at PG. Need to formalise and improve mitigation.	3	Top-level SWOT, need to move from "box-ticking".	3	In partly in place but infrastructure/ site perspective. Need to formalise.
BIA	1	Need holistic view and link sites to business impact.	2	3	No recovery objectives or business perspective.	1	3	Site perspective. Need to establish cross-functional BIA for products.	3	Informal (only functional perspective), need to better understand impact.	3	Impact to site, no recovery objectives. Need for holistic view of BU+PG sourcing.
Continuity strategies	1	Need for better principle of when to consider together with PG.	2	3	Considered based on assumptions, need for fact based.	-	3	Alternative suppliers, but need to optimize.	1	Competence identified, but need for a strategy.	3	Some strategies exist, but need for better principle of when to invest and optimize.
Disaster recovery plans	-		2	5	Identifies dual-capabilities.	2	3	In place at factories, but primarily risk mapping.	2	Not in place.	3	In place at factories, covers production equipment. Risk mapping at site for sourcing.

Within the PG, risk analysis is performed with a site-perspective and includes risks related to infrastructure. The individual factories have developed DRPs with information on how to transfer production capacity between sites and the time and cost to replace machinery. While the DRPs are stringent with BCM-theory[48] in terms of providing action plans for recovery, there are gaps in the underlying BIA and development of continuity strategies. Compared to theory, the BIA identifies critical production equipment and quantifies the impact of a disruption but does not extend the analysis further in terms of recovery requirements and business. To the authors, this may explain why the current evaluation of continuity strategies (both internal and external ones are considered) is largely based on assumptions, and why there is a perceived need from the PG-responsible to have a more fact-based discussion on how continuity strategies should be determined. Further, this suggests that the same gap in terms of misalignment between criticality (determined by the BIA) and the Company's attitude to investing in BCM, as identified on a BU-management level. This can explain why the current continuity strategies within the DRPs are limited to utilizing the infrastructure already in place (Table B.19).

Within sourcing, the site level DRPs, with info on supplier risk scoring, are used to motivate mitigation strategies (e.g., buffer stocks and dual sourcing). Compared to theory, this process would be categorised as risk analysis and proactive SCRM to mitigate risk exposure rather than continuity planning[49]. Further, the risk analysis is based upon the probability of a supplier disruption, but only considers impact from a site perspective (Table B.19). On a PG-level, while there are no explicit processes in place, critical components with single source (the disruption of which would stop the production) are identified. While mapping of critical components on a PG-level can be categorised as an informal BIA, the perceived need to optimise risk and discuss tolerable outage of products and included components suggests that there is currently no input in terms of realistic recovery objectives for benchmarking the continuity strategies against. The lack of realistic recovery objectives could explain the overall lack of a formalised disaster recovery plan, as continuity strategies for all critical components is unsustainable, and why the sourcing department instead primarily focuses on risk mitigation within the domain of SCRM (Table B.19). Further, the perceived need for considering risk already on the product development stage (e.g. by avoiding lock-in effects) and product strategy indicates that a cross-functional perspective on risk can avoid sub-optimization within functional silos.

The BU-sales function conducts a top-level SWOT-analysis. The BU-sales function does not actively engage in the BCM-process, but the BU-sales manager is aware that BCM exists related to the site. Formally, however, due to being part of the legal entity, the sales function is included in the scope of BCM. While the BU-sales function has not formally participated in the BCM-activities, the function has been instrumental in managing recovery (both during the pandemic but also in other crises) in terms of market knowledge and prioritisation of customer orders. As there are no continuity plans in place, the function relies upon its reactive capabilities in the event of a disaster. These capabilities are recognised by the BU-sales manager, the PG-sourcing manager and the PG-responsible and according to the BU-sales manager, these can be derived from the competencies within the sales function. While these competencies are identified, the perceived need to better understand the risk and how to manage them suggests that no BIA, formal or informal, have been carried out beyond the functional perspective of BU-sales (Table B.19). There is an understanding that the function is important, but there is no analysis performed to gain perspective on the risks (through the development of recovery objectives and identification of

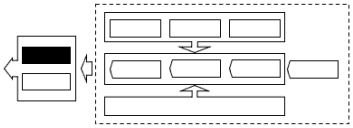
[48] See section 2.1.7 Developing and implementing BCM response and Disaster Recovery
[49] See section 2.1.8.1 Education and Training

dependencies as suggested by theory[50]), nor has the BU-sales function been consulted in the development of BIA or DRPs within other parts of the organisation.

When considering the big picture and patterns across Case C, risk analysis is in place primarily at the sites but also at BU-level. Common for the risk analysis is the site-perspective; there is also a need to formalise the process within sourcing (Table B.19). The trend of a site perspective is also observed regarding the BIA. Here, there is a clear need from both the BU-president and PG-sourcing manager to obtain a business perspective on criticality. In terms of continuity strategies, there is a need to understand how to address continuity or how to optimise the investments within all functions. This can be interpreted as a need for a better business impact analysis to base the decisions upon, as suggested by theory[51]. In terms of continuity plans, these are primarily in place at the factories and contain dual-production capabilities (where already in place). While sourcing has identified some alternative suppliers, the emphasis is on supplier risk mapping and risk mitigation, which should be classified as SCRM rather than BCM when considering theory[52].

B.3.2 Management of recovery

B.3.2.1 Structure



The structure of managing disaster recovery during the pandemic differs depending on the informants' responsibilities. For example, the BU-president and PG-responsible, both highlight the use of the crisis management teams as the primary structure for managing the recovery, where the CMTs have been in close contact with both BU and PG-management. Sourcing and BU-sales have managed the responsibility within the regular organisational structure. Within both operations and sales, the global organisation has been utilised to manage problems which have been escalated from the operational level (Table B.20).

Table B.20: Analysis of Management of recovery - Structure within Case C.

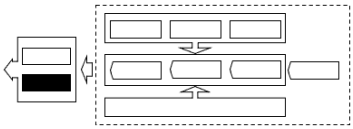
Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Recovery organisation	-	-	5	-	5	5	5	Clear responsibilities, structured by regular management structure.
Crisis management structure	5	5	-	5	5	-	5	Based on CM-policy.

Compared to theory, the crisis management teams have held the role of incident management, but the responsibility of recovery management has been shared across the CMTs and regular management teams. While the theory[53] suggests that incident and recovery management teams should be separate, the theory is primarily structured around sudden on-set disasters, not a prolonged pandemic where the severity of the crisis is volatile over an extended period (Table B.20). However, it can be argued that while there have been no outspoken "recovery teams" there

[50] See section 2.1.5.2 Business Impact Analysis
[51] See section 2.1.6 Developing and determining Business Continuity Strategies
[52] See section 2.1.5.1 Risk Analysis.
[53] See section 2.1.5.2 Business Impact Analysis

have been clear responsibilities as proposed by BCM-theory within sourcing and BU-sales. Thus, categorising the recovery organisation as *"in place, no need"*.

B.3.2.2 Recovery Actions



Concerning the DRPs contribution to the recovery from the Covid-19 pandemic, previously identified continuity strategies in terms of alternative suppliers and manufacturing capabilities have been implemented at the factories (Table B.21). This also reflects what has been developed before the pandemic (related to the material flow) that could be implemented quickly. What has not been used are elements with longer implementation time, such as the replacement of infrastructure. However, the pandemic has not caused any destruction of infrastructure, and the impact on production capacity and suppliers has been time-limited to a few weeks or months. In terms of relevance during the management of the Covid-19 pandemic, the work that has been performed in terms of risk analysis and mapping of key components has been a valuable input within PG-sourcing, as the analysis has successfully identified potential disruptions of supply. However, the PG-sourcing manager puts less emphasis on the plans and instead highlights the organisational structure within Sourcing.

Table B.21: Analysis of Management of recovery - Actions within Case C.

Aspect	BU-Management	PG-Management	PG-Sourcing	Site - manufacturing	Site - purchasing	BU - Sales	Total	Findings / Comment
Contribution of DRPs	2	2	2	4	4	2	4	Contribution of alternative suppliers and production capabilities but limited coverage.