Managing decision making

an in-depth analysis of the effects of decentralized decision making at Cisco Services

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Managing Decision Making

An in-depth analysis of the effects of decentralized decision making at Cisco Services.

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Abstract

During this master thesis the sub optimality of decisions made in the sub departments of the Service Supply Chain Department (SSCD) of Cisco Systems Inc. in the EMEAR region is investigated. A qualitative analysis of the implicit performance measurement system at the SSCD department is conducted.

A lack of trade-off between performance measures is found and a quantitative analysis of the implicit trade-offs made concerning the transport of goods to the customer is conducted. Through determining the impact of decision making on the performance figures, it is enabled to make well funded trade-offs and areas of improvement with respect to the performance measurement system are found.

This report has been made suitable for publication. Therefore the outcomes are scaled and percentages are manipulated. Furthermore, relevant information throughout the text, vendor names, and appendices have been labeled confidential and are masked in this version.

Management Summary

This master thesis describes a project conducted at the Service Supply Chain Department (SSCD) of Cisco Systems Inc. Cisco is a company that designs, manufactures, and sells networking equipment. Cisco Systems can be divided in two sections worldwide: Cisco Products, which put forward Cisco's products to its customers, and Cisco Services, which is concerned with delivering technical support, replacement services, and advanced services to its customers. Cisco Products is strictly separated from Cisco Services. This project will take place entirely within Cisco Services.

The Service Supply Chain Delivery department is Cisco Services' logistics arm. SSCD is tasked with delivering hardware replacement support to Cisco's customers and partners. The tasks of the SSCD department are executed by six operational teams of which the following four lie within scope of this project: Third Party Logistics (TPL), Order Management (OM), Asset Recovery (AR), and Planning and Repair (PR).

Problem Statement

The starting point for this project is that TPL experiences that it is not managing its business in a pro-active manner. TPL manages the logistic service providers and in doing so primarily manage the logistic movements that the departments OM, AR, and PR are triggering. The main problem identified is that the SSCD department deals with lower than possible performance figures. The causes leading to this problem are a lacking trade-off between performance measures, suboptimal decisions are taken in the departments due to silo optimization per department, and Cisco's systems make suboptimal transportation decisions. The main research question stated is:

How can the decision making process at the SSCD department of Cisco be aided, using the (cross departmental) relationships between decisions and Key Performance Indicators (KPI's), as to find a better trade-off between costs and performance.

A qualitative analysis of the implicit performance measurement system of the SSCD department is executed. Next, the friction between the departments OM and TPL, brought forward by the performance measurement system, is analyzed in detail to obtain insight in the operational impact of the lack of explicit trade-offs. The goal of the project is gaining an insight in performance measurement at the SSCD department to be able to understand decisions taken at the departments. Furthermore, a goal is to determine the impact of decision making on the performance figures and indicate areas for improvement.

Implicit Performance Measurement Structure

The original construction of the performance measurement system at the SSCD department bears resemblance with the basics of a measurement system called the Balanced Score Card (BSC), introduced by Kaplan & Norton (1996)(1996). However, the current SSCD performance measurement system has only limited resemblance with the Balanced Score Card.

The current performance measurement system fails to provide a clear overview of the whole SSCD department, and no departmental KPI's are found to relate to each other. Furthermore, an exclusive focus of each department on a separate section of the performance measurement system likely contributes to the fact that departments barely relate their performance to other departments. When comparing the measurement system with the ideal form of an BSC, adapted from scientific literature, it appears that three out of the five characteristics of a well structured BSC are lacking:

the measures are not clearly derived from strategy, there is no balance among the measures, and linkages between the different measures within each performance dimension as well as across the four performance dimensions do not exist.

Processing of RMA orders

The specific area of friction between the OM department and the TPL department, concerned with the flow of goods to the customer, is selected. This flow of goods is the processing of so called RMA orders. These orders entail an order to deliver a service part from a storage facility to the customer within certain delivery parameters. The TPL and the OM department are having a shared goal in timely delivering products to the customer and have several KPI's in place and Service level agreements (SLA) agreed with their vendors that relate to on time delivery of products. However, the OM department primarily relates this goal to customer satisfaction whereas the TPL department primarily relates this goal to the budget. There does not exist an explicit trade-off between customer satisfaction and expenses (the realization of the budget).

Transportation to the customer can be done with a number of different service levels. However, discrepancies exist between the service level stated in the contract, the service level requested by the customer, and the service level delivered. It occurs that customers request for upgrades, which entails delivering a higher service level than a customer is entitled to.

Results

By combining transportation data of Cisco and transportation data of the five main vendors an overview of the relationship between these three dimensions is obtained. In the below table the results are stated. The contracted service level is denoted as 'C', the requested service level is denoted as 'R', and the delivered service level is denoted as 'D'. For the relationships 'NTBD' is used to denote 'Not to be Determined'. Two tables are stated due to the three dimensions presented.

Table 1: relationship contracted, requested, and delivered service level

	D > C	D = C	D < C	D NTBD C	Total
R > C	6,89%	0,05%	0,00%	0,00%	6,94%
R = C	12,31%	64,67%	0,09%	0,34%	77,41%
R < C	0,07%	0,32%	1,86%	0,01%	2,26%
R NTBD C	0,72%	1,49%	0,72%	10,46%	13,39%
Total	19,99%	66,53%	2,67%	10,81%	100,00%

D > R	14,46%
D = R	82,10%
D < R	1,80%
D NTBD R	1,65%
Total	100,00%

The most important figures found from this table are that In 6,94% of the order requests the requested service level is higher than the contracted service level. In 99,28% (6,89 / 6,94) of the orders with a request for a higher service level, a higher service level is granted. Note that the granted service level is not necessarily identical to the requested service level. For 19,99% of the orders, the delivered service level is higher than the contracted service level. Remarkable is that Cisco delivers a higher service level in 19,99% of the cases, although only in 6,94% of the total cases the request of the customer is higher than contracted.

As the trade-off between customer satisfaction and the realization of the budget primarily comes forward in the orders that receive an upgrade, those orders are analyzed in more detail. Two groups are distinguished. The first group are the so called forced upgrades which take place as the lowest service level Cisco can currently deliver is higher than several service levels offered to the customer.

The second group are normal upgrades which are upgrades that are granted by Cisco while other (lower) transportation methods are available.

Based on the total cash flow and the total amount of orders, the relevancy of different groups of upgrades is determined and alternative decision making for three groups of upgrades is investigated. For these three groups, alternative decision making entails delivering the contracted service level of the customer. Next to the three groups, a fourth group of orders is selected. This group regards orders with a Scheduled service delivery and is investigated as it is possible to deliver a part of these orders with a cheaper service level whilst maintaining the same service for the customer.

1) The options entailing an upgrade to NBD service level delivery (forced upgrades)
2) The options entailing an upgrade to Scheduled service level delivery (normal upgrades)
3) The options entailing an upgrade to a 4 Hour service level delivery (normal upgrades)
4) The options that entail a Scheduled service level delivery

The results of using alternative transportation methods are stated in the following table.

Table 2: results alternative transportation methods

	Current Transport	***Alternative Service***	***Δ Relevant Costs***	***Δ Relevant Costs %***
Group 1	[redacted]	[redacted]	[redacted]	32,67 %
Group 2	[redacted]	[redacted]	[redacted]	75,66%
Group 3	[redacted]	[redacted]	[redacted]	68,95%
Group 4	[redacted]	[redacted]	[redacted]	62,00%
Total	[redacted]	[redacted]	[redacted]	52,60%

Trade-off

Using different transportation methods implies different trade-offs for each of the four groups. The impact on the budget side is exactly determined. The impact on the other side of the trade-off, customer satisfaction, however is yet to be determined. The following table states the anticipated impact on customer satisfaction.

Table 3: impact alternative transportation methods on customer satisfaction

	Customer Satisfaction	**Remark**
Group 1	+ / -	Party positive and partly negative as part of the orders are delivered faster and part of the orders are delivered slower
Group 2	--	Negative as customers receive a lower service level than requested
Group 3	--	Negative as customers receive a lower service level than requested
Group 4	-	Slightly negative as the customer receives the same service level but with limited flexibility of choice for delivery time

For each of the four groups of options the difference in relevant costs have to be weight against the anticipated impacts on customer satisfaction. For the first group and the fourth group it holds that a trade-off can be made fairly straightforward as the impact on customer satisfaction is low. For the second and the third group, which are the normal upgrades, the trade-off has to be fed by discussion with Cisco's Duty Managers who decide on granting upgrades. Discussions with Duty Managers bring forward that the amount of upgrades likely can be lowered when Cisco's systems would be updated in time as the timely updating of Cisco's systems would prevent escalations in the first place.

Furthermore, when the upgrades and reasons for upgrades are tracked an overview can be obtained which provides input for the trade-off between customer satisfaction and costs. Currently no records are kept of any of the underlying reasons for an upgrade.

Proposal for Alteration

The design of the solution and change plan is threefold: first, the operational level is discussed in congruence with the scope of transportation of RMA orders. Second, all sub departments of the SSCD department are taken into account and the silo optimization of the departments is discussed. Third, the design of the solution and a change plan with regard to the problems found in the analysis of the performance measurement system are presented.

On the operational level several changes in Cisco's system and in the vendor's system have to be taken to adapt to the new service level capabilities. Considering normal upgrades, the reasons for upgrades have to be identified and tracked to facilitate discussion within the SSCD department in which the effects on customer satisfaction and the effects on the TPL budget are brought together. Furthermore, effects on delivery performance and customer satisfaction have to be monitored. Second, considering all SSCD sub departments, it is likely that, similar to the friction between the OM department and the TPL department, the AR and PR department encounter trade-offs in the current business that are not addressed. It is proposed to organize SSCD meetings that explicitly discuss the lack of trade-offs and the potential impact on the business. Furthermore, input from all departments about the most important implicit trade-offs made should be gathered and working together, the departments should make these trade-offs more explicit. Third, considering the performance measurement system, it is proposed to restructure the performance measurement system to a Balanced Score Card System. Hereto three steps have to be taken: balance must be brought to the measures from each of the four areas of SSCD objectives by placing more emphasis on the financial measures. Second, links between the measures showing the impact of one measure on another measure must be established. Third, the SSCD department performance measurement system must be considered a whole by all departments.

Conclusion

The lack of a proficient measurement system causes the departments to not relate their performance to other departments and invoke departmental silo's. The current performance measurement system does not facilitate trade-offs and this project reveals the effects on an operational level: delivery overperformance at the OM department leads to higher costs for the TPL department. Alternative decision making is proposed and relevant costs are calculated to map the actual impact of the current way of decision making. Considering the relevant costs, it is found that making the trade-off is worthwhile for the overall benefit of the SSCD department.

When zooming out, the areas of friction between the TPL department and the AR and PR departments are indicated as important areas to apply the same methods to. For these departments it holds that the focus differs and the performance measures are not related to each other here either. Potential overall benefits might be found here as well and taking steps to bust the departmental silo's, improving the performance measurement system, and considering the performance measurement system a whole must be taken.

Preface

This master thesis is written as the final thesis for the master program Operations Management and Logistics at the Eindhoven University of Technology. The research for this project is conducted at Cisco Systems Inc. in Amsterdam.

I would like to thank several people that helped me during my research. First of all I would like to thank Mr. Slikker, my primary university supervisor, for his guidance, input, and feedback during the project. Furthermore I would like to thank Mr. Broekmeulen, my second university supervisor, for reviewing my work and his useful feedback.

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Finally, I would like to thank my family and friends who supported me during my study and especially during this master thesis project.

Thijs Wolters

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Table of Contents

1. Introduction

In this report my master thesis project is presented. This project is conducted at Cisco Systems Inc., a company that designs, manufactures, and sells networking equipment. More precise, the project is situated at Cisco's Third Party Logistics (TPL) Department, which is part of the larger Service Supply Chain Delivery (SSCD) department.

In this chapter, Section 1.1 will describe Cisco Systems Inc. by describing the organization and providing an overview of the organization structure. In Section 1.2 the problem situation, the initial research problem, and the research questions are stated, which are derived trough a detailed analysis during the initial research phase. Furthermore, the scope of the project and structure of the report are stated in this section. For an overview of all abbreviations the reader is referred to the list of abbreviations in Appendix A.

1.1. Cisco Systems Inc.

The project is situated at Cisco Systems, founded in 1984. Cisco designs, manufactures, and sells Internet Protocol (IP)-based networking and other products related to the communications and Information Technology (IT) industry and provides services related to these products and their use.

The business is conducted globally and is managed geographically into the following three geographic segments: The Americas; Europe, Middle East, and Africa (EMEAR); and Asia Pacific, Japan, and China (APJC).

Cisco Systems can be divided in two sections worldwide: Cisco Products, which put forward Cisco's products to its customers, and Cisco Services, which is concerned with delivering technical support, replacement services, and advanced services to its customers. Cisco Products is strictly separated from Cisco Services. This project will take place entirely within Cisco Services.

1.1.1. Cisco Services

Cisco Services has more than 11.600 employees worldwide and has an approximate yearly revenue of € 7.6 billion. This project will take place in the EMEAR region of Cisco Services. Europe is responsible for 16% of the worldwide revenue, and the Middle East and Africa are responsible for 8% of this revenue. The rest of the revenue is made in the Americas and the APJC region.

Directly under Cisco's Services, the department Advanced Service Delivery (ASD) is located. This ASD department is tasked with delivering hardware replacement support and field engineers to Cisco's customers according to their service contract. The customers consist of large regional, national, or global organizations with multiple locations or branch offices and in general employ 1.000 or more employees. Many of these businesses have unique IT, collaboration, and networking needs. Customers typically buy a networking system or 'architecture' from Cisco with additional service agreements that entail repair or replacement of products at the customer's location.

The services that are bought with a Cisco system are agreed upon in a service contract where service is established on a product level. Within a service contract there thus exist a service level for each product separately. Cisco delivers a vast array of service levels which range from a two-hour replacement service to several days replacement services.

Within the ASD department, the Service Supply Chain Delivery department is Cisco Services' logistics arm. SSCD is tasked with delivering hardware replacement support to Cisco's customers and partners. Next to the forward movements of goods from Cisco to the customer, the SSCD department is responsible for the reverse movement of goods and the repair movements of goods. The reverse movements of goods entails transport of defective products from the customer to Cisco and the repair movement of goods entails the transport of products from and to repair sites. All logistics movements are executed by Logistics Service Providers (LSP) or so called Vendors.

The tasks of the SSCD department are executed by six operational teams:

TPL – Third Party Logistics:	Concerned with the management of vendors and logistic movements and controlling the expenses of the vendors.
OM – Order Management:	Concerned with forward flows of products; Finished Goods Inventory (FGI) to the customer.
AR – Asset Recovery:	Concerned with the reverse flows of products; Defective Goods Inventory (DGI) from the clients to the warehouse.
PR – Planning and Repair:	Concerned with the flows from and to the repair centers (DGI+FGI) and responsible for keeping sufficient stock at the warehouses.
OSS – On Site Services	Concerned with delivering service on site at the customer.
TM's- Territory Managers:	Concerned with operating in emerging countries. For some emerging countries, this department has its own Vendor Managers (VM)
BSG – Business Support Group:	Staff department, concerned with several business projects. Delivers support to the other departments.

The organization structure of the above explained organization of Cisco is depicted in Figure 1 with the department TPL located at the bottom right.

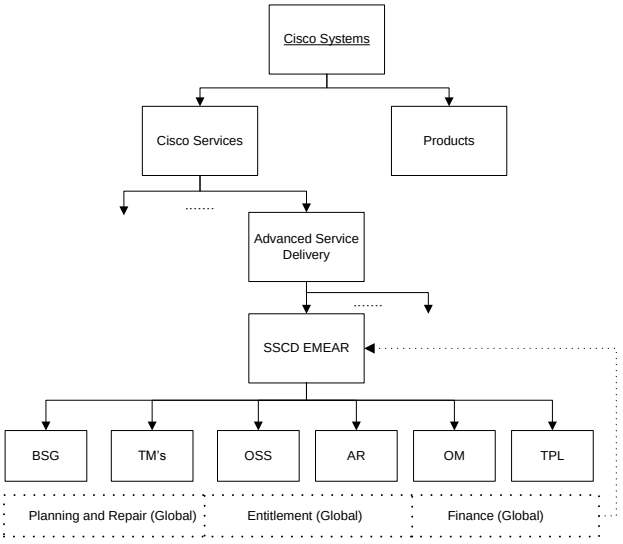

Figure 1: Cisco Services Organization

At the bottom of Figure 1 three departments are stated with a dotted border and a dotted reporting line to the SSCD department. This dotted border indicates that these departments are global departments, operating in different regions in the world. However, within these global departments there exists one separate section concerned with an exclusive focus on the SSCD business in the EMEAR region. The reporting responsibility for the departments Planning and Repair, Entitlement,

and Finance thus is global but entail another reporting responsibility to the SSCD EMEAR region separately.

1.1.2. Third Party Logistics

This project takes place at the Third Party Logistics (TPL) department within the Service Supply Chain Delivery (SSCD) department at the EMEAR region. All the logistic movements (forward orders, reverse orders, and repair centre orders) are outsourced and managed by TPL. Within TPL there are several Vendor Managers, responsible for a particular vendor and its associated budget. The TPL vendors primarily execute what the departments OM, AR, and PR are triggering.

The flow of goods for which TPL has the managing responsibility is organized according to a closed loop supply chain model; a closed-loop supply chain consist of a series of activities required to retrieve a used product to either dispose or reuse it. The movement of goods at the different flows are ordered by the departments OM, AR, and PR. Those departments are ordering the forward flow of goods, the reverse flow of goods, and the repair flow of goods respectively. The supply chain of SSCD can therefore be depicted in a simplified version as stated in Figure 2. In this picture the flow of goods is represented as well as the departments directly ordering these logistics movements at the service providers.

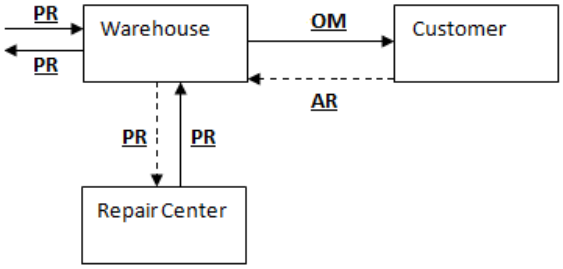

Figure 2: SSCD Supply Chain

The line from warehouse to customer indicates the forward flow of Finished Goods Inventory to the customer, satisfying customer demand. The dotted lines indicate the 'reverse flow' of DGI from the customer and the flow of DGI to the repair center. The two lines between the warehouse and the repair center indicate the repair cycle of sending and receiving DGI and FGI respectively, and the two lines to and from the warehouse denote acquisition and discarding of products.

The warehouse in Figure 2 is a combination of multiple warehouses that Cisco uses to deliver its services. Next to a main warehouse in [redacted] the Netherlands, Cisco makes use of approximately 250 Country Depots (CD) and Rapid Fulfillment Depots (RFD) in the EMEAR region. The depots are managed by the Logistic Service Providers. In general, each country in the EMEAR region which lies outside the European Union has a CD which is the first depot to receive replenishment goods from the main warehouse. The CD's are used for delivery of the Next Business Day (NBD) service level. The RFD's are situated throughout the whole EMEAR region and are primarily used for delivery of the 2 hour, 4 hour, and Scheduled service level. Within the European Union the RFD's get replenished directly from the main warehouse. Outside the European Union the RFD's are replenished via the CD's, which in turn are refilled from the main warehouse. These flows are under control of the PR department.

In Figure 2 the TPL department is not explicitly stated as they do not directly order movements of goods at logistic service suppliers. The responsibility of TPL however is managing all the LSP's (or vendors) to meet the agreed SLA's while being responsible for the total budget used for these activities. They can be seen as having an overarching responsibility for customer satisfaction, budget performance, and delivery performance and are thus managing all operations associated with the arrows in the above picture.

1.2. Problem Statement and Research Questions

In the preliminary research phase of this project, the problem situation is identified and analyzed. Based on these findings a problem statement and a set of research questions is formulated. In this section the problem situation will be explained and the problem statement and research questions are presented.

1.2.1. Problem Situation

The starting point for this project is that TPL experiences that it is not managing its business in a pro-active manner. TPL manages the logistic service providers and in doing so primarily manage the logistic movements that the departments OM, AR, and PR are triggering. The TPL department however, does not have pro-active control over these operations and cannot exert influence on the expenses for which they are responsible.

1.2.2. Analysis of the Problem Situation

Taking the problem situation as stated in Section 1.2.1 as a starting point, a series of semi structured interviews is conducted with staff from the four departments TPL, OM, AR, and PR. In these interviews a first focus is put on the responsibilities of each department. The choice for semi-structured interviews is made as it allows for additional questions to be asked which may be questions that have not been anticipated in the beginning of the interview. This type of interview gives the researcher opportunities to probe for views and opinions of the interviewee. Probing is a way for the interview to explore new paths which were not initially considered (Gray, 2004)(Gray, 2004).

Questions asked in the interviews are aimed to learn about the extent to which correspondence and co-operation exists between the departments. Furthermore, a focus is placed at problems experienced by the different departments, primarily relating to the co-operation or lack of co-operation between the departments.

1.2.3. Problem Statement

The results from the interviews are summarized in a cause and effects diagram, as proposed by Van Aken, Berends, & Van der Bij (2007). An Ishikawa diagram is used as it allows for grouping of causes. The Ishikawa diagram is stated in Appendix B.

The main problem identified is that the SSCD department deals with lower than possible performance figures. Three groups of causes that contribute to this problem are formed and stated here. For the complete overview of causes, the reader is referred to Appendix B. The three groups of causes are named SSCD Organization, Performance Measurement, and Systems.

1. SSCD Organization

This group of causes indicates that the way the SSCD department is organized makes that suboptimal decisions are taken. These suboptimal decisions come forth from the lack of alignment between departments, silo optimization per department, and the focus of departments on their own Key Performance Indicators (KPI). Furthermore, the organization of the SSCD department is such that the TPL department has no insight in or control on the decision making process with regard to the ordering of logistic movements whilst they are responsible for the expenses. There thus is a missing link between the transport of goods and the cash flow associated with this transport.

2. Performance Measurement

The second group of causes indicates that the way performance is measured leads to lower than possible performance figures for the SSCD department. In the current situation no clear trade-offs exists between different performance measures. Additionally, overperformance with respect to the customer is realized due to the departmental focus on their own KPI's.

3. Systems

The third group of causes relates to Cisco's systems currently in place to handle customer requests. Cisco makes use of a so called 'C3' Oracle application which is build to make transportation decisions based on lead time of products instead of on the service entitlement of a customer. Most orders that can be delivered within a period of multiple days are currently transported within a day due to this limited application. Furthermore, the lack of a comprehensible overarching system that keeps track of performance measures of different departments makes that there is no insight in the relation between costs and operations and makes adequate decision making difficult.

Although the causes are pulled apart and grouped for surveyability, they are interwoven and have strong links with each other. A recurring observable fact is that a lack of insight between operations and performance (and in particular between logistic operations and the costs of these operations) drives the main problem. It is in this area that the project will focus itself and that a solution for the main problem; the SSCD department deals with lower than possible performance figures, is sought.

1.2.4. SSCD Performance

A note has to be made considering the problem statement above as lower then possible performance can indicate several different situations. These different situations are indicated in a cost-performance trade-off diagram in Figure 3.

In this figure the relation between costs and performance is represented; high performance comes at high costs. The line in this figure represents the optimal trade-off. Here, the best performance for a certain cost is obtained, or, alternatively stated, the lowest costs for a certain level of performance is obtained. Point A on this line depicts the optimal trade-off for the situation that performance is right on target. Four more situations are identified:

1. Targets are met. The performance-cost point where the SSCD department finds itself lies on the efficient frontier. (Point B)
2. Targets are met. The performance-cost point the SSCD department finds itself does not lie on the efficient frontier. (Point C)
3. Targets are not met. The performance-cost point where the SSCD department finds itself lies on the efficient frontier. (Point D).

4. Targets are not met. The performance-cost point where the SSCD department finds itself does not lie on the efficient frontier. (Point E)

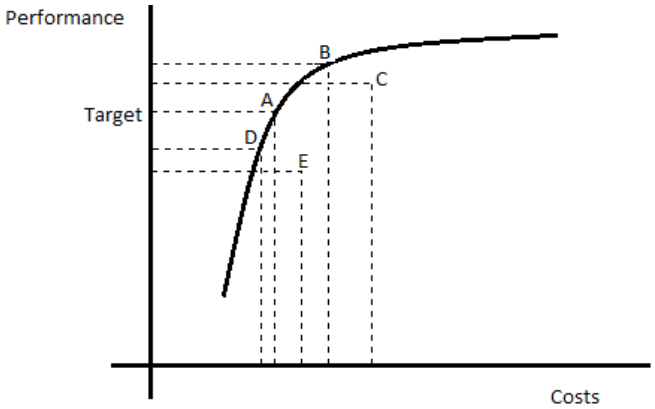

Figure 3: Cost-Performance trade-off

Based on the interviews and the problem statement it is assumed that Cisco's SSCD department finds itself in point C. There are no problems with low performance in any of SSCD's sub departments. Performance is tracked via various KPI's and those are in general on or above target. However, many questions arise within the SSCD department whether the trade-off between performance measures is a good one. From the problems stated in Section 1.2.3 it is observed that this trade-off in fact is missing and Cisco's SSCD department finds itself under the optimal cost-performance line.

Note that in reality more than two dimensions are underlying this trade-off as multiple KPI's are typically in place to manage performance. An alternative way of stating Figure 3 for a situation with multiple KPI's is provided by Sokar et al. (2011)(2011) who address the relationships among the KPI's using the method of Fuzzy Cognitive Maps (FCM's) to compute and analyze the relationships that exist among the KPI's, and (Youngblood & Collins, 2003)(Youngblood & Collins, 2003) who use Multi-Attribute Utility Theory (MAUT) to find trade-offs between multiple performance measures. Authors of both articles however state that critical issues regarding this trade-off between multiple KPI's require further research. For this report however it is assumed that the Cisco's performance can be captured in a single metric, as represented in Figure 3.

1.2.5. Research Outline

A lacking insight in the interplay between departments with respect to performance measurement causes friction between departmental performance measures and many of the symptoms have to do with a trade-off between the performance measures. Therefore, the starting point of this research is to map the implicit performance measurement system to gain an insight in the drivers of the decisions per department.

Second, in a specific area of friction in the performance measurement system, the processes of a subset of departments are analyzed and the decisions instigating these processes are established. The operational activities are mapped and the effects on the performance measures are stated.

The next step is to quantify the impact of the lack of insight in the performance measurement system by conducting an in depth analysis of a relevant subset of decisions, mapping the effects of

those decisions on the performance measures per department, and analyzing alternative ways of decision making.

1.2.6. Scope

The departments On Site Services (OSS), Business Support Group (BSG), and the Territory Mangers (TM), as mentioned in Figure 1, are left out of the analysis of the implicit performance measurement system. These departments do not influence the TPL budget and not much friction between the performance measures of those departments and the TPL department is expected. For this reason, and to keep the analysis comprehensible, the analysis of the implicit performance measurement system takes place on the departments OM, AR, PR, and TPL only.

After indicating the area of friction, a further demarcation is made by zooming in on the operations concerned with sending goods from Cisco to the customer, causing friction between costs and performance. This flow of goods to the customer is the responsibility of the OM department and is concerned with the so called Return Merchandise Authorization (RMA) orders. Although highly relevant for further analysis, the departments AR and PR and the friction between their KPI's and KPI's of other departments fall out of scope by zooming in on this area and a focus is thus laid on the possible friction between the departments OM and TPL. The primary reason for this is that in this area the possibility of data gathering can be assisted to a big extent by the TPL department and secondary the OM department, which is located at the same office as is the TPL department. For the other areas it might not be feasible to conduct further research as data gathering is probably not possible. Next, TPL perceives the scope related to the transportation of RMA orders as one where interesting results might be expected considering the friction between performance measures.

By adopting this scope, the flow of goods to the RFD's and CD's from the main warehouse, under control of the PR department, are omitted. The stock levels at these warehouses are hereby taken as given in this project. This scope thus considers the main warehouse, the RFD's and CD's as one warehouse, as depicted in Figure 2, for which the parameters are fixed. However, when comparing alternative transportation methods entailing transportation from different depots per alternative, the effects of replenishment flows to the RFD's and CD's have to be taken into account as an additional factor. Yet the quantification of this additional factor lies out of scope of this project.

1.2.7. Research Questions

Based on the problem statement several research questions are stated. These research questions will break down the problem in separate challenges and support a clear structure for the rest of the project. The logic of the research outline of Section 1.2.5 is used to construct the research questions and the scope of Section 1.2.6 is applied to these research questions.

The main research question that needs to be answered is the following:

- How can the decision making process at the SSCD department of Cisco be aided, using the (cross departmental) relationships between decisions and KPI's, as to find a better trade-off between costs and performance.

Before this question can be answered, a number of sub questions needs to be answered. The results obtained from these sub questions provide a basis for answering the main research question. The sub questions are divided into two sections: Analysis and Diagnosis (Q1-4) and Plan of Action (Q5-6).

Analysis and Diagnosis:

1. What is the structure of the implicit performance measurement system at the SSCD department?
   1.1. What are the KPI's per department and how are their norms determined?
   1.2. What are the main objectives of the SSCD department?
   1.3. How are 1.1) and 1.2) linked?
2. What major processes are concerned with transport of RMA orders?
   2.1. How are these processes related to KPI's?
   2.2. What is the impact of these processes on the level of these KPI's?
3. What decisions are starting the different processes?
   3.1. Who makes these decisions?
   3.2. How are these decisions related to KPI's?
   3.3. What is the impact of these decisions on the level of these KPI's?
4. What decisions can be marked as most important from a TPL financial perspective?
   4.1. What cash flow is related to these decisions?
   4.2. What is the influence of these decisions on the performance measures?

Plan of Action:

5. How can the alteration of decisions taken at a departmental level, influencing the KPI's of several departments at the same time, be evaluated?
   5.1. Why are the decisions made as they are made
   5.2. What decisions and processes have flexible options and are possible to be altered?
   5.3. What are the outcomes of different options per decision or process?
   5.4. Can decisions be taken in a way that it benefits overall performance?
6. Can the evaluation of the alteration of decisions be applied in the company as to realize improvements?
   6.1. Is an alteration of decision making feasible?
   6.2. What sort of alignment or incentive scheme is needed to realize the alteration of certain decisions or processes?

1.2.8. Research Methodology

To answer the research questions from Section 1.2.7 consecutive steps are taken, related to the different chapters of this paper. These steps are captured in the research methodology depicted in Figure 4. In this figure the primary sources used are stated on top of each step.

The whole of the graduation project is organized according to the regulative cycle (Van Strien, 1986)(Van Strien, 1986) which includes the following phases:

1. Problem definition
2. Analysis and diagnosis
3. Plan of action: design of solution and change plan
4. Intervention: applying the change plan

5. Evaluation

This cycle is completed by the evaluation step which is followed up by step 1. However, in this project only the first three phases are considered and recommendations for implementation are provided. Step 1 of the regulative cycle is covered in Section 1.2. Step 2 of the regulative cycle is covered in the Chapters 2, 3, 4, 5, 6, and 7, and Step 3 is discussed in Chapter 8.

In Chapter 2 a qualitative analysis of the implicit performance measurement system is presented. The chapter is concluded with an identification of friction between departments in the performance measurement system.

Chapter 3 zooms in on a specific area of the friction between the departments and considers the operations concerned with delivering RMA orders to quantify the practical impact of friction in the performance measurement system and the practical impact of the lack of trade-offs.

The decisions instigating these transportation processes and the different options at each of those decisions are analyzed in Chapter 4 and 5 respectively. Chapter 4 indicates the decision making structure and the differences between contracted service levels, requested service levels, and delivered service levels are stated. Chapter 5 proceeds by stating the different options from each decisions and presenting an overview of what decisions are taken how in which situations. The result of the Chapters 3, 4, and 5 is an comprehensible overview of the processes, decisions, and options, concerned with the transport of RMA orders and these three chapters deliver important insights with respect to impact of the transportation of RMA orders on the KPI's as well as insights in the overperformance of RMA orders.

In Chapter 6 the invoices of the different vendors are used to determine which cash flows are associated with which transports of RMA orders. This chapter completes the analysis of the decision making structure denoted in Chapter 4. The end of Chapter 6 subsequently deals with the selection of the relevant options for further analysis on basis of the calculated cash flow per option.

Chapter 7 investigates alternative decision making for the selected subset of options by use of alternative vendor rate cards and identifies potential relevant costs per group of options. In Chapter 8 the plan of action is discussed on three different levels. Finally, Chapter 9 deals with the conclusions of this project as well as the recommendations.

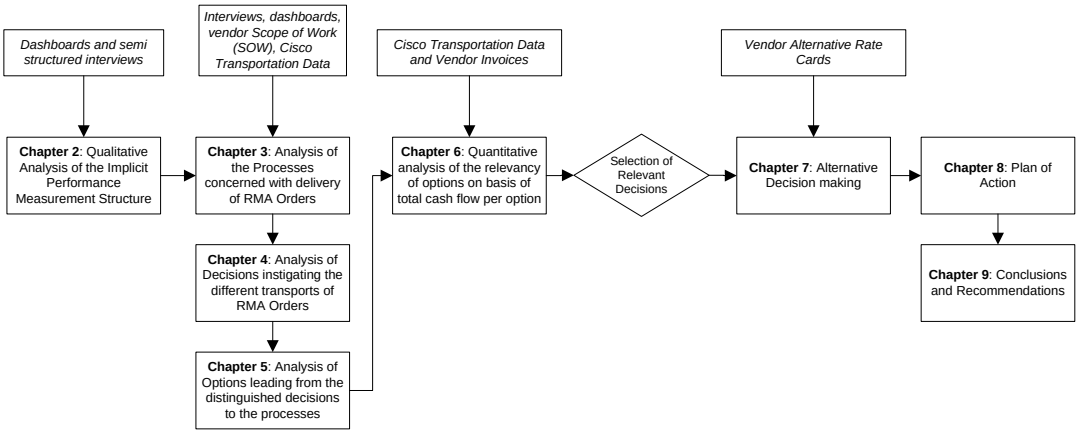

Figure 4: Research methodology

2. SSCD's Implicit Performance Measurement System

In this chapter a qualitative analysis of the implicit performance measurement system of the SSCD department is presented. A literature review by Wolters (2012)(2012) provides an insight in the different ways performance can be measured. A definite part of performance measurement are performance metrics, often indicated as Key Performance Indicators (KPI's). These KPI's indicate the gap between plan and execution and offer opportunities to identify and correct potential problems (Chae, 2009). When an organization has multiple objectives, these KPI's are bound to conflict. If the objectives do not conflict, they could be consolidated into a single objective (Keeney & McDaniels, 1992).

The original construction of the performance measurement system at the SSCD department is build upon the basics of a measurement system called the Balanced Score Card (BSC), introduced by Kaplan & Norton (1996)(1996). However, the current SSCD performance measurement system has only limited resemblance with the Balanced Score Card. The Balanced Score Card involves four perspectives: financial, customers, internal business processes, and innovation, learning and growth, which in comparable wording are in place in the SSCD measurement system as well. The concept of the balanced scorecard enables organizations to achieve an integrated and aligned balanced focus between these four perspectives, which collectively underpin the achievement of the organization's vision (Chavan, 2009)(Chavan, 2009). The Balanced Scorecard is regarded the least criticized and most widely accepted performance measurement system (Paranjape et al., 2006).

In a review of the balanced scorecard, Soderberg et al.(2011)(2011) state that for a performance measurement system to be called a balanced scorecard and to perform as wanted five characteristics have to be present:

- The measures must be derived from strategy
- There must exist balance among the measures (the four perspectives should receive equal consideration)
- The performance measures have to be causally linked (linkages between the different measures within each performance dimension as well as across the four performance dimensions should exist)
- Double-loop learning should be in place (the process of questioning the assumptions underlying the organization's strategy)
- Tie-in to compensation must be implemented (increasing employees' awareness of the activities they need to execute in order to implement the organization's strategy).

Those five characteristics are needed to reach a structural complete BSC. Primarily the second and the third characteristic will appear important for this report as the lack of those characteristics has direct effects on an operational level.

To evaluate and understand the interplay between the KPI's of the SSCD departments and the overarching SSCD department itself, links between performance measures are established. With this, the focus per department on certain KPI's is made visible, gaps in the measurement system between the SSCD department and the sub departments are recognized and with this, possible friction in the performance measurement system can be identified.

The departmental frameworks are linked to the overarching SSCD objectives when they measure the same performance construct. Departmental KPI's are thus linked to SSCD objectives when the KPI's are drawn on by the SSCD objectives. Here, links stating whether the measures at a departmental level measure the same things or part of the same things as the SSCD measures are examined. For concrete measures such as percentage of correctly delivered goods this link can be made fairly straightforward. For more subjective measures, it is analyzed whether the same or a part of the same construct is measured. A construct is an idea which is formed in order to summarize observations about things that are not directly observable (Hair et al, 2010). An example of such a construct is customer satisfaction. Most of the links that are made in the following section are objective as it can be indicated straightforward that the same performance or part of the same performance is measured. As care has to be taken to relate subjective measures to each other, it will be indicated in the following sections when subjective measures are linked.

Note that a change in the level of a KPI that is directly linked to an SSCD objective will affect the level of that SSCD objective. However, a change in the level of a departmental KPI that influences the level of an SSCD objective does not necessarily mean that they are linked. The goal is to discover the way measurement is done and whether and how the SSCD objectives are represented on a lower level.

Furthermore, note that by taking the TPL budget as a scope, the conclusions in this report with regard to the implicit performance measurement system are applicable to this scope, including the departments AR, OM, PR, and TPL. The TPL budget is a big part of the total SSCD budget but care has to be taken when applying the conclusions to the whole SSCD department.

This chapter starts in Section 2.1 with an introduction of how performance is measured in the SSCD department. Subsequently, the performance measures per department are analyzed based on semi-structured interviews and performance sheets called dashboards. All departmental measures and the SSCD objectives are captured in separate frameworks which group performance measures and allow for a comprehensible overview. All KPI's and objectives are numbered such that the department and group the KPI belongs to are clear. TPL3.1 for example denotes the first KPI of the third group of KPI's of the TPL department. These frameworks are presented in the Sections 2.2 to 2.6. The links between performance measures, as described above, are established in Section 2.7. The sections 2.8 and 2.9 subsequently discuss the gaps and friction in the current performance measurement system. This chapter is concluded in Section 2.10.

By following these steps the research questions 1.1, 1.2, and 1.3 are answered. The methodology for this chapter is summarized in Figure 5.

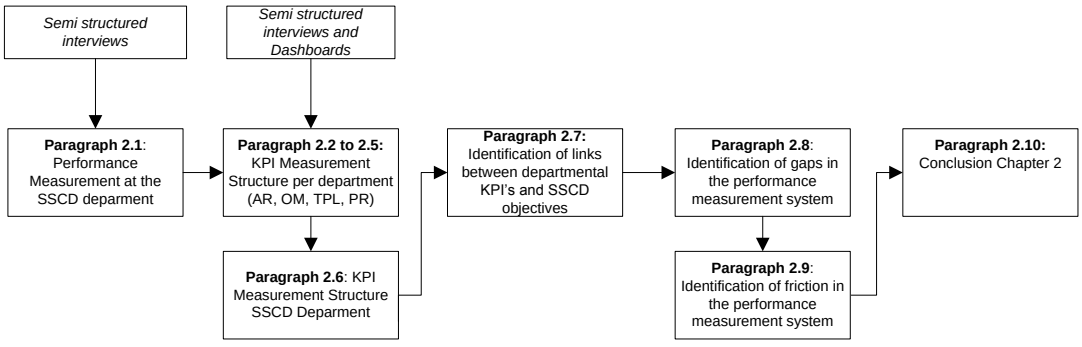

Figure 5: Methodology Chapter 2

2.1. Performance Measurement

Although the performance measurement system originally is intended to be derived from the overall strategy, no encompassing measurement system exists within the SSCD department, including this strategy. The departments know about the existence of an adopted strategy of the overarching SSCD department but no clear link with the departmental KPI's is in place.

The several sub departments primarily make use of so called dashboards to keep track of their performance and do not relate their performance measurements to each other on a structural basis. These dashboards are periodically updated spreadsheets. The data for these dashboards is delivered by multiple persons within the department, each responsible for different parts of the measurements. Per department the sheets differ in form but in the end they state the result of a KPI and with that it is indicated how this result is related to the target. The targets per department are set by a so called Business Owner, which is a person from that department. Mostly the results are color coded; red indicates a score below target and green indicates a score above target. In this way, a quick overview is generated which indicates areas to take action in when too much 'red results' appear in the sheets. The dashboards are primarily used for corrective actions. What exactly is to be measured in the sheets is not always clear; what measures to include or the level of aggregation of certain measures is open for discussion. Alterations are done over time and there is not one person assigned for making these alterations. Alterations always have to be agreed upon by the management of the department. The targets stated in the dashboards are reviewed yearly. When the targets are consistently met it is considered to increase the target. When consistent underperformance of a target occurs the influences on the KPI are considered and corrective actions are taken after approval by the management of the department.

In addition to the dashboards there exists a financial measure per department. Every department has its own budget. The department TPL however does not have full control over its own budget as activities represented in this budget are ordered by the departments OM, AR, and PR.

Cross-departmental discussions about KPI's only exist in so called SSCD management meetings. Here, trade-offs between performance measures can be discussed but the meetings are not explicitly used for discussing the relationship of performance measures between the SSCD departments.

When considering which KPI's to include in this analysis and which KPI's to exclude, it is decided to include the KPI's that are reported in the departmental dashboards. Those dashboards are the leading performance measurement system per department. Next, the budget KPI's per department are taken into account due to their potential important role in trade-offs between KPI's.

Neely et al. (1997)(1997) construct a framework from an extensive literature review stating what constitutes good performance measures. With respect to reporting the framework states the measure should have a clear title, provide information, be clearly defined, be reported in a simple consistent format, and the measure should relate to targets. Taking these notes into account, from here, a name, description, and target is stated when discussing departmental KPI's. When a target for a certain KPI is not defined N/A (Not Applicable) is stated.

2.2. KPI's Asset Recovery

The responsibility of the Asset Recovery department is to make sure Cisco´s defective products are returned to Cisco. Their main concern is keeping the ´value outstanding´ at the customer at a low

level. The value outstanding consists of all defective products that are in possession of the customer and have to be returned to Cisco. This value outstanding is calculated using the selling price of the products as the customers have to pay this amount to Cisco when not returning a product.

The performance measurement system of the Asset Recovery Department is grouped in five different parts: Return of Products, Transport of DGI, Receipt of Goods, Performance Assessment, and Budget. The first four groups are established from the performance measures stated in the AR dashboard and the fifth group consists of the budget KPI. In Appendix C the AR KPI Measurement Structure is depicted. The five groups are briefly discussed in the following five sections. For a detailed overview of all KPI's of the AR department the reader is referred to Appendix D.

2.2.1. Return of Products

The return of defective products is the main task of the AR department and the level of performance of the department is captured in two metrics measuring the value of products outstanding over a [redacted] day period and measuring the total value recovery rate respectively.

2.2.2. Transport of Defective Good Inventory

The transport of return products between the Country Depots and the main warehouse is managed by the Asset Recovery department. The AR department has its own budget for this flow. However, no clear KPI's are stated for this section within the dashboard.

2.2.3. Receipt of Goods

The receipt of goods is one of the responsibilities of the Asset Recovery department. The operations are outsourced to Vendor A (VA) in the main warehouse [redacted]. There are three performance metrics identified of which two are dealing with the clean receipt rate of defective goods inventory and one is dealing with the amount of resolved cases of discrepant returns.

2.2.4. AR Budget

Each quarter a budget is made for the AR department for the upcoming quarter. There is one financial KPI in place regarding the realization of the AR budget. This KPI entails that the realization of the AR budget cannot deviate from the planned budget during each quarter by more than -2% and +1%. The AR budget consists of three parts; first the transport by Vendor C (VC) is in the AR budget. Second the operating costs of the customer service centre Partner A is added in here. Third, the costs for DGI receiving and entitlement checks by Vendor A in the main warehouse are stated here. The AR budget approximates [redacted] euro.

2.3. KPI's Order Management

The Order Management (OM) department is responsible for delivering products to the customer and is a so called customer facing department. They are responsible towards the customer for the hardware replacements. The OM department outsources most of its operations to the Logistics Service Centre (LSC) and the business they conduct on a daily basis is primarily incident management, backorder management, and various kinds of support for the customer. The LSC provides all the metrics that are stated below to the OM department.

The KPI's of the Order Management department are derived from their dashboard and are arranged in five groups plus a separate group for the budget. The six groups are named: Auto Dispatch, Dispatch, EMEAR Backlog, Escalations, CSAT, and Budget. In Appendix C the OM KPI Measurement

Structure is depicted. The six groups are briefly discussed in the following six sections. For a detailed overview of all KPI's of the OM department the reader is referred to Appendix D.

2.3.1. Auto Dispatch

The auto dispatch measures indicate the percentage orders that are dispatched without any involvement of the LSC or the OM department. When an order is not automatically dispatched it is dispatched manually. After dispatching, the order is the responsibility of the TPL department. Two measures are in place for this group.

2.3.2. Dispatch

There are six dispatch measures. The dispatch measures stated under this header have to do with the performance of dispatching orders that are not auto dispatched. A normal dispatch indicates the order reached an 'on hold' status which causes the order to be stopped processing. This can be due to a variety of reasons. For example a request of a customer that is not entitled to a certain service but requests it nonetheless will cause an order to be put on hold.

2.3.3. Backlog

Three backlog measures are in place. The backlog measures relate to the amount of order lines that are open and states products that still have to be delivered to the customer. Order lines can contain multiple orders but are considered aggregated in these measures. A distinction is made between the total amount of open order lines and a net amount of open order lines. In the latter, the amount of backlogs due to uncontrollable events is detracted from the total amount of backlogs. The OM department decides whether a backlog is due to an uncontrollable event.

2.3.4. Escalations

There are four measures in place controlling the performance for dealing with escalations. An escalation occurs when the customer has a complaint about an order or when an order is put on hold for too long. An escalation is received by the LSC via telephone or email.

There are three teams dealing with those escalations: the LSC Escalation team [redacted] which works during normal working hours at the LSC, the Europe LSC team [redacted], and the Emerging LSC team [redacted] who work during normal working hours and according a follow the sun principle. These escalation teams have Cisco Duty Managers included who work on the more complex escalations.

2.3.5. CSAT

The CSAT scores relate to customer satisfaction. The order management department sends so called Bingo surveys to customers via e-mail where the customer satisfaction can be rated. Two separate CSAT measures are established: Customer satisfaction with overall service delivery in the EMEAR region and customer satisfaction with the OM department.

2.3.6. OM Budget

Each quarter a budget is made for the OM department for the upcoming quarter. There is one financial KPI in place regarding the realization of the OM budget. This KPI entails that the realization of the OM budget cannot deviate from the planned budget during each quarter by more than -2% and +1%. The OM budget is approximately [redacted] euro and primarily consists of personnel costs and the management fee for Partner A. Costs are stable over time.

2.4. KPI's Planning and Repair

The responsibility of the Planning and Repair department is to make sure the stock levels remain at an optimum level to not only achieve customer Service Level Agreements (SLA's) but also to minimize the new buy impact on the budget. Hereto planning has multiple processes going on and several parameters in place for monitoring the performance of the department.

The planning and repair section entails six groups of KPI's. The first five groups come forth from separate scorecards, owned by a separate functional team. Each group of KPI's consists of several objective measures and one subjective measure called Customer Satisfaction. The six groups are named New Product Introduction, Technical Operations, Quality, Planning, Business Management, and Budget. In Appendix C the PR KPI Measurement Structure is depicted. The six groups are briefly discussed in the following six sections. For a detailed overview of all KPI's of the PR department the reader is referred to Appendix D.

2.4.1. New product Introduction

The KPI's in this group are representing the performance of the end to end new product introduction supplier performance. The measures in this section ensure the timely adaption and support to new products as repairing products is cheaper than buying new products. Furthermore, they keep track of the maximum period to fully support new products in the repair cycle.

2.4.2. Technical Operations

The KPI's in this group are representing the technical operations going on in the repair process. The measures in this section deal with the yield on Defective Goods Inventory. When the yield is high, more products are repaired and thus the impact on new buy expense is reduced. Furthermore, a measure is in place of how quickly the supplier can realize an Engineering Change Order (ECO). An ECO is a message to the repair site to upgrade a part to the latest revision.

2.4.3. Quality

The quality KPI's deal with the quality of products as well as the quality of data recorded. The percentage finished inventory that turns out to be good when delivered to the customer minus the amount of defective goods that are discovered when a so called Out of Box check is done, is measured. When defects in these Out of Box checks are found, the whole series of the same repaired product is checked. The other measures in this section deal with the quality of the data stored and the early returns of products to the factory.

2.4.4. Planning

The five KPI's in this group deal with the planning of repair orders. The timeliness of delivery of orders and the performance of the execution of orders that are agreed upon to execute is measured.

2.4.5. Business management

This group deals with inventory management and re-quotes for products. The measures states the accuracy of the inventory when a cycle count is held, and make sure the Work In Progress (WIP) is not aging too long as inventory located in WIP is lost money for Cisco as it's not being put to work as FGI. This last measure prevents repair centers to use (more expensive) new parts or products and makes sure the flow trough of products is swift. Furthermore, a measure is in place tracking the timely re-quote the repair costs at the repair centers per Product ID (PID).

2.4.6. PR Budget

Each quarter a budget is made for the PR department for the upcoming quarter. There is one financial KPI in place regarding the realization of the PR budget.

This KPI entails that the realization of the PR budget cannot deviate from the planned budget during each quarter by more than [redacted]. The total budget of the PR department is a global budget, concerned with all operations regarding the repair and transport from and to repair sites. The budget of the PR department is not available for this research and lies out of scope.

2.5. KPI's Third Party Logistics

The responsibility of TPL is managing the vendors to drive to customer satisfaction while being responsible for the total budget used for these activities. The services that the vendors deliver are ordered by the operational departments OM, AR and PR. The KPI's of the TPL department can roughly be divided in five groups of which the first four are assembled from the TPL dashboard. The groups are named On Time Shipment (OTS), On Time Delivery (OTD), Lead Time Performance FGI, Lead Time Performance DGI, and Budget. The TPL KPI Measurement structure is depicted in Appendix C.

The five groups are briefly discussed in the following five sections. For a detailed overview of all KPI's of the TPL department the reader is referred to Appendix D.

2.5.1. On Time Ship

The two KPI's in this section show the on time shipment of goods from the main warehouse. This metric contains shipments for RMA's and shipments for allocations at other warehouses. The main warehouse is operated by Vendor A. On time shipment influences on time delivery directly.

2.5.2. On Time Delivery

The measures in this section consider the on time delivery of goods to the customer. A division is made in premium service (2H and 4H delivery), NBD service, and Scheduled service. Within NBD service another division exists between on time NBD delivery from the main warehouse and on time delivery NBD from the RFD's and CD's. The TPL department ensures that the targets for this metric are met by managing the vendors. The most important vendors that are used are the fourth party logistics (4PL) service provider Vendor A, and the third party logistics (3PL) service providers Vendor B, Vendor C, Vendor D, and Vendor E. Of those, Vendor A and Vendor B account for the largest part of the volume and costs (>[redacted]).

2.5.3. Lead Time Performance Finished Goods Inventory

This measure states the percentage of deliveries of which the time 'Aged In Transit' (AIT) is smaller than the stated Lead time of Finished Goods Inventory (LT FGI. This measure compares the lead time in C3 to the real performance. This target measures the end to end lead time of orders, taking into account order acceptance, transport to the customer, and all steps in between. The target is [redacted]% meaning that the target is to deliver [redacted]% of the orders with a delivery time shorter than the delivery time stated in C3.

2.5.4. Lead Time Performance Defective Goods Inventory

Similar like the previous measure, this measure states the percentage of deliveries of which the time 'Aged In Transit' (AIT) is smaller than the stated Lead time of Defective Goods Inventory (LT DGI).

This target measures the end to end lead time of order and regards the defective goods sent from the customer to the warehouse. The target is [redacted]% for this measure as well.

2.5.5. Budget TPL

As with the other departments, the department TPL is responsible for their own budget. This budget entails the money spend on the vendors for warehousing, freight services and customs and duties. As well as the first two, the latter one is paid to the vendor as he takes care of any customs and duties incurred during transport. In contrast to the other departments, the lion share of the realization of the budget is done by other departments than the TPL department itself. The departments OM, AR, and PR order the services at the vendors and the vendors in turn sent invoices to the TPL department who has to manage the costs of the vendors. The departments OM, AR, and PR thus determine for a large part the realization of the budget.

The main KPI related to the budget entails that the realization of the SSCD budget cannot deviate from the planned budget during the year by more than [redacted]. TPL has to keep track of the expenses to be able to influence this measure. The TPL budget is approximately [redacted] euro.

2.6. SSCD Objectives

In the above four sections the KPI's of the four different SSCD departments are discussed. In this section the overarching SSCD department and the associated objectives are analyzed. The SSCD department has four main groups of objectives: Customer objectives, Financial objectives, Operational Excellence objectives, and People/Organizational objectives. The SSCD Performance Measurement Structure is depicted in Appendix C. The four groups are briefly discussed in the following four sections. For a detailed overview of all SSCD objectives the reader is referred to Appendix E.

2.6.1. Customer Objectives

The group Customer objectives deals with four different KPI's. The first two KPI's are measured by a survey which is randomly distributed to Cisco's customers by a consulting firm called Partner B. The customers rate their Overall Satisfaction with Service and Service Parts Delivery Satisfaction on a scale from 1 to 5. The other two measures state that a minimum of two annual conference speaking engagements and two executive sponsorship for EMEAR Accounts should be employed.

2.6.2. Financial Objectives

The financial objectives consist of three different KPI's. The first measures state that the realization of the SSCD budget cannot be exceeded by more than [redacted] of the total budget. The second measure states that the Expense to Revenue ratio must be at least [redacted]%. Interesting to note is that the revenue side for the biggest part lies out of control of the SSCD department and the expenses are the responsibility of the TPL department. The first two measures thus measure practically the same construct. The last measure states a reduction in the annual budget of € [redacted]. The savings have to be determined in advance and will be deducted from the budget before the first measure is calculated and evaluated.

2.6.3. Operational Excellence Objectives

The operational excellence objectives state the performance of the core business of the SSCD department. There are two different measures for service delivery performance and one measure for the return of defective goods inventory (DGI). The first measure entails the Service Delivery

Performance (SDP) for 2H, 4H, and Scheduled delivery, and the second measure deals with the standard delivery levels Same Day Shipment (SDS), Next Business Day (NBD), Return to factory (RTF), 8th Business day, and 10th Business Day. The third measure is the achievement of an annual Total Value Recovery Rate (TVRR) within [redacted] days. The first two measures are firstly the responsibility of the TPL department combined with the efforts of other departments whereas the latter measure is solely the responsibility of the AR department.

2.6.4. People/Organizational Objectives

The People/Organizational objectives group consists of four typically more subjective than operational measures and are mostly not influencing or influenced by other measures. The people/organizational measures are all relatively straightforward and include foremost subjective measures. There are no clear links with other measures and this group of measures is a standalone group in the implicit SSCD KPI measurement system.

2.7. Links between KPI's and SSCD Objectives

The links between the measures of different departments and the SSCD objectives are denoted in this section. Departmental KPI's are linked to SSCD objectives when the measures at a departmental level measure the same construct or part of the same construct as the SSCD measures. The links are denoted per SSCD objective group.

2.7.1. SSCD Objective: Customers

Within this group the third and the fourth KPI; conference speaking and sponsorship respectively, are directly marked as standalone objectives and are not directly linked with departmental KPI's. The first and the second KPI however; customer satisfaction with overall service customer satisfaction with spare parts delivery service respectively, can be linked to a set of lower level KPI's. This relation is found in the two KPI's of the OM department which entail measures for performance with respect to the service performance perception of the customer.

These two measures state the overall customer satisfaction of the customer with Cisco and the customer satisfaction specific related to the OM department respectively. The measures are distinguished as measures related to a higher level SSCD objective as they measure the same construct; customer satisfaction with Cisco's service. In Appendix F these relations are stated; the boxes colored light-grey represent the relation of the departmental KPI's and the SSCD KPI's.

2.7.2. SSCD Objective: Financial

The first KPI of the financial SSCD objective, quarterly commit, states that the realization of the budget has to be within [redacted] of the original budget. There is one KPI per department related to this SSCD KPI and this KPI is defined similar to this KPI at each department. Every department thus has one KPI stating that their budget has to be within [redacted] of the original departmental budget.

KPI's related to the budget do not appear in the dashboards of the departments. As for the three departments OM, AR, and PR it holds that their budget is steady no much attention is given to this measure. For the TPL department however the budget is not stable.

The second KPI of the financial SSCD objective is "meet the annual E:R target". The revenue side for the biggest part lies out of control of the SSCD department. The expenses however are primarily

made within the SSCD department and, as the realization of the budgets of the OM, AR, and PR department are steady, the expenses are via the budget KPI of the TPL department for the biggest part the responsibility of the TPL department. The same relations are drawn for this objective as were drawn for the first financial SSCD objective. In Appendix G the boxes colored light-grey represent the relation of the departmental KPI and both the SSCD KPI's.

2.7.3. SSCD Objective: Operational Excellence

The first two KPI's of this SSCD objective measure Service Delivery Performance (SDP) of premium service delivery and standard service delivery respectively and are influenced by a multitude of factors and several departments. The successful and timely delivery of parts to the customer depends on multiple factors. It depends on whether the order is accepted timely, whether the order is dispatched timely, and whether the order is delivered in time. This structure comes forward in the several departmental KPI's which all measure a part of these SSCD KPI's.

There are seven KPI's of the TPL department, 11 KPI's of the OM department, and 4 KPI's of the PR department distinguished that directly influence the performance of the two operational excellence KPI's. As indicated above, almost all of these measures have to do with making sure the orders are dispatched, shipped, and delivered on time.

Considering the third KPI for this SSCD objective; achieve annual Total Value Recovery Rate for parts received within [redacted] days, this KPI is exactly the same KPI as AR1.2 and therefore straightforwardly are linked together.

In Appendix H the boxes colored light-grey represent the relation of the departmental KPI's with the first two SSCD KPI's and the boxes colored dark-grey represent the relation of the departmental KPI's with the latter SSCD KPI.

2.7.4. SSCD Objective: People-Organizational

The People/Organizational measures are standalone measures without direct links with departmental measures. These measures are not represented or build upon any measures at a departmental level.

2.8. Gaps in the Performance Measurement System

Gaps in the performance measurement system are identified as the KPI's that are not represented in any link as mentioned in Section 2.7. In Appendix I all department KPI's represented in SSCD objectives as well as the SSCD KPI's which represent departmental KPI's are colored light grey, representing an established link.

Several SSCD KPI's are identified as standalone objectives; Conference speaking, Sponsorship, Cost Reduction Target, and all four People/Organizational SSCD KPI's.

The amount of KPI's reflected in the SSCDD objectives per department:

TPL: 9/9 OM: 14/18 AR: 2/6 PR: 5/23

All KPI's of the TPL department and most of the KPI's of the OM department are reflected in the SSCD objectives. The AR department and the PR department however have a limited amount of established links.

2.9. Friction in the Performance Measurement System

Friction is identified firstly when it comes to the financial performance measurement. Every department has its financial measures but for the departments OM, AR, and PR it holds that these budgets are fairly straightforward with not many changes over time. The TPL budget however is the biggest of all SSCD budgets in scope and is realized by all four departments. The TPL department thus has within this scope an almost exclusive responsibility for the SSCD budget and is, within this scope, the only department keeping track of the realization of the budget.

More friction is analyzed when considering the focus per department. The focus of the OM department is related to the customer and delivery performance, the focus of the AR department is return of products, the focus of the TPL department is delivery performance and budget, and the focus of the PR department is primarily out of scope. Because there are no relations found between performance measures between departments, this exclusive focus causes friction between the departments.

Next, it follows that a cause of friction is that the PR department has a weak link with the SSCD objectives. Their priorities lie primarily with the repair and stocking processes and those priorities are not represented in the SSCD objectives. Due to the responsibilities of the PR department to, among other things, what to repair, and what stock levels are used, the influence of the PR department on the overall business is very present, although not directly represented in the implicit performance measurement system. This influence causes friction as it is not always clear what and why the PR department executes. The weak link is not unexpected as the SSCD department considered here operates in the EMEAR region and the PR department has a global focus.

Overall, regarding the necessary balance among the measures and the required linkages between the performance measures within each dimension as well as across the four performance dimensions, it is found that there is no balance between the four performance dimensions as the financial perspective is neglected. Furthermore, linkages between the departmental KPI's are not found, as are the linkages between the dimensions. Final, the adopted strategy of the SSCD department is not found to be translated into the KPI's.

2.10. Conclusion

From the above analysis several conclusions are drawn. The first conclusion is that the way of performance measurement is not proficient. Reporting is done via different excel sheets which are updated by hand. The form and way of reporting in dashboards is not standardized and not all KPI's are included in the dashboards. The dashboards fail to provide an encompassing overview of the whole SSCD department. The lack of overview of the performance of the whole SSCD department is strengthened as no departmental KPI's are found to relate to each other.

Second, the financial aspect of the performance measurement system is underrepresented to a big extent. The departments OM, AR, and PR do not have insights in the expenses and the TPL department cannot act pro-actively as they are confronted with expenses afterwards. The responsibility of TPL for a budget that is realized by all departments together is a problem in the current measurement system. No financial incentives are in place in the departments OM, PR, and AR. A risk exists that too less attention is paid to the budget of the SSCD department by these departments.

Third, the exclusive focus of each department on a separate section of the performance measurement system likely contributes to the fact that departments barely relate their performance to other departments. In Figure 6 this departmental focus is denoted.

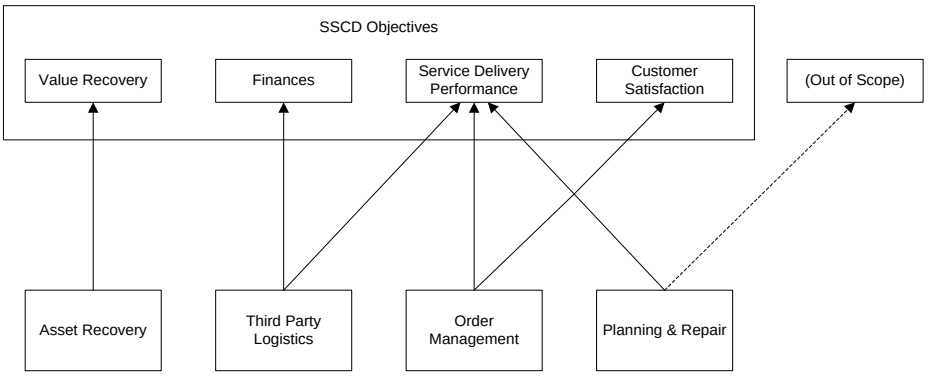

Figure 6: KPI Focus per department

Note that Figure 6 indicates the main focus of each department on one or two sections. This does however not mean the departments neglect all performance outside their scope. This focus can cause friction between the different departments and has as important implication that trade-offs between departments are not made.

Considering the five characteristics stated in Section 2, it appears that the performance measurement system is build upon an overarching strategy. However, this strategy is fairly unknown at a departmental level and thus the first characteristic deserves more attention with respect to communication. The second and third characteristic; there must exist balance among the measures and the performance measures have to be causally linked are not met as the three conclusions stated previously in this section state. The absence of the second and third characteristic is regarded as significant influence on the forming of the departmental silos and the lack of trade-offs taking place in the SSCD department.

Although not strictly regulated, the fourth characteristic seems to be present as reconsiderations and challenging of the KPI's and their targets are done by the departments. The dashboards are, after discussion with the departmental management, adapted from time to time. Characteristic five is partly in place as incentives exist for employees to reach certain targets. However, as the overall strategy is not clearly communicated, employees are not always able to see why it is important to reach a certain target.

3. Processes

In this chapter the specific area of friction between the OM department and the TPL department, concerned with the flow of goods to the customer, is selected. This is in congruence with the scope stated in Section 1.2.6. By adopting this scope we specifically analyze the trade-off between Customer Satisfaction and Finances, taking place between the OM department and the TPL department, as described in Figure 6. By zooming in on an operational level, the practical impact of friction in the performance measurement system and the practical lack of trade-off are quantified.

This chapter starts in Section 3.1 with an analysis of RMA order processing by stating the high level course of actions of the processing of an RMA order and identifying all parties involved. Business Process Modeling Notation (BPMN) is used as BPMN allows for a readily understandable overview of business processes. Furthermore, BPMN is emerging as a standard language for capturing business processes (zur Muehlen & Recker, 2008)(zur Muehlen & Recker, 2008). Swimming lanes are included as they provide a comprehensible view on the parties involved and denote the responsibilities per sub process. The activities concerned with RMA order processing are drawn from semi structured interviews.

By considering the RMA order processing, which deals with the flow of goods from the warehouse to the customer, the flow of goods between warehouses is left out of scope. For all deliveries from the RFD's and the CD's to the customer however, it holds that products have to be transported to those warehouses in the past and subsequently are stocked there until a customer demand appears. Yet the flow of goods between the main warehouse and the RFD's and CD's is under the control of the PR department and, in congruence with the scope set in 1.2.6, left out of the analysis. Chapter 6 discusses the impact of these omitted transportation flows. As stated in the description of Figure 2, the warehouses are aggregated in one warehouse and no differentiation is made between deliveries from the main warehouse and RFD's and CD's.

After identifying and denoting the course of actions of the processing of an RMA order, the chapter is followed up by an analysis of the different transportation methods used for RMA orders in Section 3.2. For this step, the interviews, the Scope of Work of the vendors, and the invoices of the vendors are used. From the interviews a basic understanding of the transportation methods is derived whereas the Scope of Work of all vendors explicitly state all service levels possibly delivered to the customers by the vendor. The invoices of the vendors, stating the service level ultimately delivered per order, are in the end used to verify and report which service levels are used by the vendors for the delivery of RMA orders. In Section 3.3 the defined processes are linked to the KPI's stated in Chapter 2 and the impact of the processes on these KPI's is stated. For each of the KPI's of the OM and the TPL department, defined in Section 2.3 and 2.5, a check is done whether they are impacted by the transportation of an RMA order. The role of the departmental KPI's with respect to RMA order processing is hereby identified in this section. This chapter ends with a conclusion in Section 3.4. By following these steps the research questions 2.1 and 2.2 are answered. The methodology for this chapter is summarized in Figure 7.

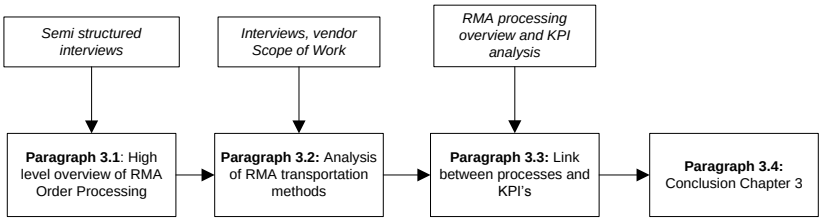

Figure 7: Research Methodology Chapter 3

3.1. RMA Order Processing

RMA stands for Return Material Authorization (RMA) and means a delivery order to deliver a service part from a storage facility to the customer within certain delivery parameters. The storage facility can be the main warehouse, a Rapid Fulfillment Depot (RFD), or a Country Depot (CD). From here we regard the RFD's and CD's as one. The transportation of RMA orders falls under the responsibility of the OM department. However, the execution of the transport of the RMA orders is the responsibility of the TPL department.

The delivery of RMA orders is started when a customer opens a case to receive a spare part. This can be done in three ways: direct, in a so called online SVO tool, or indirect via the TAC service centre or via an onsite engineer. With this action, an RMA order is created, triggering the order of a spare product for the customer. In all three ways the order will enter the online SVO tool.

The order is received by the Logistics Service Centre (LSC) of Partner A. Here the Front End Entitlement (FEE) is checked using the serial number that the customer provides. When there is a mismatch the RMA is put on hold. Here, Partner A can make a decision to ignore the result of the entitlement check or to contact the OM department. A Duty Manager of the OM department is the only one who decides to upgrade the contract. An upgrade of the contract means that more service is delivered than contractually agreed.

From the SVO tool the order is sent to the Cisco Oracle system (C3). From here, orders are passed on to different vendors. There are five main vendors that are included in the analysis. The order can be sent for transport to either one of the Third Party Logistic (3PL) service providers Vendor B, Vendor C, Vendor D, or Vendor E, or it can be sent to the Fourth Party Logistic (4PL) service provider Vendor A which uses 3PL service providers itself. In the last case the order is received by the Logistics Control Tower (LCC) which is operated by Vendor A. The LCC orders services at the 3PL service providers, which are now called carriers. Part of the vendor management is thus outsourced to vendor A. Figure 8 gives a graphical overview of the vendors and carriers used.

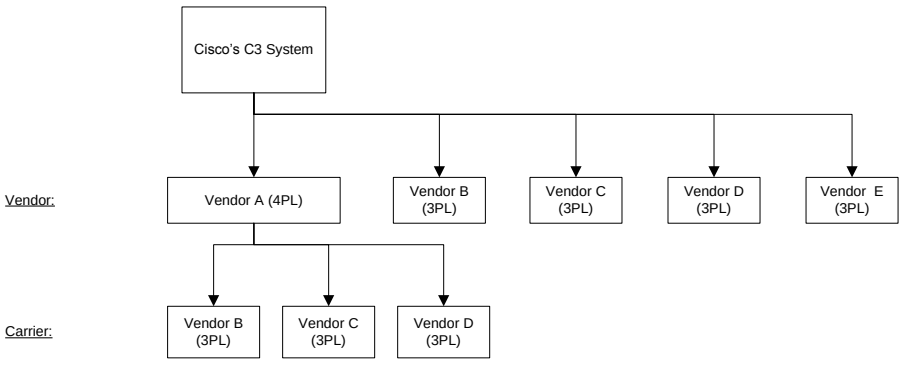

Figure 8: Vendor and Carrier Overview

In case the order is sent to the 4PL, Vendor A orders services for shipment at their carriers and creates the shipments. Consequently a load plan is generated and delivery orders are made at the carriers. The carriers used can be Vendor B, Vendor C, and Vendor D. After receipt of the load plan by the warehouse and the carrier the warehouse picks the orders for the carriers and the carriers deliver the product to the customer. When the order is sent to a 3PL vendor the intermediate steps that are done for the 4PL obviously are omitted and they transport the order themselves from their own warehouse directly.

This high level process of dealing with RMA orders is represented graphically in Figure 9.

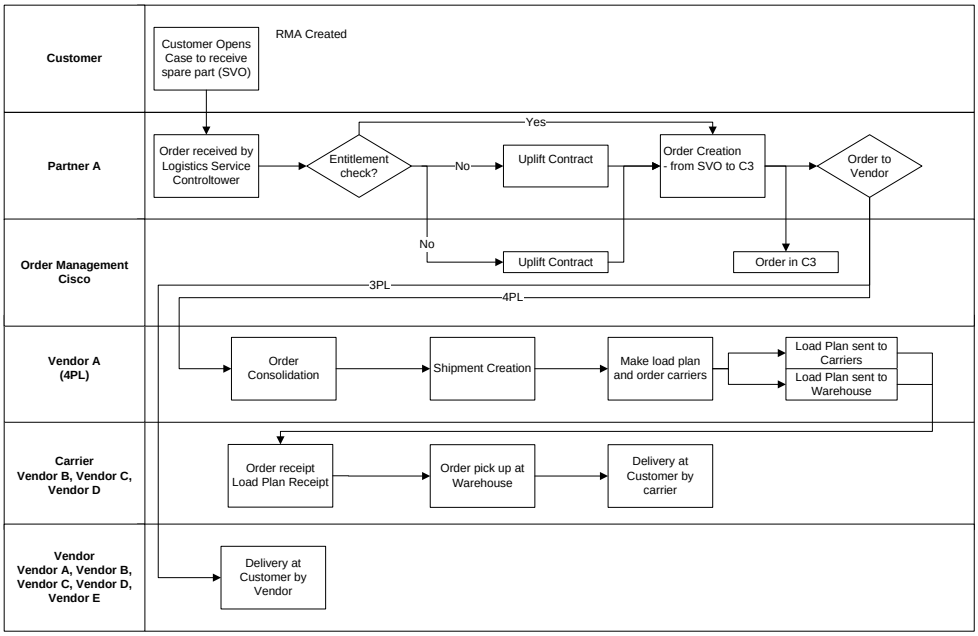

Figure 9: RMA Order Processing

The high level process stated in Figure 9 is a generic process and is executed for all RMA orders.

3.2. Transportation Processes

Transportation to the customer can be done with a number of different service levels. These service levels are distinguished by first analyzing the so called Scope of Work (SOW) of the different vendors. The Scope of Work is a part of the Vendor Service Agreement (VSA) and states the agreements between Cisco and its vendors on an operational level. Next to the SOW's the invoices of the vendors are used to determine which service levels are effectively delivered to customers. The delivered service levels are stated in Table 4.

Table 4: Delivered Service Levels

Premium Service Delivery		***Standard Service Delivery***	
2H	2 Hour service delivery	**NBD**	Next Business Day Delivery
4H	4 Hour service delivery		
Scheduled	Scheduled delivery		
NFO	Next Flight Out Delivery		

Premium service delivery is concerned with handling fast deliveries:

- The 2 Hour and 4 Hour delivery entails a delivery of the product within 2 or 4 hours after receiving the order. When the product is delivered one minute after the 2 or 4 hour limit, the delivery is marked as a delivery failure. The 2 or 4 Hour service time stamps for start and end are upon order initiation and upon delivery and receipt of shipment by the customer at the delivery location respectively. The end time stamp called the Proof of Delivery (POD) and is signed by the customer when receiving the order.
- Scheduled delivery entails delivering the product on an agreed time and will deal with any service request for delivery within a specified time frame that is shorter than that defined for NBD Service but greater than that defined for 2 hour or 4 hour service. Here, the product can be delivered 30 minutes before or 15 minutes after the agreed time.
- Next Flight Out delivery means that the order has to be sent with the first transport available. This service means any service request for delivery to be shipped on the first/next available commercial flight or by means of direct drive from the Storage Facility with door-to-door delivery to the delivery location, as defined by Cisco. This service is provided by the vendor on a 24 x 7 x 365 days per year basis.

Standard delivery is concerned with handling the less urgent deliveries:

- Next Business Day delivery entails delivery at the next business day. This holds for order placed before 17.30. If a service order is received after this cut off time, delivery is done during the Business Hours of the next business day, up to the 2nd business day.

The transport from the warehouse to the customer is carried out by the carrier who has control over the depot from where the part is shipped. The orders with a 2 hour, a 4 hour, and a scheduled service are typically delivered from the Rapid Fulfillment Depots. Orders with a NFO service are done from the main warehouse NL1/7 [redacted] for Europe, or Country Depots for emerging countries. Orders with a NBD service level are mostly delivered from the main warehouse, but can be delivered from RFD´s and CD´s as well.

Five different service levels are distinguished. A total of six processes that deliver these service levels are distinguished as the NBD orders can be delivered from the main warehouse and from RFD´s and CD´s. The six processes defined are stated in Table 5. The division between warehouse locations is merely made to indicate from where certain service levels are executed. No difference between the service levels among the two groups exists however.

Table 5: Processes

Delivery from Main Warehouse		***Delivery from RFD/CD***	
1.1	NBD	**2.1**	2H
1.2	NFO	**2.2**	4H
		2.3	Scheduled
		2.4	NBD

3.3. Relating Processes to KPI's

The processing of RMA orders directly influences the KPI's of the OM and the TPL department.

The KPI's of the OM department are primarily related to RMA orders when it comes to the timeliness of processing. Several KPI's are in place to monitor timely order acceptance and dispatch of orders and one KPI is in place to monitor the backlog of RMA orders. Furthermore two KPI's are in place to measure customer satisfaction with spare part delivery and the OM department respectively.

The KPI's directly impacted when processing RMA primarily have to do with customer satisfaction and on time delivery. The following KPI's of the OM department are directly impacted when processing RMA orders:

OM2.1	Premium Dispatch 2H	OM3.1-3.3	Backlog
OM2.2	Premium Dispatch 4H	OM5.1	CSAT EMEAR
OM2.3	Standard NBD Dispatch	OM5.2	CSAT OM
OM2.4	Order acceptance		
OM2.5	Scheduled Dispatch		
OM2.6	Global Dispatch		

The KPI's of the TPL department are related to RMA orders when it comes to the timeliness of delivery as well. KPI's are in place to monitor the on time shipment and delivery of orders. Next to that, the TPL budget is influenced by the processing of RMA orders.

TPL1.1	On Time Ship RMA's	TPL3.1	Lead Time Performance FGI
TPL2.1	On Time Delivery Premium	TPL5.1	Budget
TPL2.2	On Time Delivery NBD		
TPL2.3	On Time Delivery NBD RFD/CD		

The responsibility of the Order Management department for an order ends when an order is dispatched. The responsibility for the TPL departments starts at the same point, as is reflected in the KPI's. A strong connection between the departments exists here as they together are responsible to a big extent for the realization of the Service Delivery Performance (SDP) level, which is one of the important SSCD objectives.

Next to the KPI's in place to monitor SDP performance, the OM department has an exclusive focus on customer satisfaction whereas the TPL department has an exclusive focus on the budget.

The impact of the processes on the KPI's is straightforward. The successful handling of an RMA has a positive influence on all KPI's in place that relate to the SDP measure. Furthermore, it delivers a positive influence on customer satisfaction. The reverse side is the budget KPI, as costs are made in processing these RMA orders. However, as the budget KPI states that the realization of the budget has to be within certain limits of the budgeted amount, this KPI is not put under much pressure as a lower bound is stated. These relations are indicated in Figure 10.

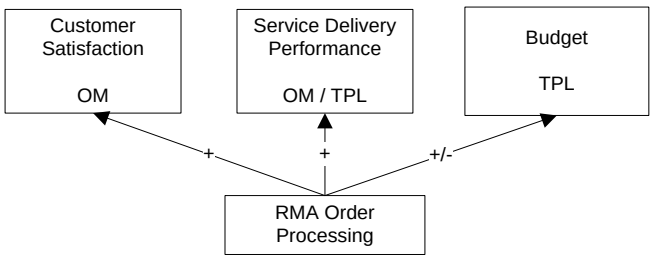

Figure 10: Impact of RMA Processing on KPI's

3.4. Conclusion

The processing of an RMA order as well as the transportation methods are identified in this chapter. Furthermore, the KPI's influenced by these processes are identified. The main conclusion of this section is that the TPL and the OM department are having a shared goal in timely delivering products

to the customer. However, the OM department primarily relates this goal to customer satisfaction whereas the TPL department relates this goal primarily to the budget.

Furthermore a conclusion is that a trade-off between customer satisfaction and the realization of the budget does not exist. Due to the split focus the OM department does not take into account expenses and does not make a trade-off between those measures. The same holds for the TPL department: the TPL department cannot influence the processes instigated by the OM department and thus does not influence the expenses in the current situation.

4. Decisions

Each process of Section 3.2 is instigated by a certain decision to execute that process. This chapter defines the characteristics of these decisions and denotes the occurrences of each decision. The results of this chapter will provide an understanding of the mechanics behind decision making, leading to the execution of the processes defined in Section 3.2.

The decision making structure is presented in Section 4.1 and an answer to research question 3.1 is stated in this section. The decision making structure is constructed from findings in the Cisco transportation data. This data contains all RMA orders requested by the customer over a 16 month period and states which service level is stated in the contract of the customer per RMA order request, as well as the service level requested by the customer. Every request for an RMA order by a customer leads to a decision, and every unique decision is identified by the combination of the contracted and the requested service level. These combinations of contracted service level and requested service level are found in the Cisco transportation data.

In Section 4.2 the service levels that are contracted and requested are discussed. The Cisco transportation data again is used. From all RMA's sent in a 16 month period, the different kinds of contracted and requested service levels are denoted. For the service levels that are not discussed in Section 3.2 a short description is given.

In Section 4.3 the decisions, defined as combinations of contracted and requested service level, are analyzed. The set of possible contracted service levels and the set of requested service levels deliver a theoretical amount of unique decisions. Section 4.3 states which decisions actually occurred in the 16 month period of which RMA data is available and states the amount of occurrences of each decision as well. For this analysis once more the Cisco transportation data stating the contracted and requested service levels is used. Using the findings of this section a number of conclusions is drawn regarding the amount of requests for upgrades, the amount of requests for downgrades, and the amount of requests for the entitled, contracted, service level.

Section 4.4 concludes this chapter. The methodology for this chapter is summarized in Figure 11.

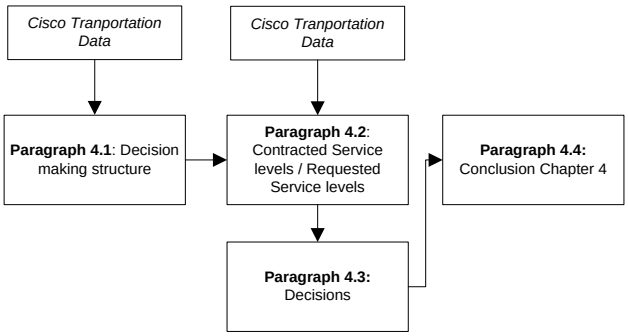

Figure 11: Methodology Chapter 4

4.1. Decision making structure

The decision with what service level to deliver an RMA order to the customer is fed by the service level the customer is requesting and the service level that is stated in the contract of the customer. The combination of the requested service level and the contracted service level is input for a decision. The output of a decision subsequently is the choice for a service level. This structure is represented in an example in Figure 12.

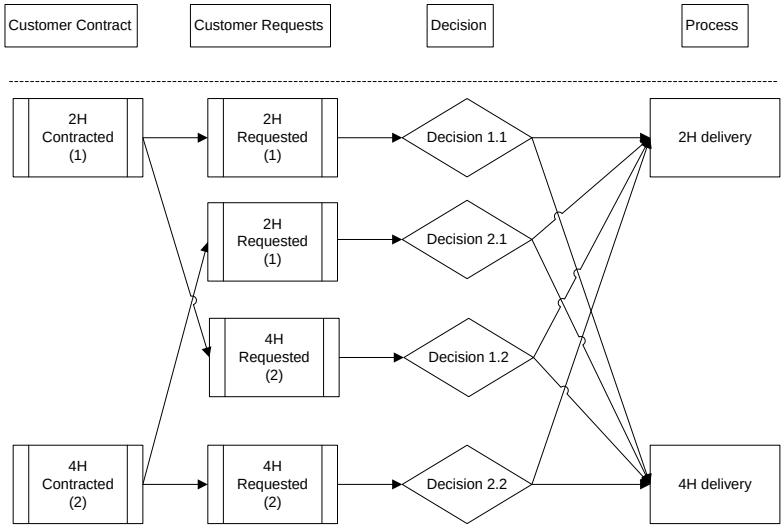

Figure 12: Decision Structure

The customer thus can request a service level that is higher, equal, or lower to the service level stated in the contract. Cisco subsequently decides on what service level to deliver to the customer. The decisions in the above figure are numbered such that the first index indicates the contracted service level and the second index indicates the service level that is requested by the customer. The combination of these two service levels defines a unique decision.

The decision what service level to deliver to the customer is, for the part where the same service level has to be delivered to the customer, highly automatic. Customers can state their orders online or through a customer service center, employed by a third party. Next, the order flows through different systems, triggering automated movements in the supply chain, and the product is delivered at the customer. When an order is delivered without manual intervention this is labeled a 'no touch' order.

Decisions for an upgrade or a downgrade however entail manual intervention. When a customer request entails a higher service level than the contracted service level, the order is automatically put on hold. These orders become so called escalations and the Duty Manager that is on shift at that moment has to decide on the service level to be delivered. The decision to deliver a higher service level can be based on numerous criteria. For example the criticality of the part for the customer, the extra efforts for Cisco to deliver the part, the presence of an RFD or CD near the customer, other contracts in place at the customer, how big the customer is, the country to which the part has to be delivered, the pressure of a Sales Support Manager (SSM) or an Account Manager (AM), and the negative consequences for Cisco of not complying with the request all play a role in this decision. Furthermore, it occurs that an upgrade is required because Cisco's systems are not updated in time. It thus can happen that a customer is rightly entitled to a higher service level, although Cisco's systems state otherwise and an upgrade is needed to fulfill the customer's rightful request. No standardized decision schedule does exist because of the variety of different situations under which the decisions are made. Nor does a list of escalations or reasons of granting an upgrade exist.

4.2. Contracted Service levels / Requested Service levels

There exist a vast amount of different service levels in the contracts of the customer. However, when an order enters the C3 system, the contracted service level is translated into one of seven

different bins of service levels. In this report, the term contracted service level refers to these seven bins. They are organized in three different groups:

Premium Delivery	*Standard Delivery*	*Other Delivery*
2 Hour Delivery	Next Business Day	10th Business Day
4 Hour Delivery	Same Day Ship	Return to Factory – Same Day Ship
		Warranty - 10th Business Day - Return to Factory – Same Day Ship

The service levels 2 Hour delivery, 4 Hour delivery, and Next Business Day are already discussed in Section 3.2. The Same day Ship delivery entails that an RMA must be picked, packed, transacted and dispatched at the same day as the scheduled ship date. Here, the delivery time does not matter, as long as the shipment is done at the same day. The 10th Business Day delivery entails that a part has to be delivered to the customer within 10 business days. The Return to Factory – Same Day Ship service level entails that a part first has to be returned to Cisco before a spare part is sent. After a faulty part is received a part is sent using a Same Day Ship service level. The Warranty service level means that when a product fails during a certain period, a new product is sent. This product can be sent with a 10th Business Day service level or a Return To Factory – Same Day Ship service level.

The requested service levels consist of all service levels that are stated in the contract of the customer. In addition there are two more service levels that can be requested by the customer:

Premium Delivery	*Other Delivery*
Scheduled Delivery	8th Business Day Warranty - Same Day Ship

The Scheduled service level is discussed in Section 3.2. The Warranty SDS service level entails that a shipment is done with a Same Day Ship service level when the product fails during a certain period. This service level is the same as the Warranty RTF-SDS service level except that with this service level the customer does not have to return its defective product before a new product is send. The 8th Business Day Delivery entails that a part has to be delivered to the customer within 8 business days.

An overview of the total of contracted service levels and requested service level is stated, with an index number, in the following table. The service levels are ranked in descending order.

Table 6: Service level and Indices

Index	***Service Level in Contract***	***Index***	***Service Level Requested***
1	2H	**1**	2H
2	4H	**2**	4H
		3	Scheduled
4	NBD	**4**	NBD
5	SDS	**5**	SDS
		6	8th Business Day
7	10th Business Day	**7**	10th Business Day
8	RTF - SDS	**8**	RTF - SDS
		9.a	Warranty SDS
9.b	Warranty RTF-SDS	**9.b**	Warranty RTF-SDS
9.c	Warranty – 10th	**9.c**	Warranty – 10th

4.3. Decisions

Section 4.2 provides a theoretical amount of 8*11 = 88 decisions. The amount of unique decisions actually existing is obtained from the Cisco transportation data, containing a yearly amount of [redacted] RMA orders. The decision figures are stated in Table 7.

Table 7: Yearly amount of decisions taken - Cisco Transport Data

		Service Level Requested										
		1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9.a***	***9.b***	***9.c***
Service Level Contracted	***1***	[redacted]										
	2		[redacted]									
	3											
	4				[redacted]							
	5					[redacted]						
	6											
	7							[redacted]				
	8								[redacted]			
	9.a											
	9.b										[redacted]	
	9.c											[redacted]

The following legend can be used in reading the table: Blue: Asks for Upgrade; Red: Asks for Downgrade; **Bold**: Entitled Request; Blank: Change to scheduled.

Table 7 shows the 55 decisions that actually occur. Furthermore Table 7 provides figures about the amount of upgrades and downgrades requested per year. In Table 8 the amount of entitled requests, upgrades, downgrades, and requests for a change to a scheduled delivery are stated.

Table 8: Decision Categories

Request	**Amount**	**Percentage**
Entitled	[redacted]	76,46%
Upgrade	[redacted]	12,50%
Downgrade	[redacted]	3,33%
Change to Scheduled	[redacted]	7,71%
Total	[redacted]	**100%**

Note that the change to scheduled is not seen as an upgrade or downgrade. Within Cisco there does not exist agreement on whether a change from a 2H or a 4H contract is an upgrade. Therefore, these orders are considered separately.

4.4. Conclusion

A total of 55 unique decisions are established by considering the total amount of 135.356 yearly decisions taken at Cisco. By far the biggest percentage of the customer orders entails a request for a delivery of an entitled service level; in 76,46% of the total orders the customer requests a service level which is stated in his contract. A noticeable amount of customer orders (7,71%) entail a request for a change to a scheduled delivery whereas 12,50 percent and 3,33 percent of the total orders entail a request for an upgrade or a downgrade of the contract respectively. The next chapter states Cisco's reaction to these decisions.

5. Options

Knowing the total number of decisions taking place at Cisco, in this chapter the results of these decisions are stated. Referring to Figure 12, the results are the arrows leading from the decisions to the processes and are called options. In this chapter the link between the decisions, which are a combination of contracted service level and requested service level, and the delivered service level is made. The goal of this chapter is to provide a description of all the elements stated in Figure 12.

Cisco does not have data available about the delivered service level and vendor invoice data is used. By coupling the Cisco transportation data and the vendor invoice data on RMA number, which is a unique identifier, a complete overview is obtained.

First, the invoice data per vendor is gathered. Required fields in the data are RMA number, delivery date, delivered service level, quantity, price, weight, delivery distance, and original depot. Not all these fields were available for all vendors and when needed assumptions are made about the missing data, indicated in this report. The amount of data available varied per vendor as well. Section 5.1 presents details about the vendor invoice data. In this section all gathered vendor invoice data is transformed to yearly figures, assuming a steady yearly demand.

To couple the decisions taking place to the results of these decisions, the Cisco transportation data is to be matched and coupled with the vendor invoice data. The unique identifier used for this coupling is the RMA order number. Section 5.2 states the results of coupling the Cisco transportation data with the vendor invoice data for each of the five main vendors. With this an overview of the total options is obtained, stating the combination of contracted service level, requested service level, and delivered service level per RMA order. In Section 5.2, the results of coupling the data per vendor dataset and an overview of all total options are presented.

Section 5.3 presents the validation of the vendor invoices as those datasets are extrapolated due to limited availability of data. The total amount of options from Cisco's transportation data is compared to the total amount of options, extrapolated to yearly figures, from the vendor invoice data.

The coupling of the data sets, as done in Section 5.2, provides interesting information about the relationships between the contracted, requested, and delivered service level. Stating the relationships of these three dimensions in two tables, insights in i.a. the amount of entitled deliveries, the amount of requested upgrades, and the amount of delivered upgrades is obtained. Section 5.4 presents an analysis of the total options and the relationship between these dimensions.

The insights of Section 5.4 are used in determining the impact on the KPI's of the OM and the TPL department. In Section 5.5 this relation is examined, using the KPI analysis of Chapter 2, and answers the research questions 3.2 and 3.3. The chapter is concluded in Section 5.6.

In Figure 13 the methodology of this chapter is presented.

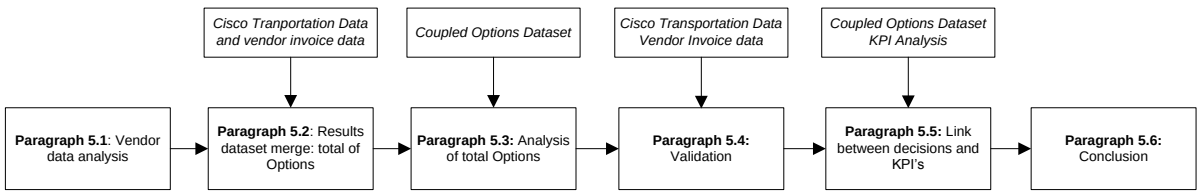

Figure 13: Methodology Chapter 5

5.1. Vendor Data

The major vendors for the transportation of RMA orders are Vendor A, Vendor B, Vendor C, Vendor D, and Vendor E. As indicated in Section 3.2 the transport from the warehouse to the customer is carried out by the carrier who has control over the depot from where the part is shipped. Vendor A operates the main warehouse [redacted], and the [redacted] RFD's and CD's in the EMEAR region are operated by Vendor B ([redacted]), Vendor C ([redacted]), Vendor D ([redacted]), and Vendor E ([redacted]).

The amount of data available varies per vendor. Figure 14 states the availability of vendor invoice information per vendor. At the bottom of this figure the Cisco data is stated, which covers all available vendor information.

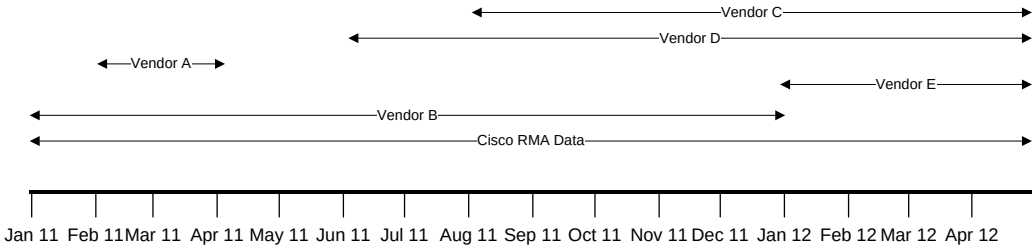

Figure 14: Vendor data availability

The figures presented in the rest of the report are all transformed to yearly figures. By transforming the results of incomplete data to year data it is assumed that the demand for products is stable over the year. From discussions at Cisco it appears that this is a reasonable assumption. No peaks or downs are reported during the year and demand appears to be relatively flat.

From Vendor A, Vendor B, Vendor C, and Vendor D all orders transported in the stated period are obtained. Vendor E data about a part of their Next Business Day orders could not be provided. The aggregated cost of these orders is approximately [redacted] per year. No further details are available.

NFO orders are transported by the main warehouse and do not appear in the vendor data. For these orders no information except for the total amount of orders and the total costs are available. The main warehouse transports [redacted] NFO orders per year, totaling costs of [redacted]. This equals an average of [redacted] per order. These orders are left out of the analysis as no details are available.

5.2. Options

The results of the union between the Cisco transportation data and the vendor invoice data is denoted per vendor in Table 9. This table states the amount of RMA orders per dataset, the period of data available, the matches and mismatches found in merging the datasets, the transportation methods used by the vendors, and the unique amount of decisions and options identified.

Table 9: Dataset Merge - Cisco Transportation Data & Vendor Invoice Data

Vendor	*Amount of RMA orders*	*Data period*	*Matched*	*Not Matched*	*Transportation methods*	*Unique decisions*	*Unique Options*
A	[redacted]	55 days	[redacted]	[redacted]	NBD	33	33
B	[redacted]	12 months	[redacted]	[redacted]	2H/4H/SCHED/NBD	35	61
C	[redacted]	8 months	[redacted]	[redacted]	2H/4H/SCHED/NBD	16	28
D	[redacted]	11 months	[redacted]	[redacted]	2H-4H/SCHED/NBD	17	26

E	[redacted]	4 months	[redacted]	[redacted]	2H-4H/SCHED/NBD	11	14

Table 9 states that Vendor A only delivers NBD orders. Each decision thus has only one option; the transport of an order with a Next Business Day service level. Furthermore, Table 9 states that Vendor D and Vendor E do not make a differentiation between the 2 Hour and the 4 Hour service level. For these vendors the 2 Hour and the 4 Hour service levels are thus presented aggregated.

The tables stating the total amount of decisions and the total amount of options per vendor are added in the appendices, as well as a graphical overview of these relationships per vendor. Table 10 states the overview of these appendices.

Table 10: Overview Appendices

Vendor	***Decisions and Options***	***Graphical Overview***
A	Appendix J	Appendix K.
B	Appendix L	Appendix M.
C	Appendix N	Appendix O.
D	Appendix P	Appendix Q.
E	Appendix R	Appendix S.

5.2.1. Total Options

The aggregated numbers of the five vendors deliver 45 unique decisions and 82 options. The yearly total amount of decisions and the yearly total amount of options and option occurrences is stated in Appendix T. A graphical overview is presented in Appendix U. The total graphical overview is split in two separate parts for surveyability.

5.3. Validation Vendor invoice data

As the vendor information is incomplete and extrapolation to year data is done for several vendors, the results of the amount of unique decisions and the amount of occurrences of these decisions of the aggregated vendor data is checked against the Cisco data, which is transformed to year data as well. The results are stated in Table 11.

Table 11: Cisco data vs. Vendor data

Dataset	**Orders**	**Decisions**
Aggregated Vendor invoice Data	[redacted]	45
Cisco Transportation Data	[redacted]	55

The total amount of orders according to the Cisco data is higher. This is due to several reasons:

- During the merge 193 mismatches occurred;
- Taking into account the five main vendors leaves approximately 60 RMA's, which are transported by other small vendors, out of the analysis;
- No NFO orders are included in the above analysis. The amount of NFO orders is 101 yearly.

The biggest part of this discrepancy between the datasets however is most likely due to the missing NBD orders of Vendor E. Furthermore, inaccuracy of the both datasets can be a cause of the discrepancy between the datasets.

Next Table 11 states that the total amount of decisions is higher in the Cisco data as well. Table 12 provides the differences between the vendor invoice data and the Cisco transportation data with

respect to the occurrences of decisions. The numbers stated between brackets represent decisions that were not found in the vendor invoice data.

Table 12: Discrepancies datasets

		Service Level Requested										
		1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9.a***	***9.b***	***9.c***
Service Level Contracted	***1***					( )						
	2						( )					
	3											
	4						( )		( )			
	5											
	6											
	7						( )					
	8	( )										
	9.a											
	9.b				( )				( )			
	9.c							( )	( )			

The occurrences of the decisions that did not appear in the extrapolated and aggregated vendor data are not high and the impact on any conclusions drawn can be neglected. To assess the impact of the missing occurrences for the other decisions Table 13 provides the relative discrepancies, stating missing occurrences per decision as a percentage of the occurrences per decisions as stated in the aggregated vendor data.

Overall, the percentages are acceptable. However, several high numbers are stated in Table 13, indicating a deviation between the datasets. When interpreting conclusions drawn upon these figures care has to be taken that a discrepancy in the amount of yearly occurrences exists.

Table 13: Relative discrepancies datasets

		Service Level Requested										
		1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9.a***	***9.b***	***9.c***
Service Level Contracted	***1***	3%	8%	5%	30%							
	2	0%	13%	13%	28%	-14%		-4%	-57%			
	3											
	4	46%	24%	-3%	1%	163%		3%				
	5		50%	-20%	56%	-8%		59%				
	6											
	7	25%	22%	12%	2%	-5%		16%	-13%			
	8		56%	200%	-13%	-14%		7%	10%			
	9.a											
	9.b									-32%	48%	29%
	9.c				-23%	-34%				-14%	55%	178%

5.4. Analysis of Total Options

The relationships between contracted service level, requested service level, and delivered service level are depicted in Figure 15. Figure 15 depicts how a specific order can be handled. A request thus can entail a higher service level than stated in the contract, equal to the contract, lower than the contract, or not to be determined (NTBD). The same four options hold for the delivery by Cisco.

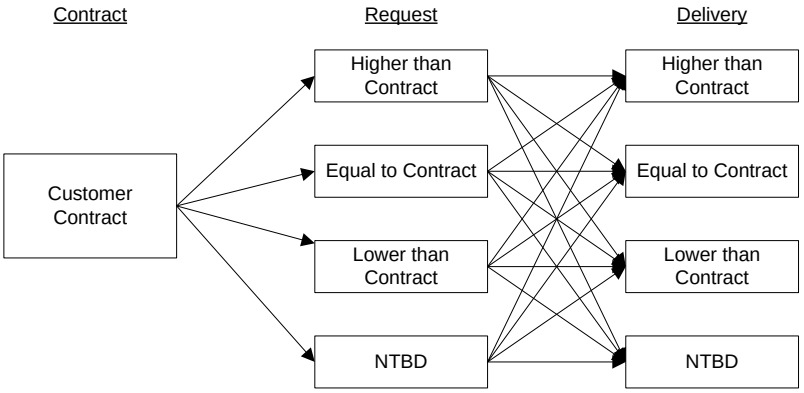

Figure 15: Contracted Service level, Requested Service level, Delivered Service level flow

The quantification of these relationships is stated in Table 14 using the [redacted] orders from Section 5.2. Due to the three dimensions of the table, two tables are used to state all relationships.

The delivered service level is compared to the contracted service level in the columns and the requested service level is compared to the contracted service level in the rows. The contracted service level is denoted as 'C', the requested service level is denoted as 'R', and the delivered service level is denoted as 'D'. For the relationships 'NTBD' is used to denote 'Not to be Determined'.

For determining which service levels are lower or higher than other service levels, the results of Table 6, which states all service levels in descending order, are used. Corresponding, the > sign compares a higher service level with a lower service level from Table 6, and the < sign compares a lower service level with a higher service level from Table 6.

Table 14: relationship Contracted, Requested, and Delivered Service level

	D > C	D = C	D < C	D NTBD C	Total
R > C	6,89%	0,05%	0,00%	0,00%	6,94%
R = C	12,31%	64,67%	0,09%	0,34%	77,41%
R < C	0,07%	0,32%	1,86%	0,01%	2,26%
R NTBD C	0,72%	1,49%	0,72%	10,46%	13,39%
Total	19,99%	66,53%	2,67%	10,81%	100,00%

D > R	14,46%
D = R	82,10%
D < R	1,80%
D NTBD R	1,65%
Total	100,00%

From Table 14 the following findings are obtained:

- For 64,67 % of the orders ([redacted] orders), the contracted service level is requested by the customer and the same service level is delivered.
- In 6,49% of the order requests ([redacted] orders), the requested service level is higher than the contracted service level.
- In 99,28% (6,89 / 6,94) of the orders with a request for a higher service level, a higher service level is granted. Note that the granted service level is not necessarily identical to the requested service level.
- For 19,99% of the orders ([redacted] orders), the delivered service level is higher than the contracted service level.
- In 14,46% ([redacted] orders), the delivered service level is higher than the requested service level.

- In 96,56% (82,10 + 14,46) of the orders ([redacted] orders) the delivered service level is higher or identical to the requested service level.

For the biggest part of all orders (64,67%) the requested service level is equal to the service level stated in the contract. For 6,94% of the orders the customer however requests more.

Remarkable is that Cisco delivers a higher service level in 19,99% of the cases, although only in 6,94% of the total cases the request of the customer is higher. Subsequently, in a total of 9,46% the customer receives a higher service level than the customer requested.

5.5. Relating decisions to KPI's

In this section the relation between the decisions made and the KPI's stated in Section 2 is discussed. In particular, the decisions to upgrade a contract are discussed as those entail a clear trade-off between difference performance measures.

Section 5.4 states that in 6,94 percent of the order requests the requested service level is higher than the contracted service level. In 99,28 percent of the orders with a request for a higher service level, a higher service level is granted. Furthermore, Section 5.4 states that in 14,46% the delivered service level is higher than the requested service level. A differentiation is made between decisions invoking so called 'forced upgrades' and decisions leading to 'normal' upgrades.

The 'forced upgrades' are upgrades that are done as currently no lower service than Next Business Day delivery can be done. The main cause of the limited amount of service levels that can be delivered is that Cisco's old systems could only handle a limited amount of service levels. Since Vendor A is appointed as a 4PL, a part of this inflexibility is gone. However, rate books and new service levels are not updated to match the lower service levels Cisco agrees with its customers. The 'normal' upgrades are upgrades that are granted by Cisco while other transportation methods are available.

For the forced upgrades it holds that the customer does not always perceive receiving a higher service level due to the 'C3' Oracle application which is build to make transportation decisions based on lead time of products instead of on the service entitlement of a customer. Most orders that can be delivered within a period of multiple days are currently transported within a day due to this limited application. For example the order requests for a 10th Business Day service delivery are processed at the ninth day so the customer gets its order delivered on the 10th Business Day with a Next Business Day service level. Table 15 states for each of the contracted service levels the perceived service level when a NBD service level is used for the delivery.

For the normal upgrades the trade-off between KPI's relates to Section 3.3 where the impact of the processing of RMA orders on the KPI's is stated. When the trade-off is made between delivering the contracted service level or delivering a requested higher service level, three KPI's stated in this section are impacted: OM5.1:CSAT EMEAR, OM5.2:CSAT OM, and TPL5.1:Budget. Assuming the same delivery performance of upgraded orders, the other KPI's that are impacted by the processing of RMA orders remain unaffected by this trade-off.

Table 15: Contracted, delivered, and perceived service level

Contracted Service Level	*Delivered Service level*	*Perceived Service level*
SDS	NBD	NBD
8th Business Day	NBD	8th BD
10th Business Day	NBD	10th BD
RTF - SDS	NBD	RTF - NBD
Warranty SDS	NBD	NBD
Warranty RTF-SDS	NBD	RTF – NBD
Warranty – 10th	NBD	10th BD

The Same Day Ship service level does not commit on lead time but only commits on time of shipment. As transportation currently is done with a NBD service level however, the customers with a SDS service level in their contract thus notice a fast service level delivery and possible are used to a fast service delivery associated with this contract.

Table 15 shows that customers with a SDS contracted service delivery level thus receive and perceive more service than contracted. This will positively influence the KPI's OM5.1 CSAT EMEAR and OM5.2 CSAT OM. The customers with a 8th or 10th Business Day contracted service delivery level however do not perceive more service as those products are delivered with a NBD service level on the 8th or 10th business day.

For all upgraded transports it holds that the cash flows for this transport are likely to be bigger than when an alternative service level, suited to the contracted service level, would be used. The budget KPI of TPL, TPL5.1, therefore is negatively impacted as they need to control these expenses.

The level of impact of these upgrades can be determined fairly accurate by considering alternative transportation methods and stating the costs that differ between the alternatives, also named relevant costs. The exact level of impact on the customer satisfaction KPI's however is hard to determine.

5.6. Conclusions

The relationship between the contracted service level, the requested service level, and the delivered service level is uncovered and quantified in this chapter. The most interesting revelation is that in 6,94% of the cases a customer requests more than the customer is entitled to and that Cisco delivers more than a customer is entitled to in 19,99% of the cases. The difference in the numbers indicates that a big part of the overperformance is not invoked by customer requests but has its causes at Cisco intern. Furthermore, the overdelivery done by Cisco is not always perceived as an upgrade by the customer. For example, orders are processed on the 9th business day and delivered on the 10th business day with a NBD service level. Cisco gains nothing from holding these products longer.

The implication of these findings is that only part of the upgraded orders positively impacts the Order Management KPI's OM5.1 CSAT EMEAR and OM5.2 CSAT OM. All upgrades however potentially negatively impact the budget KPI of the TPL department, TPL5.1, as cheaper transportation options are possible.

The next chapter will discuss the cash flow associated with each of the 82 distinguished options. The impact on the budget of the TPL department thereby will be quantified.

6. Relevancy of Decisions

Not all of the 82 distinguished options are relevant for further analysis. Some options rarely occur and other options do not have a big impact in terms of total occurrences or costs. Although some options can be ruled out of further analysis on forehand, coupling the cash flow at every option provides insight in the distribution of the total cash flow of all options.

This chapter states the relevance of the decisions by stating the cash flow associated with each option and determining the impact of each option on the TPL budget. Note that for all deliveries from the RFD's and the CD's to the customer, it holds that products have been transported to those warehouses in the past and subsequently are stocked there until a customer demand appears. Yet the flow of goods between the main warehouse and the RFD's and CD's is under the control of the PR department and, in congruence with the scope set in 1.2.6, left out of the analysis. The cash flows discussed in this section thus only take into account the consequences of the decisions for the transportation between the warehouse and the customer, taking the stock levels at the warehouses, which are under the control of the PR department as well, as given. This separate handling of the replenishment flows to the RFD's and the flows to the customers comes forth from the fact that the different departments do not operate together and the actual impact of the replenishment costs on the total transportation costs hereby remain unclear. Currently no link between the costs of these flows exists as the PR department is aimed at keeping the supply in the warehouses at the right level. This implies that the relevancy of certain decisions is limited to the scope of this project as additional costs for replenishment of warehouses are not taken into account. The impact of this assumption for the eventual selection of relevant decisions is discussed in Chapter 10.

The cash flows associated with the 82 option are determined using the invoices of the vendors. The research questions 4, 4.1, and 4.2 are answered with this chapter. The chapter starts in Section 6.1 with an overview of the cash flows per process as identified in 3.2 by analyzing the total invoice amount per vendor and aggregating these cash flows per process. The figures are transformed to yearly figures where needed. The amount of orders and the average costs per order are stated as well as to generate insight into the costs per vendor and per service level. Section 6.2 states the cash flow per option. Using the Coupled Options dataset from Chapter 5 the cash flow per option is determined. Per vendor the fields contracted service level, requested service level, and delivered service level, are iteratively adjusted, coinciding with the 82 options. The results per option for the five vendors are added in one table. This results in 82 tables, each stating the cash flow per vendor for a specific option, as well as the total cash flow associated with that option.

On basis of the findings in Section 6.2 a set of relevant options is selected and discussed in Section 6.3. To come to this set of relevant options, the cash flow of the options is taken into account, as well as whether an option entails an upgrade, downgrade, or entitled delivery. The chapter is concluded in Section 6.4. The methodology of this chapter is stated in Figure 16.

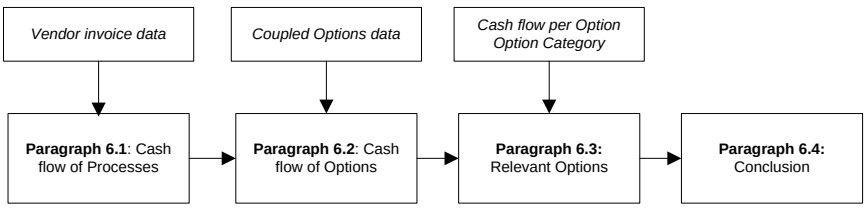

Figure 16: Methodology Chapter 6

6.1. Cash flow of Processes

The invoices of the five vendors determine the total costs of all transportation processes from the warehouse to the customer. The five vendors are stated separately before aggregating the cash flows in a total overview.

6.1.1. Vendor A

Vendor A operates as a 4PL service provider and transports RMA orders from the main warehouse to the customer. The cash flow associated with Vendor A comes forth from executing the processes 1.1 and 1.2; NBD delivery from the main warehouse and NFO delivery from the main warehouse respectively. The total cash flow is stated in Table 16.

Table 16: Cash flow Vendor A

Process code	Process name	Cash flow	Amount of orders	Average costs per order
1.1	NBD delivery from main warehouse	[redacted]	[redacted]	€ 0,67
1.2	NFO delivery from main warehouse	[redacted]	[redacted]	€ 32,83

6.1.2. Vendor B

Vendor B transports RMA orders from their [redacted] RFD's and CD's, [redacted], to the customer. The cash flow associated with Vendor B comes forth from executing the processes 2.1, 2.2, 2.3, and 2.4 as stated in Table 17.

Table 17: Cash flow Vendor B

Process code	Process name	Cash flow	Amount of orders	Average cost per order
2.1	2H delivery from RFD's and CD's	[redacted]	[redacted]	€ 1,87
2.2	4H delivery from RFD's and CD's	[redacted]	[redacted]	€ 2,65
2.3	Scheduled Delivery from RFD's and CD's	[redacted]	[redacted]	[redacted]
2.4	NBD Delivery from RFD's and CD's	[redacted]	[redacted]	€ 1,87

6.1.3. Vendor C

Vendor C transports RMA orders from their [redacted] RFD's and CD's [redacted]. The cash flow associated with Vendor C comes forth from executing the processes 2.1, 2.2, 2.3, and 2.4 as stated in Table 18

Table 18: Cash flow Vendor

Process code	Process name	Cash flow	Amount of orders	Average cost per
2.1	2H delivery from RFD's and CD's	[redacted]	[redacted]	€ 1,09
2.2	4H delivery from RFD's and CD's	[redacted]	[redacted]	€ 0,77
2.3	Scheduled Delivery from RFD's and CD's	[redacted]	[redacted]	€ 0,67
2.4	NBD Delivery from RFD's and CD's	[redacted]	[redacted]	€ 0,52

6.1.4. Vendor D

Vendor D [redacted] transports these orders from their [redacted] CD's and RFD's [redacted]. In their invoices no differentiation is made between orders with a 2 Hour service level and a 4 Hour service level. The cash flow associated with Vendor D comes forth from executing the processes 2.1, 2.2, 2.3, and 2.4 as stated in Table 19.

Table 19: Cash flow Vendor D

Process code	Process name	Cash flow	Amount of orders	Average cost per order
2.1+2.2	2H+ 4H delivery from RFD's and CD's	[redacted]	[redacted]	€ 5,37
2.3	Scheduled Delivery from RFD's and CD's	[redacted]	[redacted]	€ 5,69
2.4	NBD Delivery from RFD's and CD's	[redacted]	[redacted]	€ 0,88

6.1.5. Vendor E

Vendor E transports orders from their [redacted] RFD's and CD's [redacted].
A big part of the NBD delivery orders are outsourced to subcontractors. No details of these orders are known except for the total cash flows of these orders. In Table 20 N/A indicates that details are not available for these orders. In the invoices no differentiation is made between orders with a 2 Hour service level and a 4 Hour service level. The cash flow associated with Vendor E comes forth from executing the processes 2.1, 2.2, 2.3, and 2.4 as stated in Table 20.

Table 20: Cash flow Vendor E

Process code	Process name	Cash flow	Amount of orders	Average costs per order
2.1+2.2	2H + 4H delivery from RFD's and CD's	[redacted]	[redacted]	€ 1,70
2.3	Scheduled Delivery from RFD's and CD's	[redacted]	[redacted]	€ 1,82
2.4	NBD Delivery from RFD's and CD's	[redacted]	[redacted]	€ 0,51
	NBD Delivery - Subcontracted	[redacted]	[redacted]	N/A

6.1.6. Total cash flow of processes

The total cash flow per process is stated in Table 21.

Table 21: Cash flow per Process

Process Code	Process name	Cash flow	Amount of Orders	Costs per order
1.1	NBD Delivery from the main warehouse	[redacted]	[redacted]	€ 0,67
1.2	NFO delivery from the main warehouse	[redacted]	[redacted]	€ 32,83
2.1	2H delivery from RFD's and CD's	[redacted]	[redacted]	€ 1,86
2.2	4H delivery from RFD's and CD's	[redacted]	[redacted]	€ 2,57
2.1+2.2	2H + 4H delivery from RFD's and CD's	[redacted]	[redacted]	€ 4,60
2.3	Scheduled Delivery from RFD's and CD's	[redacted]	[redacted]	€ 3,13
2.4	NBD Delivery from RFD's and CD's	[redacted]	[redacted] *	N/A

* Excluding the subcontracted NBD orders from Vendor E.

The sum of these processes equals a cash flow of [redacted] per year spend on transport of RMA orders. Table 22 states the cash flow per service level, ranked ascending.

Table 22: Cash flow per service level

Service Level	Cash flow	Percentage of total Costs	Amount of Orders	Percentage of total orders*
2H+4H	[redacted]	[redacted]	[redacted]	[redacted]
2H	[redacted]	[redacted]	[redacted]	[redacted]
NFO	[redacted]	[redacted]	[redacted]	[redacted]
4H	[redacted]	[redacted]	[redacted]	[redacted]
Scheduled	[redacted]	[redacted]	[redacted]	[redacted]
NBD	[redacted]	[redacted]	[redacted] *	[redacted]

* Excluding the subcontracted NBD orders from Vendor E.

6.2. Cash flow of Options

The cash flow per process is a sum of the cash flows per option leading to that process. The 45 decisions stated in Section 4.3 lead to the five processes stated in 3.2 via 82 options, which are identified in Section 5.2. Appendix T states the 82 options and the amount of occurrences per year per option. The total cash flow per option is the sum of the transports of the five vendors for that particular option. Table 23 states an example of the identification of the total cash flow per option.

Table 23: Cost per option; example

1.1.2H	*Amount of Orders - Yearly*	*Costs – Yearly*	*Cost per Order*
Vendor A	500	€ 10.000,00	€ 20,00
Vendor B	1000	€ 15.000,00	€ 15,00
Vendor C	-	-	-
Vendor D	1000	€ 5.000,00	€ 5,00
Vendor E	-	-	-
Total	2500	€ 30.000,00	

Appendix V states the total cash flow of each of the 82 options in a descending order with respect to the total cash flow. Appendix W provides detailed information about the breakdown of the cash flow per option over the five vendors. Table 24 states the total cash flows grouped per category, i.e. entitled delivery, upgrade, downgrade, or a change to scheduled delivery.

	D > C	D = C	D < C	D NTBD C	Total
R > C	6,89%	0,05%	0,00%	0,00%	6,94%
R = C	12,31%	64,67%	0,09%	0,34%	77,41%
R < C	0,07%	0,32%	1,86%	0,01%	2,26%
R NTBD C	0,72%	1,49%	0,72%	10,46%	13,39%
Total	19,99%	66,53%	2,67%	10,81%	100,00%

D > R	14,46%
D = R	82,10%
D < R	1,80%
D NTBD R	1,65%
Total	100,00%

Table 24: Total cash flow per category

Category	*Cash Flow*	*Percentage*
Entitled delivery	[redacted]	59,02%
Upgrade	[redacted]	19,89%
Downgrade	[redacted]	2,17%
Change to Scheduled	[redacted]	18,92%
Total	[redacted]	100,00%

The discrepancies with the total cash flow from the processes, determined in Section 6.1 comes from the exclusion of NFO orders in this analysis, and the missing orders for which no match was found between the Cisco transportation data and the vendor invoice data.

Table 24 states that the biggest part (59,02%) of the cash flow is associated with entitled deliveries. Upgrades take up 19,89 percent of the total cash flow and downgrades take up 2,17 percent of the total cash flow. Furthermore, a relatively big percentage of the total cash flow (18,92%) entails a change, but not an upgrade, to a scheduled delivery.

When comparing Table 24 with Table 14, which stated the percentage of orders for each category, the entitled deliveries appear to be cheaper per order as Table 14 states that 66,53 percent of the orders receives an entitled delivery. The amount order with an upgrade (19,99%) and the amount of

orders with a downgrade (2,67%) are represented alike in numbers and cash flow. The orders with change to a scheduled delivery level however (10,81%) consume a relative big part of the cash flow.

The analysis of these 82 options and their associated cash flows is done in Section 6.3.

6.3. Relevant Options

Relevant options for further analysis are selected based on the total cash flow associated with the option, and based on the relevancy for this research. As the research into the transport of RMA orders comes forth from the perceptible trade-off between customer satisfaction and costs we are primarily interested in the options where more service is delivered than the customer is entitled to.

For 51 out of 82 options an upgrade with respect to the contracted service level is delivered. These options, the amount of occurrences, and the total cash flow associated with these option are stated in Appendix X. Table 25 states the 51 options when grouped according the delivered service level.

Table 25: Options with upgrade, grouped to delivered service level

Upgrade	***Orders***	***Total Cash Flow***	***Average Cash flow per order***
Upgrade to 2H Total	[redacted]	[redacted]	€ 2,00
Upgrade to 4H Total	[redacted]	[redacted]	€ 3,46
Upgrade to 2H/4H Total	[redacted]	[redacted]	€ 3,58
Upgrade to Scheduled Total	[redacted]	[redacted]	€ 4,42
Upgrade to NBD Total	[redacted]	[redacted]	€ 0,70
Total	[redacted]	[redacted]	

In Table 25 the average cash flow per order is not such that a lower service level entails lower costs. This is because the orders with scheduled service level on average are delivered over a distance of 72 kilometer whereas the orders with a 4 Hour service level and the orders with a 2 Hour service level on average are delivered over a distance of 58 and 41 kilometer respectively. The orders with a NBD service level are charged on basis of transported weight.

The biggest cash flow is associated with the options that entail an upgrade to a Next Business Day service level. Furthermore, the options that entail a change to a Scheduled service level represent a big amount, as does the group options that entail an upgrade to a 4 Hour service level. Based on the financial impact on the TPL budget, these three groups of options are selected for further analysis.

Next to those three groups of options there exists a possibility to deliver a part of all the orders with a Scheduled service level with a pre 09.00 or a Pre 12.00 service level. There are [redacted] orders entailing a Scheduled service level delivery, corresponding with a cash flow of [redacted]. This group of options is stated in Appendix X and is the fourth group that is analyzed.

Concluding, the following four groups of options are selected for analysis:

1) The options entailing an upgrade to NBD service level delivery
2) The options entailing an upgrade to Scheduled service level delivery
3) The options entailing an upgrade to a 4 Hour service level delivery
4) The options that entail a Scheduled service level delivery

The groups 2 and 4 are partly overlapping as both entail orders receiving an upgrade to a scheduled service level delivery. In group 4 however the orders that receive a change, but not an upgrade, to a scheduled service level delivery, are included, i.e. orders with a 2 or 4 Hour contracted service level.

6.4. Conclusion

For each option identified in Section 5.2 the associated cash flow is identified. By grouping the options with an upgrade according to delivered service level a comprehensible overview of the options that are relevant for further analysis is presented. On basis of whether the group of options entails an upgrade and whether the associated cash flow is considerable, three groups are selected. A fourth group is selected due to the potential to deliver these orders with a different, cheaper, service level.

7. Alternative Decision Making

This chapter presents alternative decision making for the four groups of options identified in Section 6.3. The goal of this chapter is to identify the difference in relevant costs and to map trade-offs between customer satisfaction and cash flows. For the first three groups of options identified in Section 6.3 an upgrade of the contracted service level occurred and the effects of delivering the contracted service level are calculated. For the fourth group the effect of using a different kind of transport is analyzed.

This chapter starts in Section 7.1 with an overview of the alternative rate cards used in determining alternative ways of transport for the three subgroups and the alternative rate cards for the fourth group of options.

Section 7.2 states the results of alternative decision making for the four groups of options. For this analysis, the alternative rate cards from Section7.1 are used to determine the costs of alternative transport. The costs of this alternative transport are compared with the actual costs of the RMA orders in the current situation. The details of the orders in the current invoices are used to calculate the alternative method for these orders such that similar order details including weight, kilometers and extra surcharges are used. For each order the alternative costs thus represent the costs when exactly the same order would be transported with the alternative service level. This method can be applied as the current orders are constructed from the current rate cards. Extra surcharges for the current orders are taken into account for the alternative way of transportation one on one, as these surcharges are additional costs for both the current rate cards as the alternative rate cards.

In some cases it is necessary to project a weight distribution to the orders as the original order is based on kilometers driven instead of weight transported. In these cases the weight distribution of [redacted] Vendor B orders is used and the expected weight (and thus costs) per order is calculated. The Vendor B orders are used as Vendor B is the vendor with the biggest amount of orders stating weights, and because vendor B transports these orders in the whole of the EMEAR region and thus is representing the total of orders best. The weight distribution is stated in Appendix Y.

Hereby, this section answers the research questions 5.2 and 5.3.

A validation of the results is done in Section 7.3. In this section, three random examples for the validation of the rate cards currently used are stated, confirming that the costs of the current orders are calculated from the current rate cards, and providing an illustration for the results obtained in Section 7.2.

Section 7.4 states the link between the KPI analysis of Chapter 2 and the results of Section 7.2, and analyzes the trade-offs between customer satisfaction and cash flows. Having determined the difference in relevant costs this section tries to analyze the other side of the trade-off and provides insight in the consequences of an alteration of service level for each of the four groups. Hereby, this section answers research question 4.2. This chapter provides a discussion for the main assumptions made during the report in Chapter 7.5. and is concluded in Section 7.6.

Per group of options, subgroups are made based on contracted service level. These subgroups of options are analyzed together as the same alternative service level delivery can be used for all the

options in the group. The alternative transportation methods used in the analysis depends on the service level stated in the contract. The following subgroups are made per group of options:

Next Business Day	***Same Day Ship***	***10th Business Day***
Next Business Day (4)	Same Day Ship (5)	10th Business Day (7)
	Return to Factory – Same Day Ship (8)	Warranty – 10th Business Day
	Warranty Return to Factory – Same Day Ship (9b)	

Figure 17 states the research methodology of this chapter.

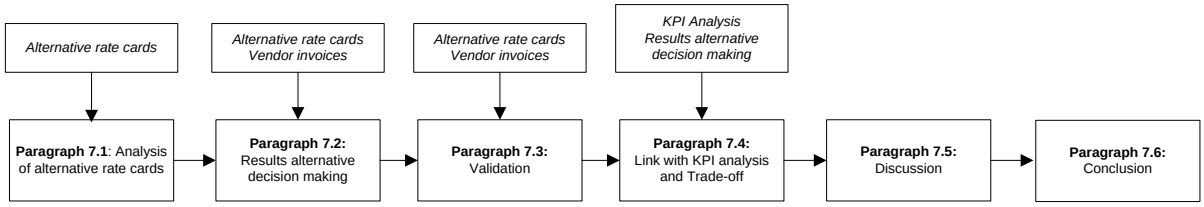

Figure 17: Research methodology Chapter 7

7.1. Alternative rate cards

For the subgroup Next Business Day , existing rate cards are used as this is already a service level which is delivered to customers. For the other two subgroups alternative rate cards are asked from the different vendors. The only rate card that is a contractually agreed rate card with Cisco and delivers a lower service level than the NBD service level is the Vendor D standard service. Other rate cards could not be obtained for this project. The vendors were unwilling to provide alternative rate cards as no contractual agreements currently exist for these rate cards. The alternative rate card used is obtained from Vendor A and states the rates for transport from the main warehouse in the Netherlands. As the lead time of the transports are less than ten days for all zones, this rate card is used for the subgroups Same Day Ship and 10th Business Day. For each of the three subgroups of options an alternative rate card is stated, followed by the rate card for the fourth group of options.

7.1.1. Subgroup 1: Next Business Day

For the subgroup NBD delivery the rate cards for delivery from the main warehouse in the Netherlands are used as transport from the main warehouse to the customer is on average cheaper than transport from RFD's and CD's, according to the different rate cards. Note that this comparison is made between a delivery from the RFD/CD to the customer and a delivery from the main warehouse to the customer. When taking into account the costs for replenishment transportation to the RFD's and CD's the difference would be even bigger.

The different rate cards for NBD transport from the main warehouse differ little and the most recent and most used rate card of Vendor B is used. This rate card states that the costs of transport depend on both zone and weight. The rate card states a table with the prices for all combinations of weight and zone. Any surcharges are added to this price and on top of the final amount an extra 17% fuel surcharge is added.

7.1.2. Subgroup 2+3: Same Day Ship and 10th Business Day

The Vendor D standard service states rates based on both zone and weight as well. The Vendor B rate card makes a differentiation between orders with a single package and with multiple packages

however and states different rates for both of them. Furthermore, orders with a single package can have a maximum weight of 70 kilograms. No maximum weight for orders with multiple packages is stated. Any surcharges are added to this price and on top of the final amount an extra 10% fuel surcharge is added.

7.1.3. Subgroup 4: Pre 09.00 Delivery and pre 12.00 Delivery

The fourth group of options deals with the options that entail Scheduled deliveries. A part of these deliveries possible can be done with a pre 09.00 delivery, a pre 12.00 delivery, or a NBD delivery. For the potential NBD deliveries the rate card from Section 7.1.1 is used. The prices of a pre 09.00 and pre 12.00 delivery depend on both zone and weight. The order has to be received before 18.00 to be delivered the next day before 09.00 or 12.00. For some countries it is only possible to deliver the order pre 09.00 or pre 12.00 in 2 days. Any surcharges are added to this price and on top of the final amount an extra 17% fuel surcharge is added.

7.2. Alternative transportation methods

Alternative transportation methods for each of the four groups of options are stated in this section. For each subgroup the total orders and costs per vendor are stated as well as the results of the alternative transportation method.

7.2.1. Options with an upgrade to a NBD service level delivery

Two different subgroups are differentiated for this group of options. These subgroups are stated in Table 26 and Table 27. For both of these groups the Vendor B standard service level delivery is used. As this service cannot deliver to all destinations, the orders currently transported by Vendor C and Vendor D are omitted from the analysis, as well as a few orders from Vendor A and Vendor B.

Table 26: Group 1 - Subgroup SDS

SDS	Amount of Orders	Costs	Average Cost per Order
Vendor A	[redacted]	[redacted]	€ 0,90
Vendor B	[redacted]	[redacted]	€ 1,18
Vendor C	[redacted]	[redacted]	€ 0,44
Vendor D	[redacted]	[redacted]	€ 0,72
Vendor E	[redacted]	[redacted]	€ 0,50
Total	[redacted]	[redacted]	

Table 27: Group 1 - Subgroup 10th BD

10th BD	Amount of Orders	Costs	Average Cost per Order
Vendor A	[redacted]	[redacted]	€ 0,74
Vendor B	[redacted]	[redacted]	€ 1,70
Vendor C	[redacted]	[redacted]	€ 0,60
Vendor D	[redacted]	[redacted]	€ 0,93
Vendor E	[redacted]	[redacted]	€ 0,49
Total	[redacted]	[redacted]	

For the SDS subgroup, a total of [redacted] can be transported with the Vendor D standard Service and for the 10th Business Day subgroup, a total of [redacted] orders can be transported with the Vendor D Standard Service. The results are stated in Table 28.

Table 28: Results alternative transportation method Group 1

	Current Transport	Alternative Service	Δ Relevant Costs	Δ Relevant Costs %
		Subgroup SDS		
Vendor A	[redacted]	[redacted]	[redacted]	30,52 %
Vendor B	[redacted]	[redacted]	[redacted]	48,99%
		Subgroup 10th Business Day		
Vendor A	[redacted]	[redacted]	[redacted]	34,95 %
Vendor B	[redacted]	[redacted]	[redacted]	56,59%
		Total		
Total	[redacted]	[redacted]	[redacted]	32,67 %

Considering the cash flow of the whole group of options, [redacted], the difference in cash flow totals 27,0 percent. Note that the orders currently transported by Vendor B will be transported from the main warehouse in the alternative situation. Savings obtained as the 10th Business Day orders spend less days in the warehouse are neglected. Potential extra cost savings for transport, handling, and storage can be obtained when keeping stock would be done at the main warehouse.

7.2.2. Options with an upgrade to a Scheduled service level delivery

Three different subgroups are differentiated for this group of options. These subgroups are stated in Table 29, Table 30, and Table 31. As the Vendor D standard service cannot deliver to all destinations, the orders currently transported by Vendor C and Vendor D for the subgroups SDS and 10th BD are omitted from the analysis, as well as a few orders from Vendor B.

Table 29: Group 2 - Subgroup NBD

NBD	Amount of Orders	Costs	Average cost per Order
Vendor B	[redacted]	[redacted]	€ 5,97
Vendor C	[redacted]	[redacted]	€ 0,71
Vendor D	[redacted]	[redacted]	€ 5,50
Vendor E	[redacted]	[redacted]	€ 1,77
Total	[redacted]	[redacted]	

Table 30: Group 2 - Subgroup SDS

SDS	Amount of Orders	Costs	Average cost per Order
Vendor B	[redacted]	[redacted]	€ 4,33
Vendor D	[redacted]	[redacted]	€ 1,41
Total	[redacted]	[redacted]	

Table 31: Group 2 - Subgroup 10th BD

10thBD	Amount of Orders	Costs	Average cost per Order
Vendor B	[redacted]	[redacted]	€ 3,20
Vendor C	[redacted]	[redacted]	€ 0,55
Vendor D	[redacted]	[redacted]	€ 4,60
Vendor E	[redacted]	[redacted]	€ 1,77
Total	[redacted]	[redacted]	

For the NBD subgroup all orders can be transported with the alternative service level. For the SDS subgroup, [redacted] orders can be transported with the Vendor D Standard Service. For the 10th BD subgroup, [redacted] orders can be transported with the Vendor D Standard Service. The

results are stated in Table 32. [redacted]
[redacted].

Table 32: Results alternative transportation method Group 2

	Current Transport	Alternative Service	Δ Relevant Costs	Δ Relevant Costs %
		Subgroup NBD		
Vendor B	[redacted]	[redacted]	[redacted]	74,00 %
Vendor C	[redacted]	[redacted]	[redacted]	N/A
Vendor D	[redacted]	[redacted]	[redacted]	68,68 %
Vendor E	[redacted]	[redacted]	[redacted]	N/A
		Subgroup SDS		
Vendor B	[redacted]	[redacted]	[redacted]	89,30 %
		Subgroup 10th Business Day		
Vendor B	[redacted]	[redacted]	[redacted]	81,66 %
		Total		
Total*	[redacted]	[redacted]	[redacted]	75,66%

*In calculating the totals, the transports for which the alternative method is more expensive are omitted.

Considering the cash flow of the whole group of options, [redacted], the difference amounts a total of 72,67 percent. Note that those will be transported from the main warehouse in the alternative situation. Savings obtained as the 10th Business Day orders spend less days in the warehouse are neglected. Potential extra cost savings for transport, handling, and storage can be obtained when sparing for these orders would be done at the main warehouse.

7.2.3. Options with an upgrade to a 4 Hour service level delivery

Three different subgroups are differentiated for this group of options. These subgroups are stated in Table 33, Table 34, and Table 35. As the Vendor D standard service cannot deliver to all destinations, the orders currently transported by Vendor C for the subgroups SDS and 10th BD are omitted from the analysis, as well as a few orders from Vendor B.

Table 33: Group 3 - Subgroup NBD

NBD	Amount of Orders	Costs	Average cost per Order
Vendor B	[redacted]	[redacted]	€ 4,08
Vendor C	[redacted]	[redacted]	€ 0,59
Total	[redacted]	[redacted]	

Table 34: Group 3 - Subgroup SDS

SDS	Amount of Orders	Costs	Average cost per Order
Vendor B	[redacted]	[redacted]	€ 5,20
Total	[redacted]	[redacted]	

Table 35: Group 3 - Subgroup 10th BD

10th BD	Amount of Orders	Costs	Average cost per Order
Vendor B	[redacted]	[redacted]	€ 2,45
Vendor C	[redacted]	[redacted]	€ 0,76
Total	[redacted]	[redacted]	

For the NBD subgroup all orders can be transported with the alternative service level. For the SDS subgroup, [redacted] orders can be transported with the Vendor D Standard Service. For the 10th

BD subgroup, [redacted] orders can be transported with the Vendor D Standard Service. The results are stated in Table 36.

Table 36: Results alternative transportation method Group 3

	Current Transport	Alternative Service	Δ Relevant Costs	Δ Relevant Costs %
		Subgroup NBD		
Vendor B	[redacted]	[redacted]	[redacted]	65,74 %
		Subgroup SDS		
Vendor B	[redacted]	[redacted]	[redacted]	92,58 %
		Subgroup 10th Business Day		
Vendor B	[redacted]	[redacted]	[redacted]	77,42%
		Total		
Total	[redacted]	[redacted]	[redacted]	68,95%

Considering the cash flow of the whole group of options, [redacted], the difference amounts a total of 67,75 percent. Note that those will be transported from the main warehouse in the alternative situation. Savings obtained as the 10th Business Day orders spend less days in the warehouse are neglected. Potential extra cost savings for transport, handling, and storage can be obtained when sparing for these orders would be done at the main warehouse.

7.2.4. The options that entail a Scheduled service level delivery

In the following table the scheduled delivery orders with associated costs per vendor are stated.

Table 37: Group 4 - Scheduled

Scheduled	Amount of Orders	Costs	Average cost per Order
Vendor B	[redacted]	[redacted]	€ 3,22
Vendor C	[redacted]	[redacted]	€ 0,76
Vendor D	[redacted]	[redacted]	€ 5,64
Vendor E	[redacted]	[redacted]	€ 1,82
Total	[redacted]	[redacted]	

Some of those orders are currently delivered in the weekend, entailed a request after 18.00 for a delivery the next day, or are to be transported to a country where the pre 09.00 or pre 12.00 service does not deliver. For the Vendor C, Vendor D and Vendor E orders it holds that the lead times are too long for a ore 09.00 or pre 12.00 delivery. The following Vendor B orders with potential for transportation with an alternative service level are left, split in the following groups:

Table 38: Vendor B orders per service level

	Pre 09.00	Pre 12.00	NBD Delivery	Total
Vendor B	[redacted]	[redacted]	[redacted]	[redacted]

The results of this analysis are stated in Table 39.

Table 39: Results alternative transportation method Group 4

	Current Transport	Alternative Service	Δ Relevant Costs	Δ Relevant Costs %
		Subgroup Pre 09.00		
Vendor B	[redacted]	[redacted]	[redacted]	55,60%
		Subgroup Pre 12.00		
Vendor B	[redacted]	[redacted]	[redacted]	59,66 %

Subgroup NBD						
Vendor B	[redacted]		[redacted]		[redacted]	70,37 %
Total						
Total	[redacted]		[redacted]		[redacted]	62,00%

Considering the cash flow of the whole group of options, [redacted], the difference amounts a total of 30,31 percent. Note that those will be transported from the main warehouse in the alternative situation. Savings obtained as the 10th Business Day orders spend less days in the warehouse are neglected. Potential extra cost savings for transport, handling, and storage can be obtained when sparing for these orders would be done at the main warehouse.

7.3. Validation

This section gives three examples of orders of which the current costs are checked against their current rate cards. Furthermore, as some of the results of Section 7.2 entail big differences between the alternative situation and the current situations, these orders provide an illustration for these differences. The big differences primarily are caused because most of the original orders are charged on base of kilometers driven and the alternative methods are all on base of kilograms transported.

Three random illustrations from the groups 2, 3, and 4 are stated in this section, discussing the differences between the current transportation method and an alternative transportation method in more detail. All three examples are available in the invoices. Their costs are checked with the calculated costs and are equal.

7.3.1. From Scheduled to NBD (Group2)

Taking an order to France as a random example, the minimum charge for a scheduled order is € 57,80 and the costs are € 1,61 per kilometer. The fuel surcharge is 7%. The charge for a NBD order from the Netherlands to France with the Vendor B NBD service level is [redacted] for half a kilogram plus [redacted] per half kilogram extra till 5 kilograms, plus [redacted] per half kilogram extra till 10 kilograms, plus [redacted] extra per kilogram extra till 20 kilograms etc. The fuel surcharge is 17%.

Taking the average distance travelled for a scheduled order (72 kilometer) and taking the average weight transported (9,45 kilogram) this results in costs of € 3,25 for a scheduled order and € 0,80 for a NBD order. This equals a difference of 75,40%.

7.3.2. From 4 Hour to SDS (Group3)

Taking an order to Portugal as a random example, the minimum charge for a 4 Hour service delivery is [redacted] and the costs are [redacted] per kilometer. The fuel surcharge is 7%. The charge for a SDS order from the Netherlands to Portugal with the Vendor D standard service level is [redacted] for a kilogram plus [redacted] per kilogram extra till 5 kilograms, plus [redacted] per half kilogram extra till 10 kilograms, plus [redacted] extra per two kilograms extra till 20 kilograms etc. The fuel surcharge is 10%.

Taking the average distance travelled for a scheduled order (58 kilometer) and taking the average weight transported (9,45 kilogram) this results in costs of € 1,79 for a 4 Hour order and € 0,55 for a SDS order. This equals a difference of 44,20%.

7.3.3. From Scheduled to pre 12.00 (Group4)

Taking an order to Germany as a random example, the minimum charge for a Scheduled service delivery is [redacted] and the costs are [redacted] per kilometer. The fuel surcharge is 7%. The charge for a pre 12.00 order from the Netherlands to Germany with the Vendor B pre 12.00 service level is [redacted] for half a kilogram plus [redacted] per half kilogram extra till 5 kilograms, plus [redacted] per half kilogram extra till 10 kilograms, plus [redacted] extra per kilogram extra till 20 kilograms etc. The fuel surcharge is 10%.

Taking the average distance travelled for a scheduled order (72 kilometer) and taking the average weight transported (9,45 kilogram) this results in costs of € 2,65 for a scheduled order and € 1,04 for a pre 12.00 order. This equals a difference of 60,78%.

7.4. Trade-off

In Section 5.5 the relation of decisions with the KPI's is stated and the KPI's regarding customer performance and TPL Budget are indicated as impacted by the decisions taken. The quantification of the relevant costs from this chapter provide one side of the trade-off between customer satisfaction. For each of the four groups of options discussed, the results are different with respect to impact on budget performance and customer satisfaction. In this section the trade of between the two performance areas is stated for each of the four groups of options.

7.4.1. Upgrade to NBD service level delivery (group 1)

This group of options entails a forced upgrade, as defined in Section 5.5, as the lowest service level currently used to deliver RMA orders is the NBD service level. The delivery is currently executed with a NBD service level.

The difference in relevant costs of this group is stated in Section 7.2.1 and totals [redacted]. Considering the cash flow of the whole group of options, [redacted], the difference in relevant costs totals 27,04 percent of the total cash flow.

The impact on customer satisfaction depends on the customer contract:

- For the subgroup SDS the impact will be negative as the alternative transportation method used is a slower one than the NBD delivery. Although the SDS contract does not commit on lead time, the customer might be used to receiving a fast delivery.
- For the subgroup 10th Business Day the impact will be positive as the alternative transportation method used is faster than sending the product on the ninth business day with a NBD service level delivery.

The trade-off thus exists between the difference in relevant costs of [redacted] on the one hand and a partly positive, partly negative impact on customer satisfaction. The total impact on customer satisfaction however is a subject for further investigation.

7.4.2. Upgrade to Scheduled service level delivery (group 2)

This group of options entails an upgrade to a scheduled service level. The difference in relevant costs of this group is stated in Section 7.2.2 and totals [redacted]. Considering the cash flow of the whole group of options, [redacted], the difference in relevant costs totals 72,67 percent of the total cash flow.

The impact on customer satisfaction is straightforwardly negative as the customers do not receive the requested service level but their contracted service level. The trade-off thus exists between the relevant costs of [redacted] on the one hand and negative impact on customer satisfaction on the other hand.

7.4.3. Upgrade to a 4 Hour service level delivery (group 3)

This group of options entails an upgrade to a scheduled service level. The difference in relevant costs of this group is stated in Section 7.2.3 and totals [redacted]. Considering the cash flow of the whole group of options, [redacted], the difference in relevant costs totals 67,75 percent of the total cash flow.

The impact on customer satisfaction is, as with group 2, straightforwardly negative as the customers do not receive the requested service level but their contracted service level. The trade-off thus exists between the difference in relevant costs of [redacted] on the one hand and negative impact on customer satisfaction on the other hand.

However, an upgrade to a 4 Hour service level delivery is an upgrade to a premium service level. For upgrades to a premium service level the customer pays an extra fee. This fee is based on certain rate cards that are unavailable for this research. To determine the real trade-off between customer satisfaction and cash flow these fees have to be taken into account. These fees are seen as an extra revenue and do not appear in the departmental KPI's of the SSCD department. The extra costs however are affecting the budget KPI of the TPL department.

The relevant costs can moreover be used to determine whether these rate cards are in line with the extra costs Cisco incurs for granting the upgrade.

7.4.4. Scheduled service level delivery (group 4)

This group of options entails a change to a scheduled service level. For this group of options a change in the transportation method is investigated which allows for a demarcation of the scheduled service level but still grants the customer request for this scheduled service level.

The relevant costs of this group are stated in Section 7.2.3 and total [redacted]. Considering the cash flow of the whole group of options, [redacted], the relevant costs total 30,31 percent of the total cash flow.

For a part of the scheduled orders a pre 09.00, a pre 12.00, and a NBD service level (before 18.00), can be used. Instead of getting a free range for choosing the delivery time, a customer picks one of these three service levels. The customer thus has less freedom in choosing the delivery time. This is likely to affect customer satisfaction negatively. The trade-off thus exists between the difference in relevant costs of [redacted] on the one hand and negative impact on customer satisfaction on the other hand.

7.5. Discussion

In this section several assumptions and demarcations made throughout the analysis are discussed, as well as their potential impact on the results. Furthermore, the impact of missing data is discussed. The topics in this section are discussed in the same order as they appear throughout the report.

7.5.1. Stable demand

Based on interviews with Cisco's employees in Section 5.1 the assumption is made that demand over time is stable. The result of this assumption is that extrapolations of vendor data can be made without distorting figures. The impact on the results when in reality demand would be lower or higher would be an overestimate or an underestimate of the total amount of orders respectively. This assumption is validated in Section 5.3 where the extrapolated vendor data is compared to Cisco's RMA data.

7.5.2. Missing order Vendor E

In Section 5.1 notion is made of an unknown amount of NBD orders transported by Vendor E for which no details could be obtained. The approximate yearly cash flow of these orders ([redacted]) totals 3,10 percent of the total cash flow for transportation of RMA orders. The impact of omitting these orders in the analysis however is limited. Firstly, these orders do not impact the selection of relevant options as all upgrades to NBD orders are selected for further analysis and the missing orders thus would merely be included in this further analysis. The results of the analysis when including the missing orders thus would entail a bigger difference in relevant costs. However, it would not affect any conclusions drawn from the analysis. Second, even if included, the total effect on the difference in relevant costs would be limited as rate cards for transport to [redacted] show that not much difference in expenses can be realized.

7.5.3. Replenishment flows out of scope

In Section 6 notion is made of leaving the relevant costs concerned with transport of the replenishment flows out of the analysis. These flows are outside the scope of the project but can impact the results in this project in two ways. First, including those costs would increase the cash flow to be considered for the transports taking place from RFD's and CD's and thus options including these transports would possible be eligible for selection. Considering the selection of relevant options in this report, only the upgrades to 2H service are potentially falsely omitted. However there are [redacted] orders with an upgrade to a 2H service level, corresponding with a cash flow of less than 1 percent of the total cash flow concerned with upgrades. Even when taking into account the impact of the relevant costs of the replenishment flows, these options would not be selected as their financial impact is insufficient . Second, the impact of omitting the relevant costs of replenishment flows on the difference in relevant costs is evident. The difference in relevant costs will be bigger than stated in this report. However, the conclusions of this report are not affected.

7.5.4. Weight distribution

In Section 7 a weight distribution is used in calculating the rates for alternative transportation methods. In combination with the destination country an estimated rate per RMA order is calculated. The weight distribution is based on orders that represent the orders for which weights have to be assumed best. When the weight distribution overstates or understates the actual weights this would impact the difference in relevant costs but not to such a big extent that the selection of relevant options is affected. The conclusions of this report therefore are not affected.

7.6. Conclusion

Using different transportation methods implies different trade-offs for each of the four groups. The impact on the budget side is exactly determined. The impact on the other side of the trade-off,

customer satisfaction, however is yet to be determined in detail. Table 40 summarizes the anticipated impact on customer satisfaction.

Table 40: impact alternative transportation methods on customer satisfaction

	Customer Satisfaction	Remark
Group 1	+ / -	Party positive and partly negative as part of the orders are delivered faster and part of the orders are delivered slower
Group 2	--	Negative as customers receive a lower service level than requested
Group 3	--	Negative as customers receive a lower service level than requested
Group 4	-	Slightly negative as the customer receives the same service level but with limited flexibility of choice for delivery time

For each of the four groups of options the difference in relevant costs have to be weight against the anticipated impacts on customer satisfaction. For the first group and the fourth group it holds that a trade-off can be made fairly straightforward as the impact on customer satisfaction is low. For the second and the third group, which are the normal upgrades, the trade-off has to be fed by discussion with Cisco's Duty Managers who decide on granting upgrades. Discussions with Duty Managers bring forward that the amount of upgrades likely can be lowered when Cisco's systems would be updated in time as the timely updating of Cisco's systems would prevent escalations in the first place. Furthermore, when the upgrades and reasons for upgrades are tracked an overview can be obtained which provides input for the trade-off between customer satisfaction and costs. Currently no records are kept of any of the underlying reasons for an upgrade.

Note that the difference in relevant costs will increase when the costs of the replenishment flows will be taken into account.

8. Plan of action: design of solution and change plan

This chapter states the design of the solution and a change plan for both the operational analysis done in the Chapters 3, 4, 5, 6, and 7 as for the analysis of the performance measurement system from Chapter 2. This chapter is subsequently organized in three sections: first, in Section 8.1 a design of the solution and change plan is stated for the implementation of alternative decision making. This section discusses the implications of an alteration of decision making for each of the four groups of options analyzed in Chapter 7.

Zooming out from the operational level a design of the solution and a change plan for realizing a culture change with respect to the departmental silo's is proposed in Section 8.2

Section 8.3 states the design of the solution and a change plan with regard to the problems found in the analysis of the performance measurement system. This section thus zooms out from the operational level and regards a solution and change plan for the overarching performance measurement system. For this section scientific literature is used to compare the current situation at Cisco with an alternative situation proposed by scientific. The chapter is concluded in Section 8.4. Hereby, the research questions 5.1, 5.4, 6.1, and 6.2 are answered. The methodology of this chapter is stated in Figure 18.

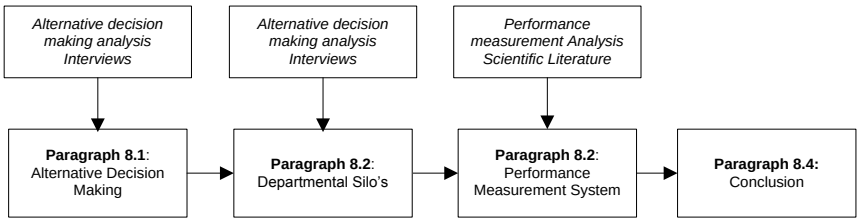

Figure 18: Methodology Chapter 8

8.1. Alternative Decision Making

The design of the solution and change plan differs per group of options. Subsequently alternative decision making for forced upgrades (options group 1), normal upgrades (options group 2 and 3), and scheduled deliveries (options group 4) are discussed.

8.1.1. Forced Upgrades (Group 1)

The problem for this group of options stems from the fact that not all of the service levels Cisco agrees with its customers are delivered by Cisco's vendors. To solve this problem, capabilities providing alternative ways of transport have to be contractually agreed with Cisco's vendors.

From Figure 9 it is noted that an RMA order request is received by the online [redacted] tool. Here, multiple service levels can be chosen. However, the next step entails the forwarding of the order to the Logistic Service Center. The order is received by the control tower of Vendor A Logistics (VAL) and forwarded to one of the vendors. In forwarding only a few service levels are used however. The start of the solution is to take into account suitable new rate cards and integrate alternative transportation methods in this system. Note has to be taken that the new transportation methods comply with Cisco's current demands such as delivery accuracy.

The following steps to realize these alterations are proposed:

1. Identify suitable new transportation methods
2. Adapt Cisco's systems to new service levels

3. Discuss prerequisites for implementation at VAL
4. Integrate new transportation methods in the VAL system
5. Monitor effects on delivery performance and customer satisfaction

For step 1 the transportation method used in this project can be used. However, for this project most alternative vendor rate cards were unavailable and more transportation methods and rate cards should be identified that suit the service levels offered by Cisco. Step 2 entails adapting Cisco's system to the changes as currently C3 makes use of lead times instead of the service entitlement of the customer. The third and the fourth step involve discussions with VAL to identify the prerequisites for integrating new rate cards in their current systems. At the moment of writing this report this step is not yet analyzed in further detail as Cisco wants to discuss these possible changes internally first before including VAL.

The final step is to monitor the effects on delivery performance and customer satisfaction. With regard to delivery performance, the new way of transporting must meet the targets set for these KPI's, as did the previous ways of transporting. The current performance measurement system in place for monitoring the on time delivery of products, with the monitoring done by various vendor managers, is adequate and no significant changes are needed. Considering customer satisfaction, the implications are varied and depending on the contracted service level of the customer since, as indicated in Table 15, the perceived change in service differs per customer. As customers might be used to receiving a fast service, customer satisfaction may lower. A suggestion is to discuss the proposed changes with a select group of customers to identify negative response in advance.

8.1.2. Normal Upgrades (Group 2 and 3)

For this group of options the problem is that no trade-off currently exists between customer satisfaction and costs. Section 7.4 discussed this trade-off and clearly states the effects for the cost side. The effects on the customer satisfaction side however remain unclear.

As stated in Section 4.1 the decision to upgrade a contract is made by a Duty Manager and can depend on a multitude of factors. However, if an escalation reaches the duty manager the case is regarded critical enough to grant an upgrade. Often pressure is applied from a sales team as customer sentiment is low and Cisco's systems are not always up to date resulting in upgrades granted to the customer because the customer actually is entitled to the higher service.

Discussions with Duty Managers bring forward that the amount of upgrades likely can be lowered when Cisco's systems would be updated in time as the timely updating of Cisco's systems would prevent escalations in the first place. Furthermore, when the upgrades and reasons for upgrades are tracked an overview can be obtained which provides input for the trade-off between customer satisfaction and costs. Currently no records are kept of any of the underlying reasons for an upgrade.

Therefore, the following steps to realize alterations are proposed:

1. Upgrade Cisco's systems as to enable timely updates and prevent escalations
2. Identify and track upgrades and reasons for upgrades
3. Formulate a trade-off between the costs identified in this report and the underlying reasons for an upgrade identified under 2.
4. Facilitate discussion within the SSCD department in which the effects on customer satisfaction and the effects on the TPL budget are brought together.

The prerequisites for step 1 are unknown and detailed research in Cisco's IT environment is needed. Step 2 is fairly easy to implement; tracking of the reasons for upgrades should be done. Next, a categorization of these reasons can be made and from here possible guidelines can be constructed to facilitate a consequent upgrade policy. When these underlying reasons become clear, a trade-off can be made as both sides of the equation are known. Discussion between the OM department and the TPL department has to take place to weigh both sides and find a well based trade-off.

8.1.3. Scheduled Deliveries (Group 4)

An alteration of transportation methods for this group of options entails offering the customer a little less service for diminished expenses. The alternative transportation methods is applicable to a subset of all options currently receiving a scheduled service level delivery and involves offering the customer a choice between a pre 09.00, pre 12.00, and pre 18.00 delivery instead of the current Scheduled delivery.

The following steps to realize alterations are proposed:

1. Involve the sales teams to discuss impact of alternative transportation method on customer satisfaction
2. Adapt Cisco's systems to new service levels
3. Discuss prerequisites for implementation at VAL
4. Integrate new transportation methods in the VAL system
5. Monitor effects on delivery performance and customer satisfaction

Step 1 involves discussions with the sales teams as they are closest to the customer wishes and can determine best if it is sensible to give the customer this alternative choice. Step 2 involves preparing Cisco's systems to cope with those new service levels. For example C3 and the online [redacted] tool have to support these service levels. Next, as with the proposed alteration for the first group of options, the control tower of VAL has to take into account the different transportation methods and new rate cards and alternative ways of transport have to be integrated in this current system.

The current performance measurement system in place for monitoring the on time delivery of products, with the monitoring done by various vendor managers, is adequate and no significant changes are needed. Considering customer satisfaction, the implications are likely to be small as the Scheduled service level still is delivered but only the freedom to choose the exact time stamp is reduced.

8.2. Departmental Silo's

Section 8.1 indicates the operational impact of the lack of trade-offs and the impact of suboptimal decision making on the OM and TPL department. This section zooms out and takes all different sub departments into account.

Suboptimal decisions are not only taken at the departments TPL and OM. As indicated in Figure 6, the departments AR and PR have their own separate focus. It is likely that, similar to the friction between the OM department and the TPL department, the AR and PR department encounter trade-offs in the current business that are not addressed. The AR and PR department are responsible for the realization of the TPL budget as well and here too, no insight in the realization of the budget by these departments may cause ill made trade-offs and lower than possible performance figures.

Before looking into the deficiencies of the performance measurement system it is proposed to counter the problems on a lower level first. An important reason is that it will take time to implement changes in the performance measurement system. But more important, by actively discussing implicit trade-offs, acknowledgement of the problems is realized in the departments and furthermore, important input for a reconstruction of the performance measurement system can be obtained. Currently, not all departments see the necessity of considering this trade-off and would rather see each department mind his own business.

The following steps to realize an alteration in this situation are proposed:

1. Hold SSCD meetings to explicitly discuss the lack of trade-offs and the potential impact on the business
2. Gather input from all departments about the most important implicit trade-offs made
3. Analyze the trade-offs found under 2 to improve decision making with multiple involved departments
4. Use the results of those meetings as input for a change in the performance measurement system.

The first step entails creating awareness of the lack of trade-offs and the potential impact on the business as not all departments realize this impact. It entails discussing the departmental silo's and the sub optimality of decisions taken. The next step is to collect the most important implicit trade-offs made as to improve business in those areas. The third step consists of cooperation between the departments to dig into these implicit trade-offs and find areas of improvements, much as is done in this report for the situation between the departments OM and TPL. By analyzing the multiple sides of an implicit trade-off in detail and quantify the opposing arguments the trade-off can be made explicit. Last, the results of the meetings have to be used as input for an alteration in the performance measurement system, as presented in Section 8.3.

8.3. Performance Measurement System

This section discusses the design of the solution and change plan for proposed alterations of the performance measurement system. Hereby, this section zooms out from the operational level and takes the SSCD department as a scope.

In Chapter 2 the deficiencies of the current performance measurement system are discussed. The most important findings are that the financial aspect of the performance measurement system is underrepresented to a big extent and that the exclusive focus of each department on a separate section of the performance measurement system likely contributes to the fact that departments barely relate their performance to other departments. These findings are in congruence with the problems found in Section 1.2; a lack of alignment between departments, silo optimization per department, and the focus of departments on their own Key Performance Indicators.

The impact on the departments OM and TPL became clear during the project. No well funded trade-offs are made due to the lack of insight the actions of the OM department have for the budget of the TPL department. The current performance measurement system does not facilitate this trade-off and in this case, delivery overperformance at the OM department involves higher costs for the TPL department.

As stated in Section 8.2 the different departments OM, AR, and PR impact the TPL budget. The budget KPI's in place at the departments do not facilitate any trade-offs in the current situation. First

because the KPI's state a realization of the budget between -2% and + 1% of the budget but foremost because the construction of the budget does not take into account any trade-offs.

The design solution and change plan proposed here are based on findings from scientific literature, stating the necessary properties of the Balanced Score Card. As stated in Chapter 2, the performance measurement system at the SSCD department is build upon the basics of a Balanced Scorecard (BSC), introduced by Kaplan & Norton (1996)(1996) and the BSC is regarded the least criticized and most widely accepted performance measurement system (Paranjape et al., 2006). The implementation of a Balanced Score Card fits the SSCD department as the start of the BSC is the strategy a company or department adopted. The SSCD department already has a strategy in place and from here on the BSC can be constructed.

From the five necessary properties of the BSC as stated by Soderberg et al. (2011) a change plan for Cisco's performance measurement structure is constructed. The five properties are: the measures are derived from strategy, there is balance among measures, the measures are causally linked, double-loop learning, and tie-in to compensation is in place. The first, the fourth, and the fifth characteristic appear to be in place to a big extent. The second and the third characteristic however deserve more attention.

The following high level steps to realize alterations are proposed:

1. Bring balance to the measures from each of the four areas of SSCD objectives
    a. Place more emphasis on the financial measures
2. Establish links between the measures showing the impact of one measure on another measure
3. Consider the SSCD department performance measurement system as a whole and thereby prevent silo-optimization

Step 1 states putting more emphasis on the financial measures. The balance between the different measures is distorted as the financial aspect is neglected. To bring back this balance three practical steps are proposed. Firstly, increase the amount of financial measures as they currently are underrepresented. Second, more emphasis to the financial section can be placed by making direct connections between the logistic operations of the different departments and the costs of those operations. The budget per department hereby can be justified easier and effects of logistics operations on the budget become visible. In this way sub departments are made accountable for their decisions. Third, including the financial measures in the dashboards of the different departments helps making the financial aspect more visible for all sub departments

Step 2 indicates that measures should be linked. This should be done in a series of cause and effect relationships such that the impact of one measure on another measure becomes clear. The multiple measures on a properly constructed BSC should consist of a linked series of objectives and measures that are both consistent and mutually reinforcing (Kaplan & Norton, 1996)(Kaplan & Norton, 1996). Currently, this relationship is lacking and that makes the departments operate as separate silo's. The cause and effect relationships between the KPI's should tell the story behind the strategy of the SSCD department. For example:

If more products receive back end entitlement, *then* the clean receipt rate will be higher
If we make sure the clean receipt rate is higher, *then* the repair to new buy ratio will be higher
If the repair to new buy ratio is higher, *then* the profits will increase

For this step three practical steps are proposed as well. Firstly, the input from the SSCD meetings, which explicitly discussed the lack of trade-offs and the potential impact on the business, as discussed in Section 8.2 is to be used. As stated in this former section, the relation between performance measures on each other is discussed as implicit trade-offs are identified. These relations can be used in constructing a performance measurement system with balance among the measures, and cause and effect relationships between the measures in place. Second, next to those meetings discussions have to be held to identify which performance measures are so called 'driver' measures and which performance are so called outcome measures. By identifying the sort of performance measure a series of performance measures can be constructed. Third, the series of performance measures has to be analyzed to look at possible improvements. One important property of proper cause and effect relationships between performance measures is that these links exist between all four perspectives.

Step 3 follows from step 2 and is primarily a change of attitude: the current departmental boundaries with respect to performance measurement have to disappear and departments have to realize overall performance is an overarching goal. With a correct implementation of step 1 and 2, this step will be reached to a big extent.

8.4. Conclusion

The steps to be taken to implement alterations on an operational level, for the three groups of options distinguished, lies at the control tower of VAL, the SSCD department, and the sales department respectively. For the first group merely practical issues have to be overcome. The second group however asks for a trade-off that currently cannot be made due to the unknown causes and justness of upgrades. The costs of this trade-off are known and the next step is to value the reasons of the upgrades against these costs. The third group entails primarily practical issues to overcome but demands a little trade-off between costs and customer satisfaction as the customers' freedom of choice for the delivery time stamp is curtailed. A good start would be to involve the sales team to estimate the impact on customer satisfaction of this change.

Moving from silo optimization to considering the SSCD performance measurement system as a whole is a cultural change. In the current situation several departments want each department to mind its own business. An alteration of this situation would entail that the departments discuss implicit trade-offs and confer with each other.

With respect to the change plan of the performance measurement system it is proposed to upgrade the current system, which is based on a Balanced Score Card, to a system that truly is a Balanced Score Card. Based on a Soderberg et al. (2011) two neccesary properties for a BSC are indicated as lacking in the current performance measurement system: there is balance among measures and the measures are causally linked. To realize the first step, more emphasis on financial measures should be placed. Subsequently, cause and effect relations between the measures are to be established to make the performance measurement system overarching the departments and diminishing the departmental silo's. For both these alterations three practical steps for starting are proposed.

To implement a real BSC, the starting point is for the corporate level to adopt a strategy. As the SSCD department is the overarching department with a defined strategy In place, this is a good starting point for implementing a real Balanced Score Card.

9. Conclusions and Recommendations

This chapter summarizes and implicitly answers all research questions in Section 9.1. The overall conclusion of the report is stated in Section 9.2 and recommendations are presented in Section 9.3.

9.1. Conclusion Research Questions

The structure of the implicit performance measurement system is mapped by arranging the KPI's per department in groups, stating a description and their targets. The objectives of the SSCD department are mapped as well. Links between the departmental KPI's and the SSCD objectives are stated by denoting whether the same construct was measured. The financial part of the performance measurement system is underrepresented to a big extent and an exclusive focus of each department on a separate section of the performance measurement system causes the departments not to relate their performance to other departments. The current performance measurement system can cause friction between the different departments and has as important implication that trade-offs between departments are not made.

The processing of RMA orders is identified as well as the different transportation methods used. By zooming in on these processes the scope is limited to the OM department and the TPL department. The impact of the processes on the level of KPI's entails a positive influence on all KPI's that relate to the SDP measure and a positive influence on customer satisfaction is stated. The reverse side is the budget KPI, as costs are made in processing these RMA orders. However, as the budget KPI states that the realization of the budget has to be within certain limits of the budgeted amount this KPI is not put under much pressure as a lower bound is stated. The TPL and the OM department are having a shared goal in timely delivering products to the customer by several of their KPI's that relate to on time delivery of products. However, the OM department primarily relates this goal to customer satisfaction whereas the TPL department relates this goal primarily to the budget. There does not exist a trade-off between customer satisfaction and expenses (the realization of the budget). Due to the split focus the OM department does not take into account expenses and does not make a trade-off between those measures. The TPL department cannot influence the processes instigated by the OM department and thus does not influence the expenses in the current situation.

	D > C	D = C	D < C	D NTBD C	Total
R > C	6,89%	0,05%	0,00%	0,00%	6,94%
R = C	12,31%	64,67%	0,09%	0,34%	77,41%
R < C	0,07%	0,32%	1,86%	0,01%	2,26%
R NTBD C	0,72%	1,49%	0,72%	10,46%	13,39%
Total	19,99%	66,53%	2,67%	10,81%	100,00%

D > R	14,46%
D = R	82,10%
D < R	1,80%
D NTBD R	1,65%
Total	100,00%

The decisions instigating the processes are defined. It appeared that the decision what process to start is highly automatic for the part where the same service level has to be delivered to the customer. Decisions for an upgrade or a downgrade however entail manual intervention and are done by a Vendor Manager. The decision to deliver a higher service level can be based on numerous criteria and no guidelines exist. By far the biggest percentage of the customer orders entails a request for a delivery of a entitled service level; in 77,41% of the total orders the customer requests a service level which is stated in his contract. A noticeable amount of customer orders (13,39%) entail a request for a change to a scheduled delivery whereas 6,94 percent and 2,26 percent of the total orders entail a request for a upgrade or a downgrade of the contract respectively. In 6,94% of

the cases a customer requests more than the customer is entitled to and that Cisco delivers more than a customer is entitled to in 19,99% of the cases. The implication of these findings for the relation to the KPI's and for the impact on the level of these KPI's is that only part of the upgraded orders positively impacts the Order Management KPI's that deal with customer satisfaction. All upgrades however potentially negatively impact the budget KPI of the TPL department as cheaper transportation options are possible.

By coupling the cash flows to all the options, four groups of options are marked as most important from a TPL financial perspective: For each of the four groups of options, the results are different with respect to impact on budget performance and customer satisfaction. A trade-off however exists between the difference in relevant costs and customer satisfaction for all of those groups. This part of the thesis provided important insight in the quantification of the financial side of the trade-off.

The steps to be taken to implement alterations on an operational level, for the three groups of options distinguished, lies at the control tower of VAL, the SSCD department, and the sales department respectively. With respect to the change plan of the performance measurement system it is proposed to upgrade the current system, which is based on a Balanced Score Card, to a system that truly is a Balanced Score Card, following a series of practical steps identified.

By constructing a real Balanced Score Card, trade-offs are made more explicit and current issues relating to decisions made only in the benefit of separate departments will be largely prevented.

9.2. Overall Conclusion

The lack of a proficient measurement system causes the departments not to relate their performance to other departments and invoke departmental silo's. The current performance measurement system does not facilitate trade-offs and this project reveals the effects on an operational level: delivery overperformance at the OM department lead to higher costs for the TPL department. Alternative decision making is proposed and relevant costs are calculated to map the actual impact of the current way of decision making. Considering the relevant costs, it is found that making the trade-off is worthwhile for the overall benefit of the SSCD department.

When zooming out, the areas of friction between the TPL department and the AR and PR departments are indicated as important areas to apply the same methods to. For these departments it holds that friction mostly comes forth from a different focus and that departmental performance measures are not related to each other. Potential overall benefits might be found here as well.

9.3. Recommendations

The recommendations consist of executing the steps denoted in Chapter8.

Operational:

- Upgrade Cisco's systems as to enable timely updates and prevent escalations
- Identify and track upgrades and reasons for upgrades
- Identify Suitable Alternative Transportation Methods
- Integrate new transportation methods in the VAL system
- Adapt Cisco's systems to new service levels
- Facilitate discussion within the SSCD department in which the effects on customer satisfaction and the effects on the TPL budget are brought together.

- Formulate a trade-off between the costs identified in this report and the underlying reasons for an upgrade identified
- Monitor effects on delivery performance and customer satisfaction

Structural:

- Enhance the performance measurement system so that overviews of the performance are presented in a comprehensible and encompassing way
- Bring balance to the measures from each of the four areas of SSCD objectives by placing more emphasis on the financial measures
- Relate the performance measures of the SSCD departments to each other to enable trade-offs on an operational level;
- Consider the SSCD department performance measurement system as a whole and diminish the departmental silo's.

Furthermore, with the causal relationships between the performance measures in place it deserves recommendations to reconsider all trade-offs implicitly taking place at the SSCD department and thus explicitly considering the departments AR and PR, which are left out of scope for this report. This can be realized using the change plan proposed in Section 8.2. The link between the current logistic operations and the actual costs of these operations for these other departments has to become transparent to facilitate this trade-off. Possible reconsiderations might entail replenishment from the main warehouse versus replenishment between RFD's and CD's, reconsideration of storage parameters, or the profitability of delivering certain service levels.

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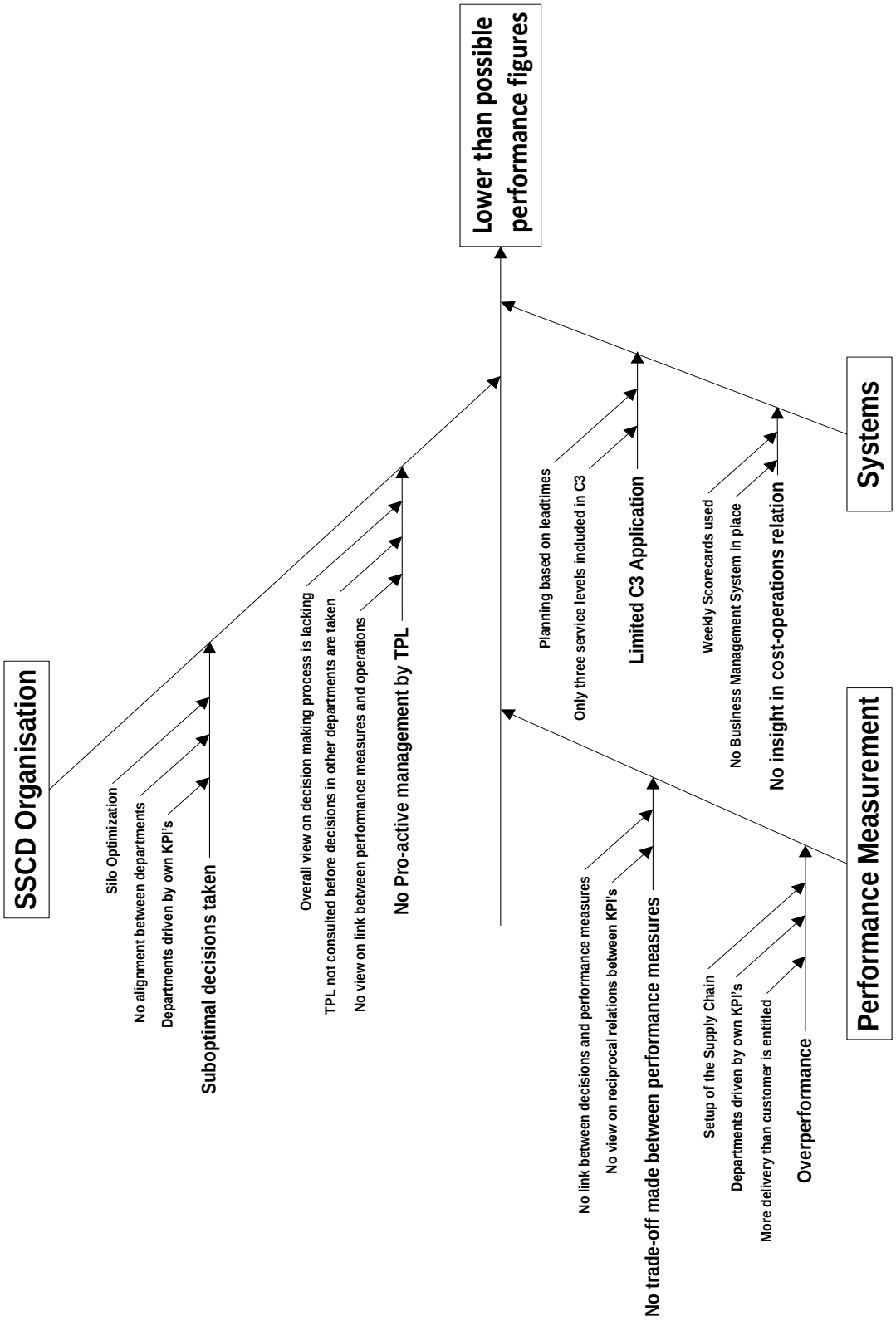
Appendix A. List of Abbreviations

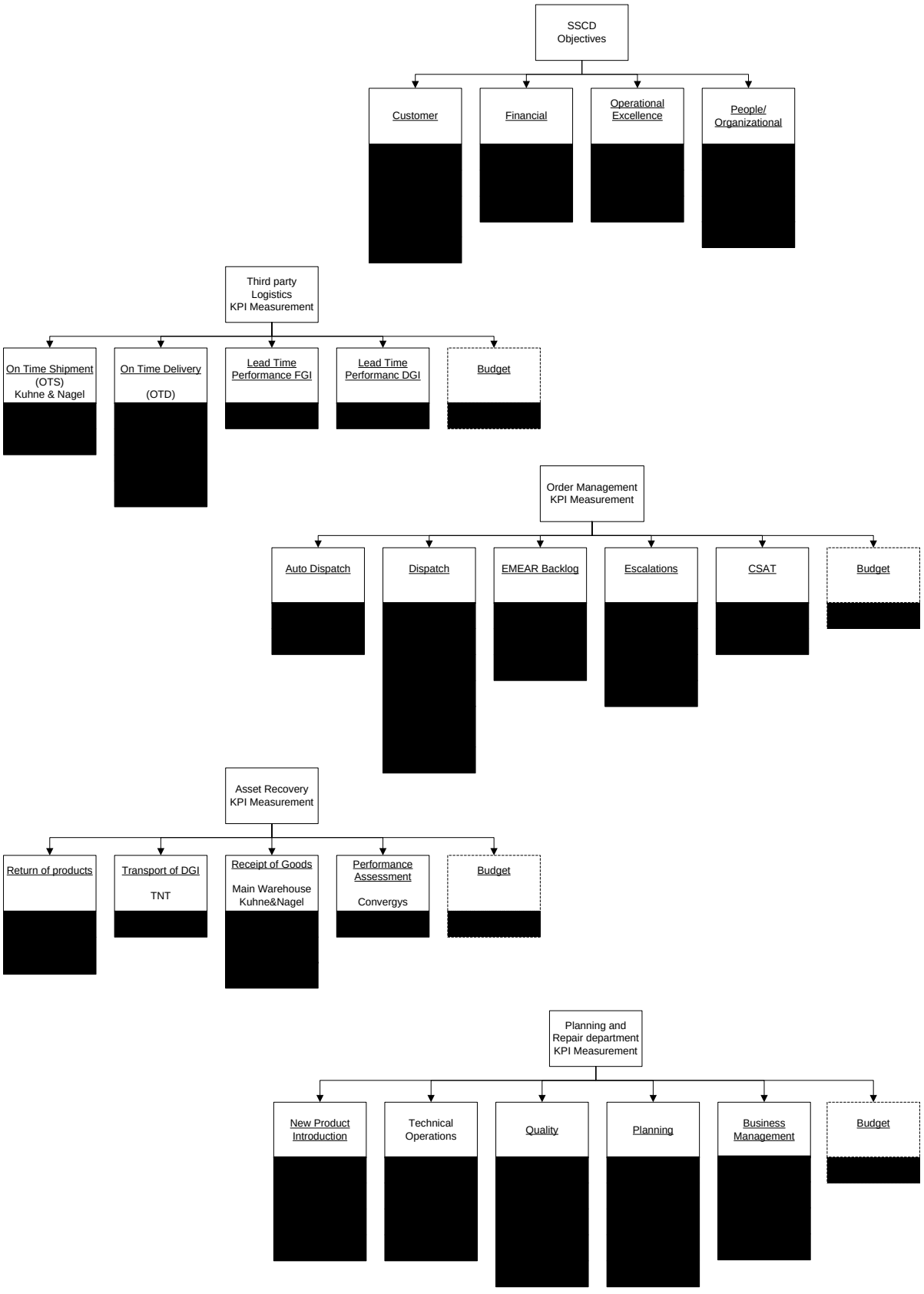
3PL	Third Party Logistic (service provider)
4PL	Fourth Party Logistic (service provider)
AIT	Aged In Transit
AM	Account Manager
APJC	Asia Pacific, Japan, and China
AR	Asset Recovery
ASD	Advanced Service Delivery
BEE	Back End Entitlement
BPMN	Business Process Modeling Notation
BSC	Balanced Score Card
BSG	Business Support Group
CD	Country Depot
CRM	Contract Repair Manufacturing
DGI	Defective Goods Inventory
DM	Duty Manager
ECO	Engineering Change Order
EMEAR	Europe, Middle East, and Africa
FCM	Fuzzy Cognitive Map
FEE	Front End Entitlement
FGI	Finished Goods Inventory
IP	Internet Protocol
IT	Information Technology
[redacted]	[redacted]
[redacted]	[redacted]
KPI	Key Performance Indicator
LCC	Logistic Control Tower
LSC	Logistics Service Center
LSP	Logistic Service Providers
LT	Lead Time
MAUT	Multi-Attribute Utility Theory
NBD	Next Business Day
NTBD	Not to be Determined
OM	Order Management
OSS	On Site Services
OTD	On Time Delivery
OTS	On Time Shipment
PID	Product ID
POD	Proof of Delivery
PR	Planning and Repair
RFD	Rapid Fulfillment Depots
RMA	Return Merchandise Authorization
RTF	Return to Factory

SDP	Service Delivery Performance
SDS	Same Day Shipment
SLA	Service Level Agreement
SOW	Scope of Work
SSCD	Service Supply Chain Delivery
SSM	Sales Support Manager
TM	Territory Manager
TPL	Third Party Logistics
TPM	Third Party Maintenance
TSD	Technical Service Delivery
VAL	Vendor A Logistics
TVRR	Total Value Recovery Rate
VSA	Vendor Service Agreement
WIP	Work In Progress

Appendix B. Ishikawa Diagram



Appendix C. KPI Measurement Structures



Appendix D. KPI's per Department

Asset Recovery Group 1: Return of Products

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

Asset Recovery Group 3: Receipt of Goods

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

Asset Recovery Group 5: Budget

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]

Order Management Group 1: Auto Dispatch

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Order Management Group 2: Dispatch

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

Order Management Group 3: EMEAR Backlog

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Order Management Group 4: Escalations

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Order Management Group 5: CSAT

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Order Management Group 6: Budget

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]

Planning and Repair Group 1: New Product Introduction

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Planning and Repair Group 2: Technical Operations

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

Planning and Repair Group 3: Quality

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]

Planning and Repair Group 4: Planning

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]

Planning and Repair Group 5: Business Management

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Planning and Repair Group 6: Budget

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]

Third Party Logistics Group 1: On Time Ship

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	

Third Party Logistics Group 2: On Time Delivery

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	

Third Party Logistics Group 5: Budget

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]

Appendix E. SSCD Objectives

Group 1: Customer Objectives

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Group 2: Financial Objectives

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

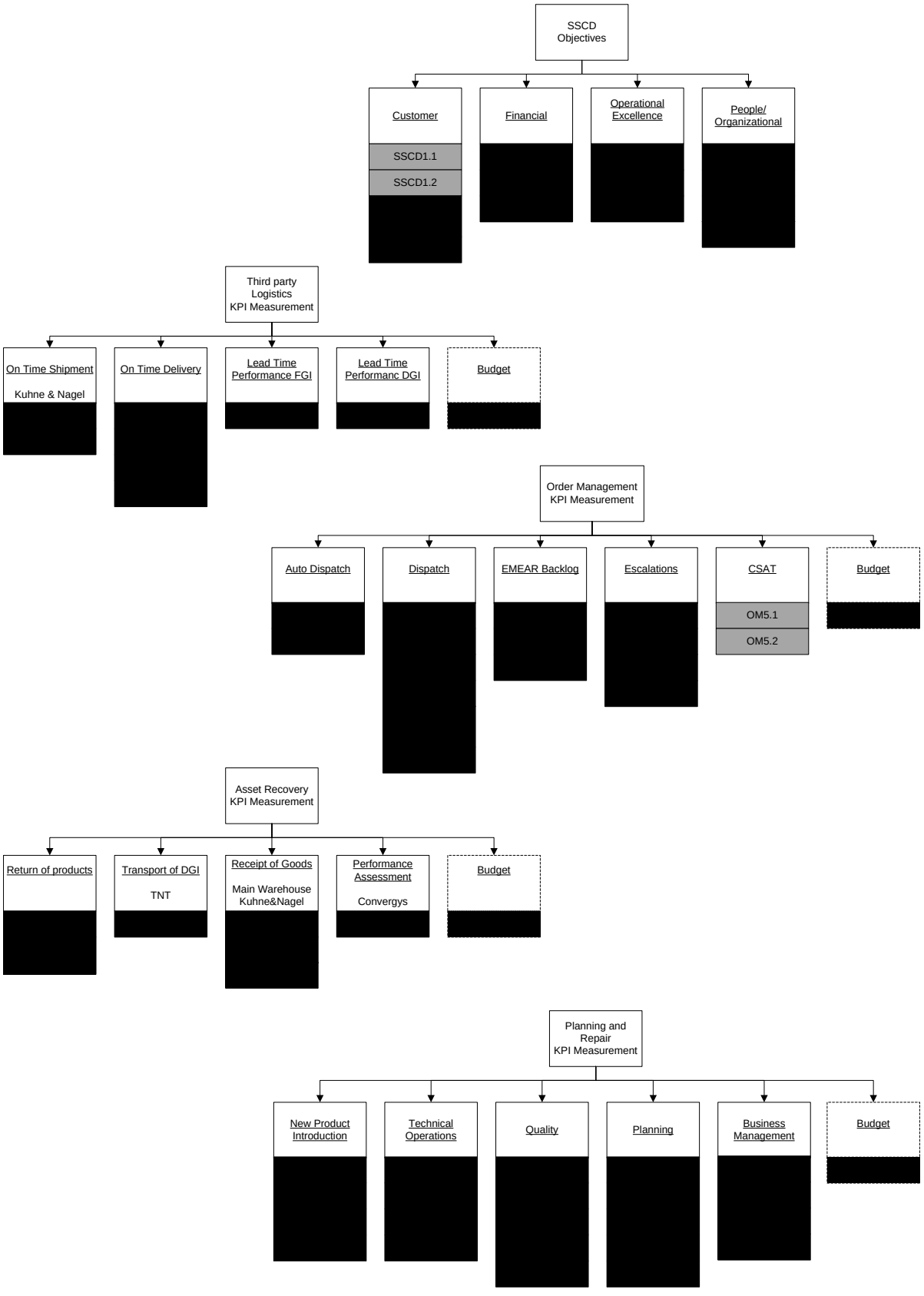
Group 3: Operational Excellence Objectives

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

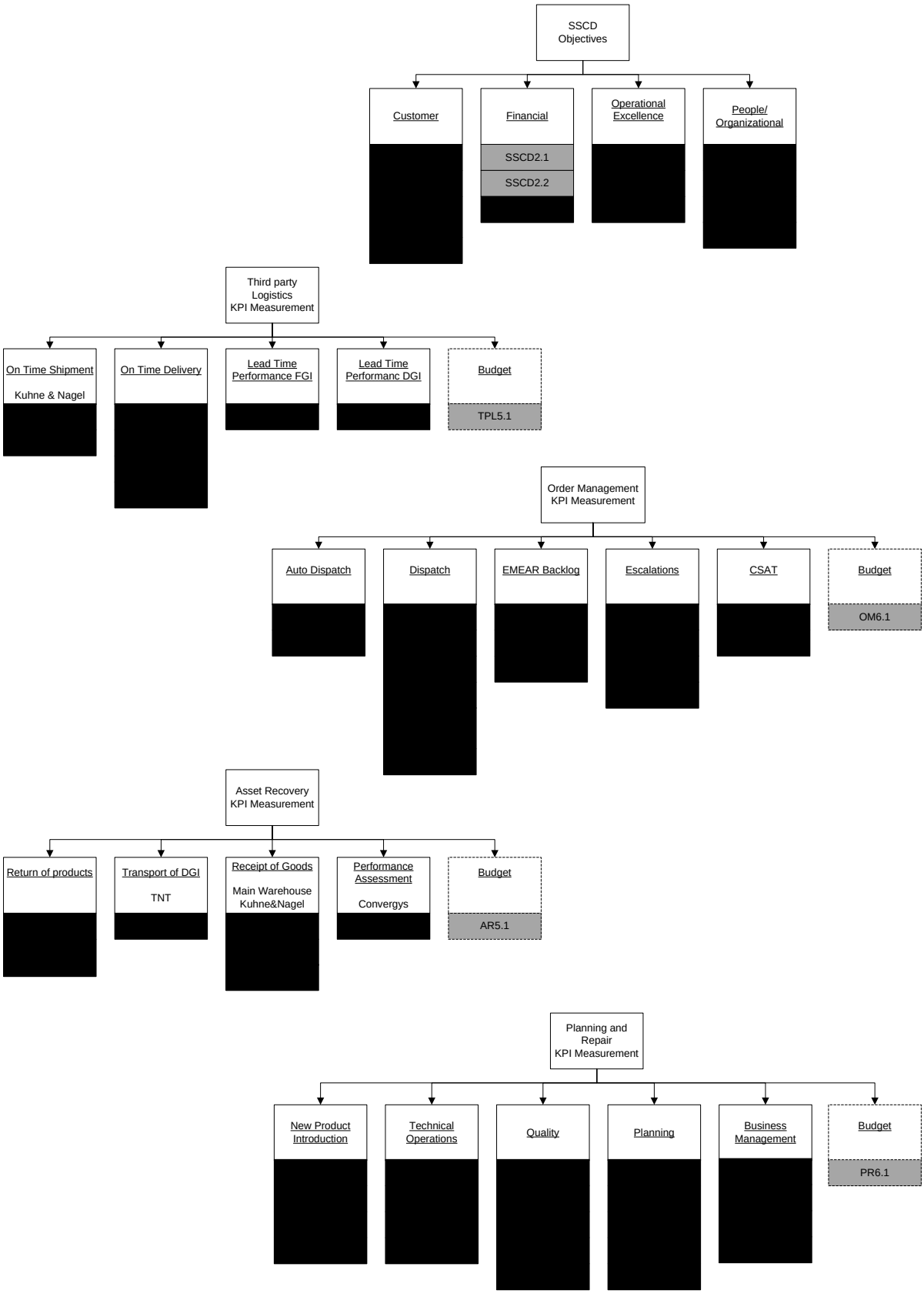
Group 3: People/Organizational Objectives

Measure	*Description*	*Target*
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

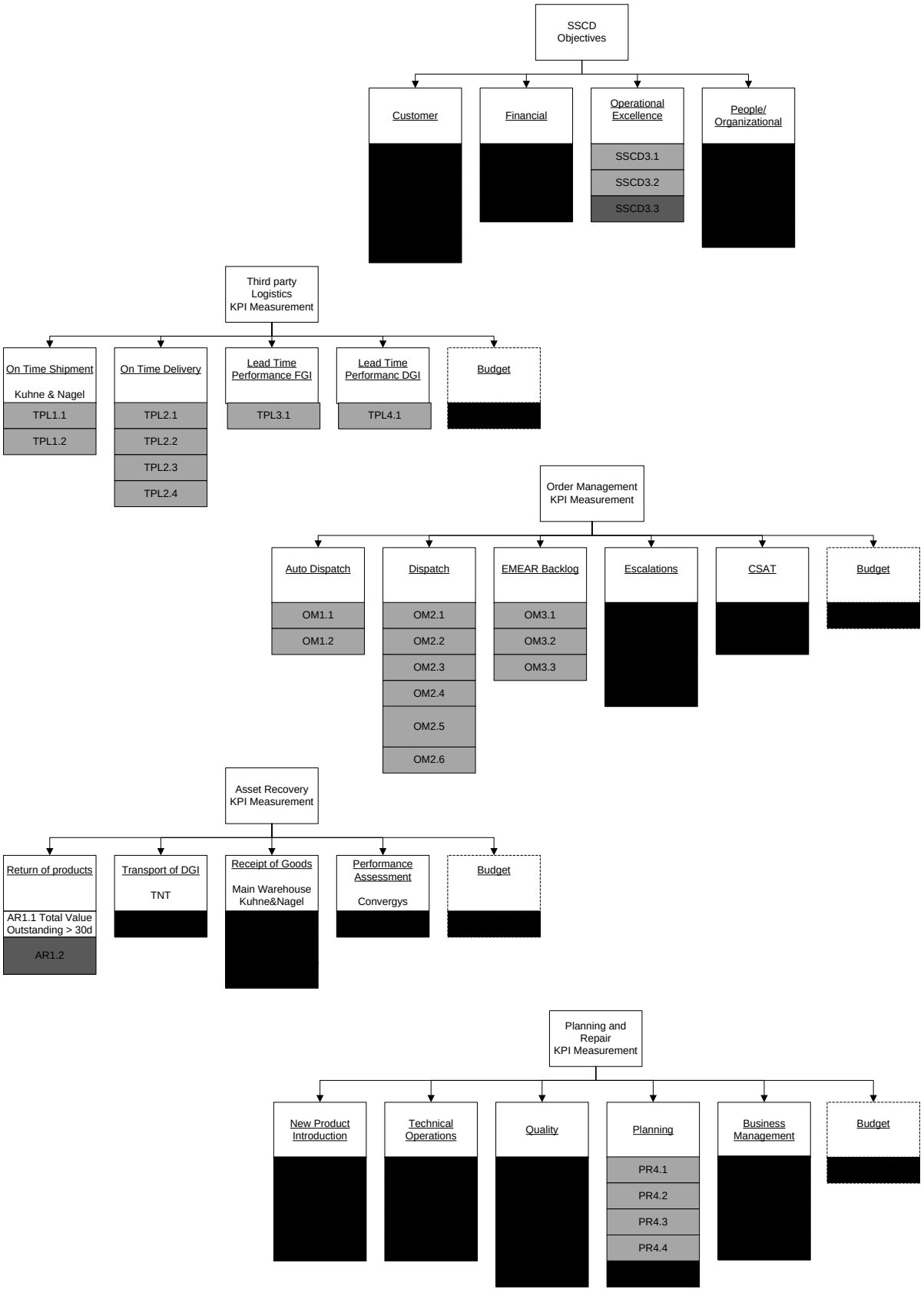
Appendix F. KPI Relations – Customer Objective



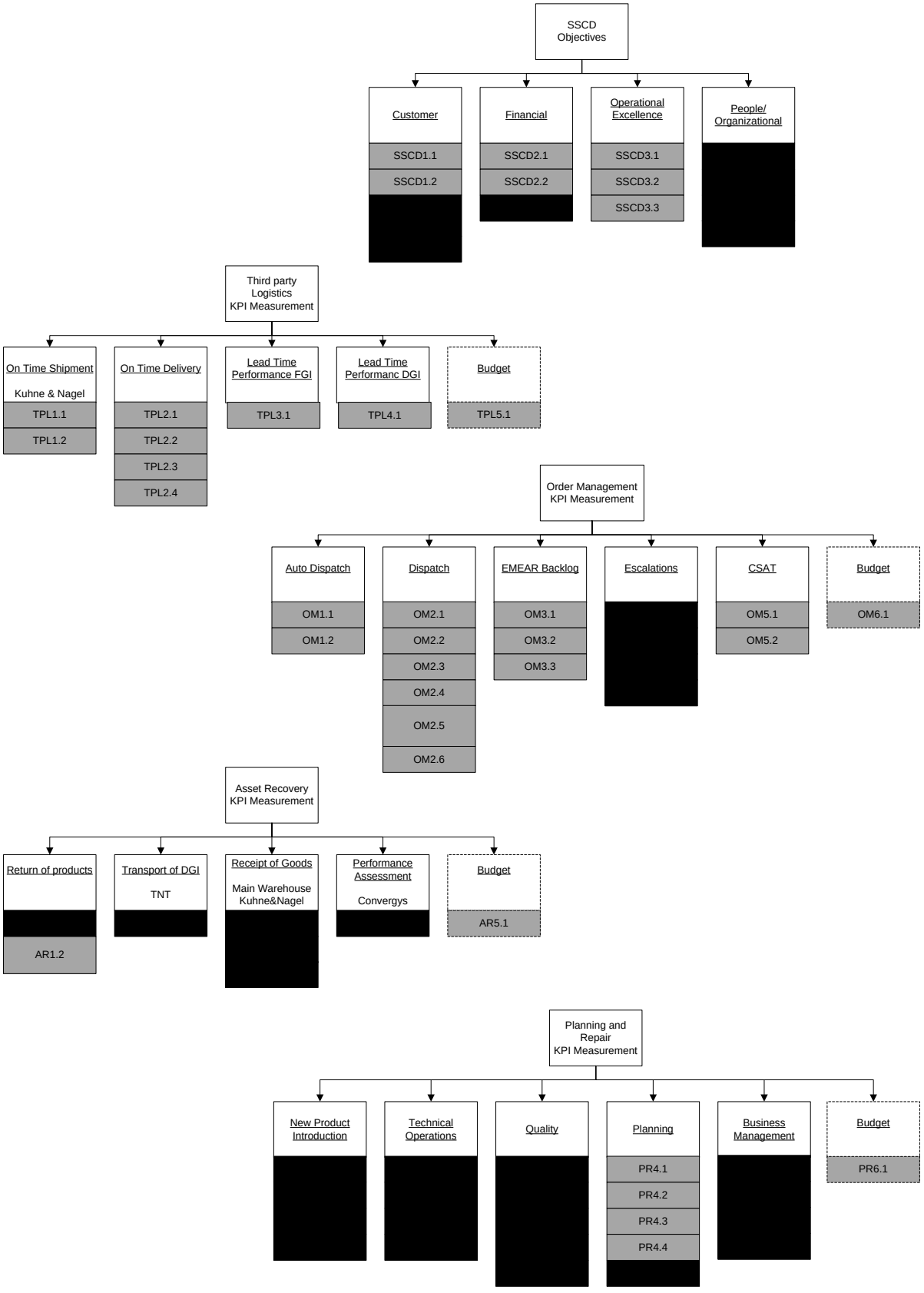
Appendix G. KPI Relations – Financial Objective



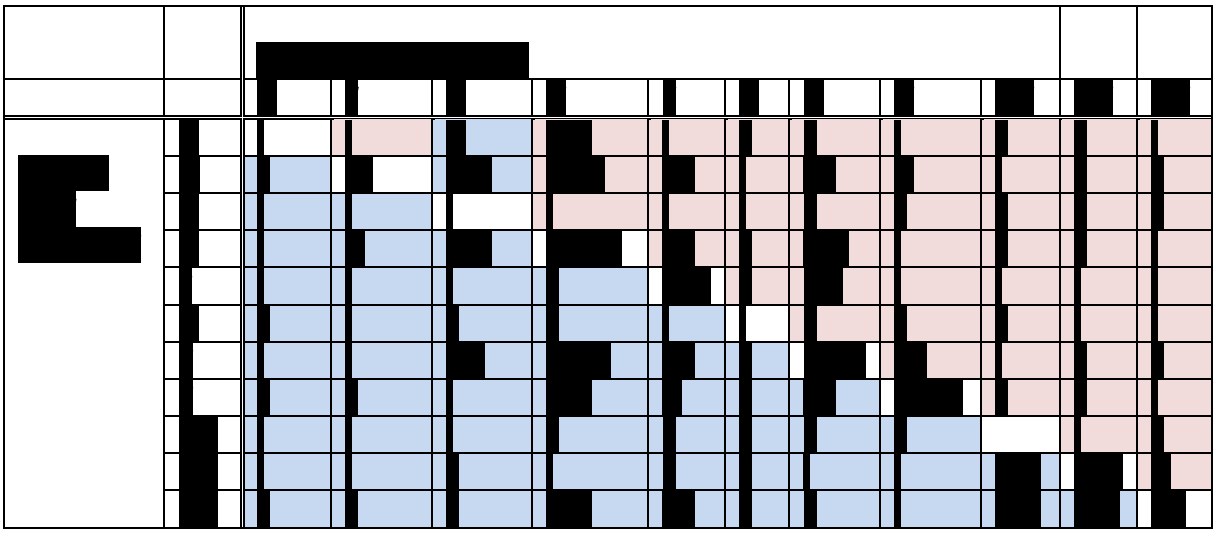
Appendix H. KPI Relations – Operational Excellence



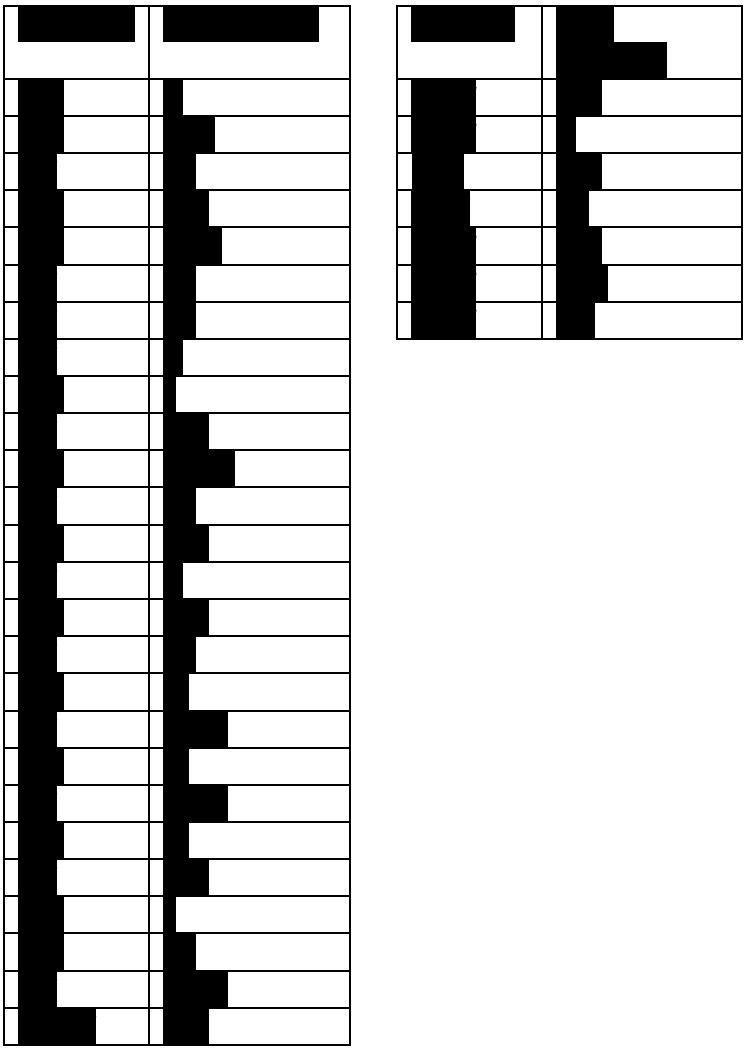
Appendix I. KPI's represented in SSCD Objectives



Appendix J. Decisions and Options Vendor A

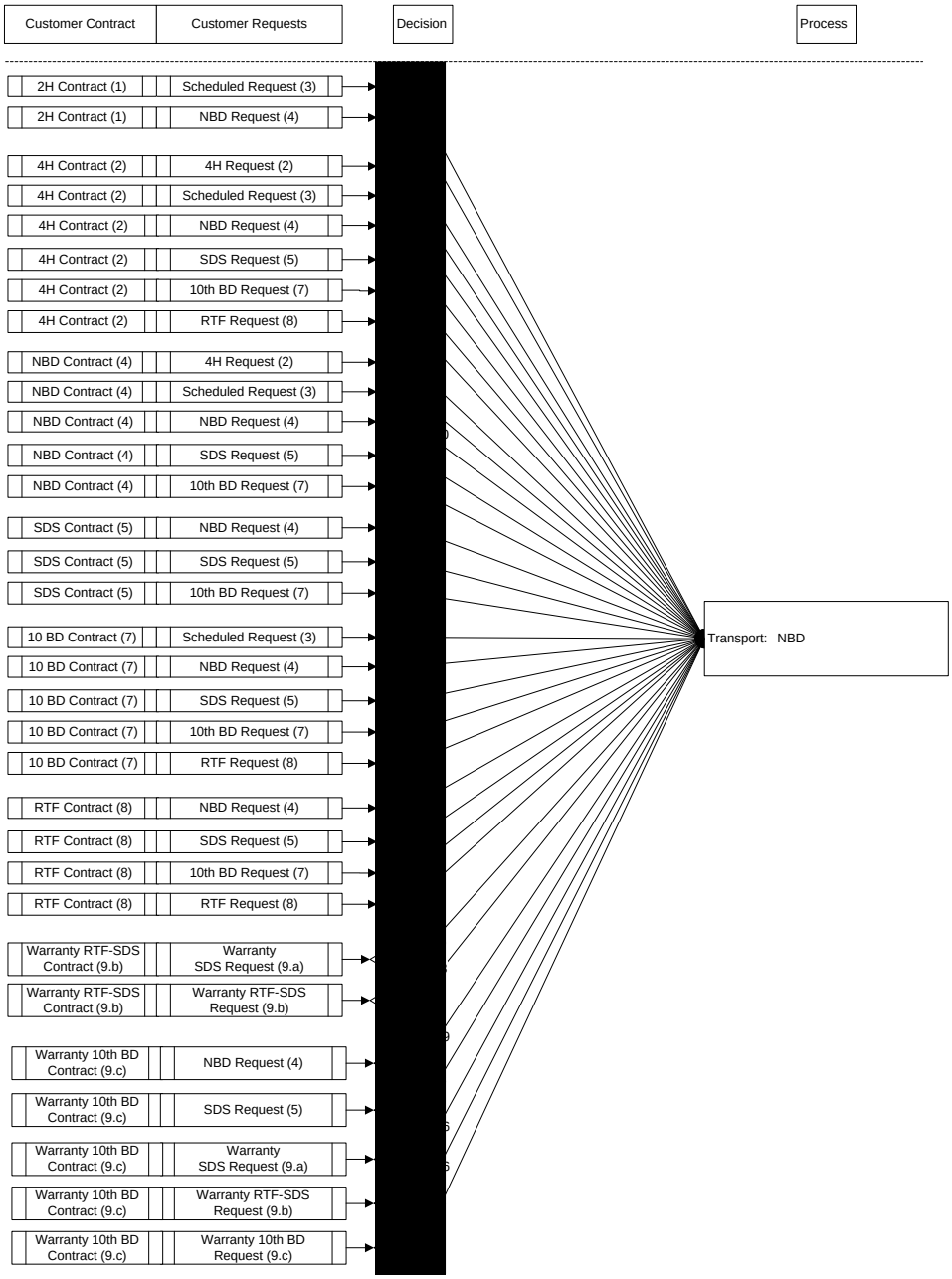


This table denotes the total amount of occurrences per decision at Vendor A.

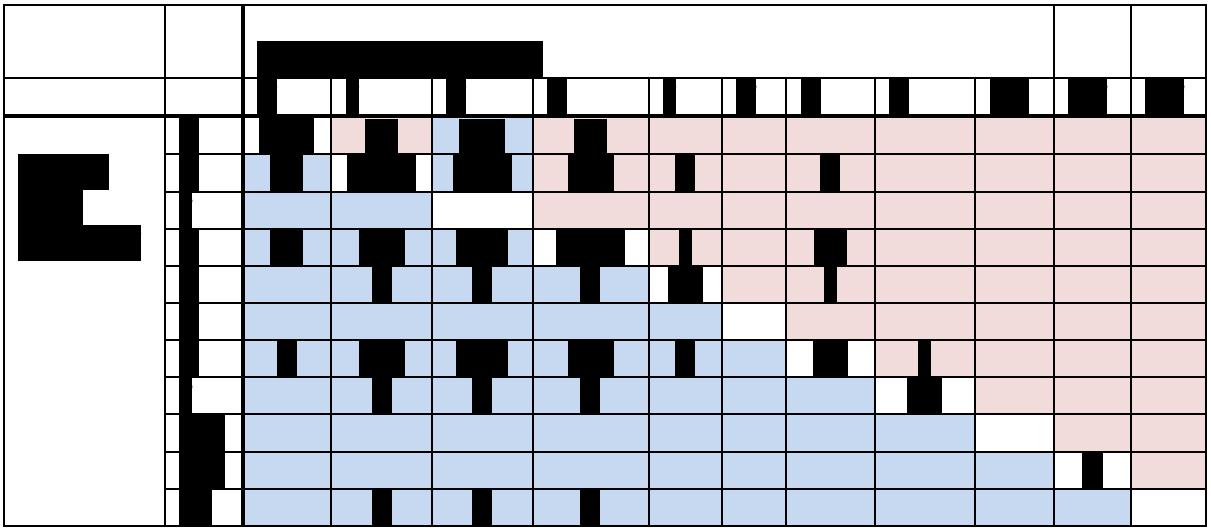


This table denotes the total amount of Option occurrences at Vendor A

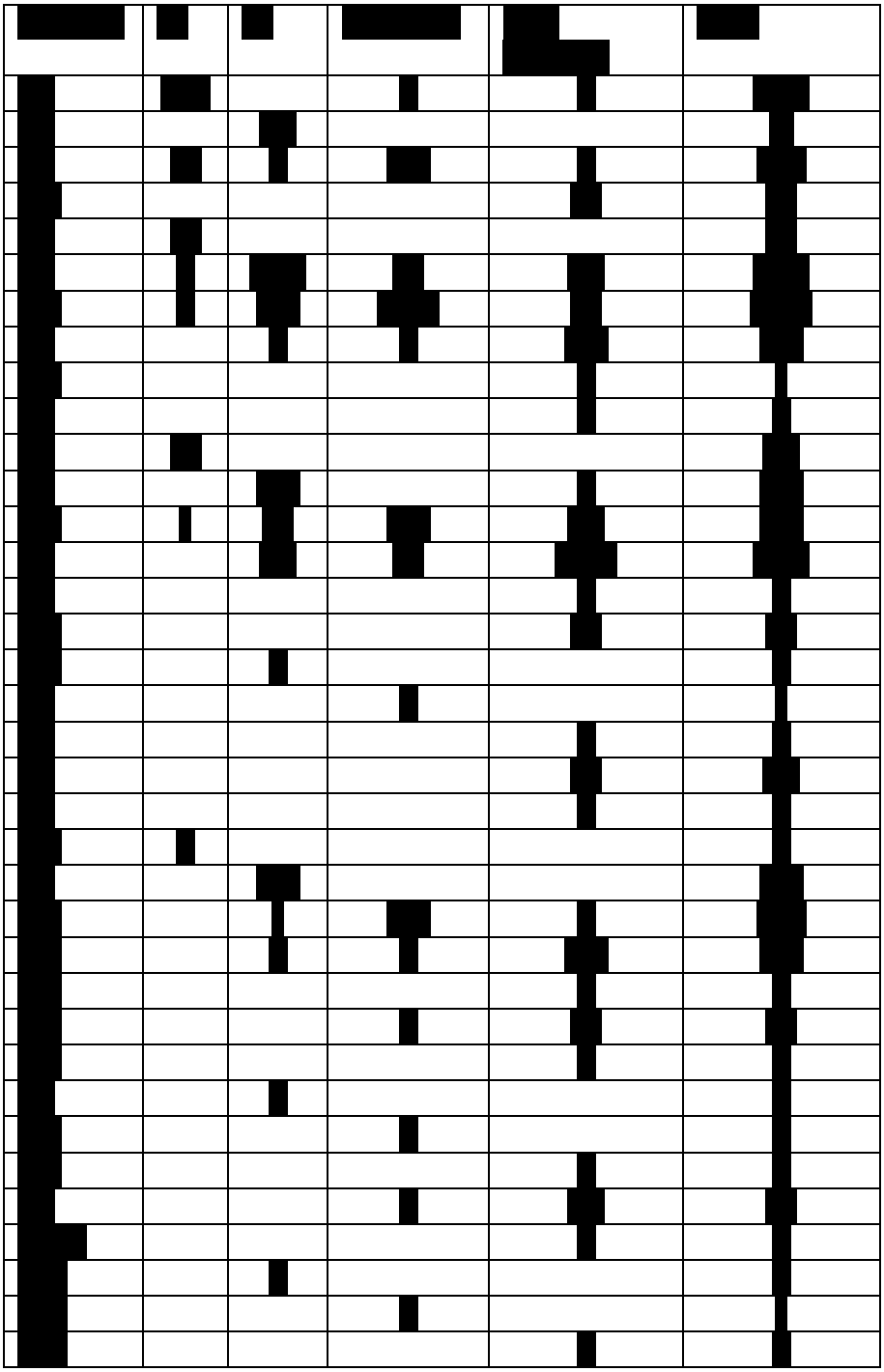
Appendix K. Graphical Overview Options Vendor A



Appendix L. Decisions and Options Vendor B



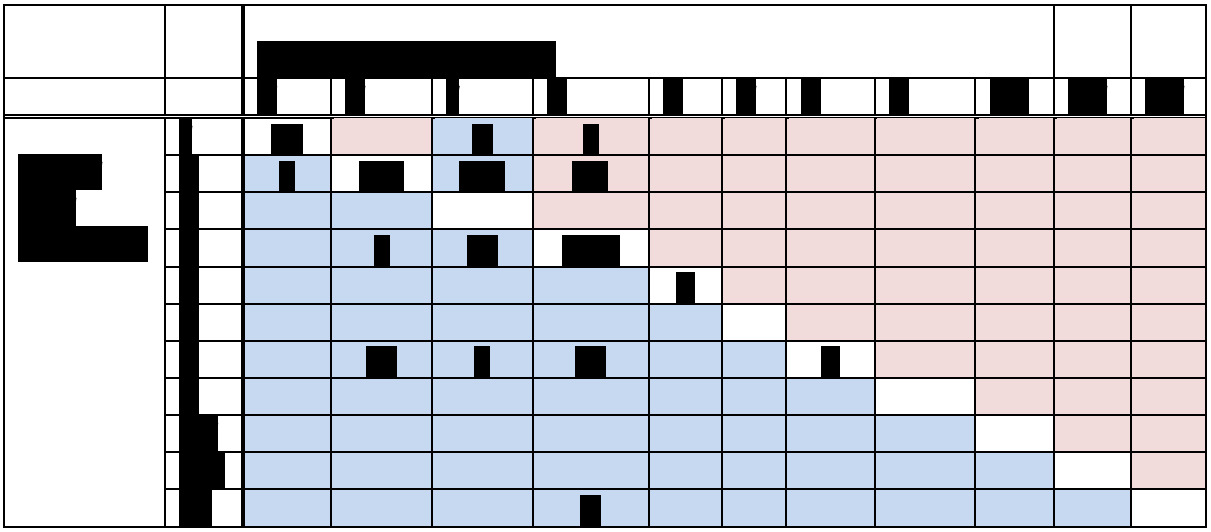
This table denotes the total amount of occurrences per decision at Vendor B.



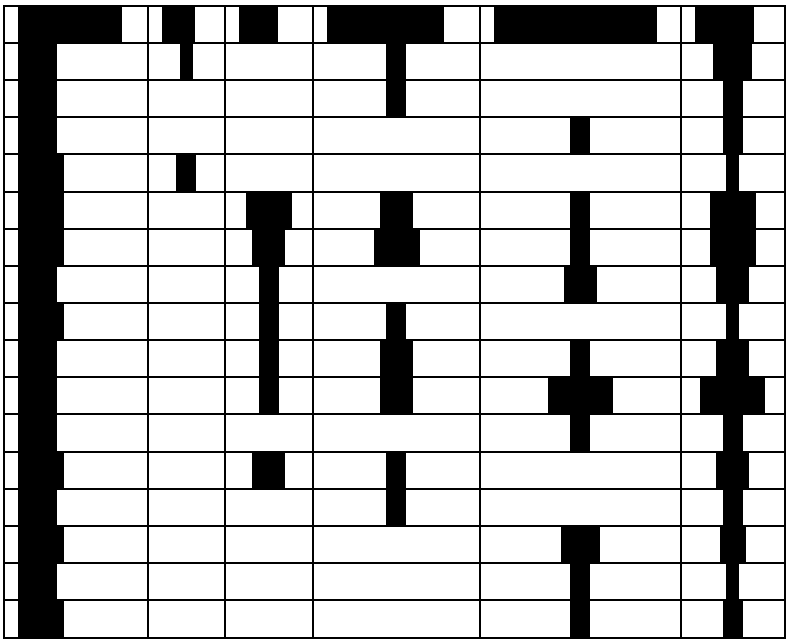
This table denotes the total amount of Option occurrences at Vendor B

Appendix M. Graphical Overview Options Vendor B

Appendix N. Decisions and Options Vendor C

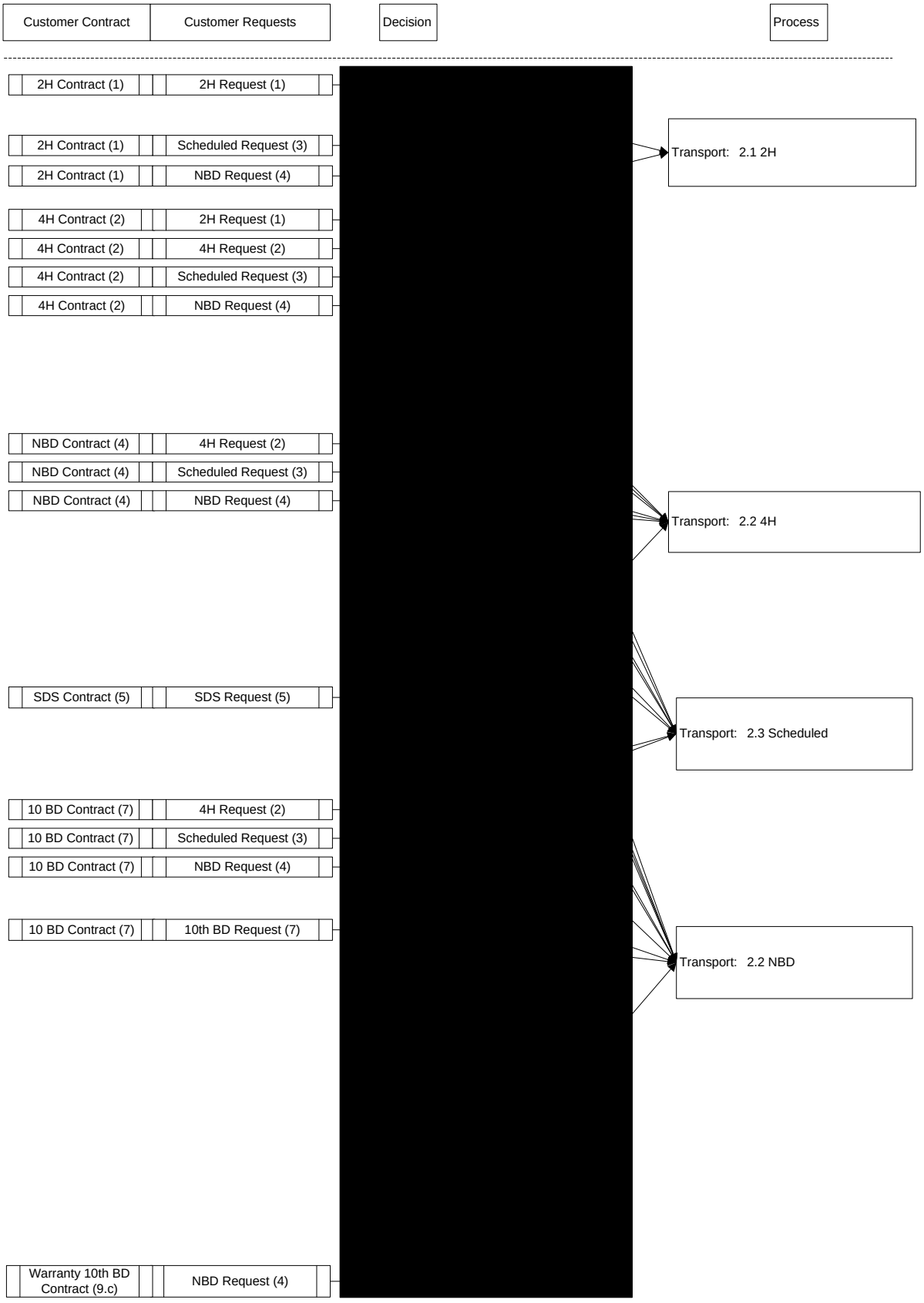


This table denotes the total amount of occurrences per decision at Vendor C.

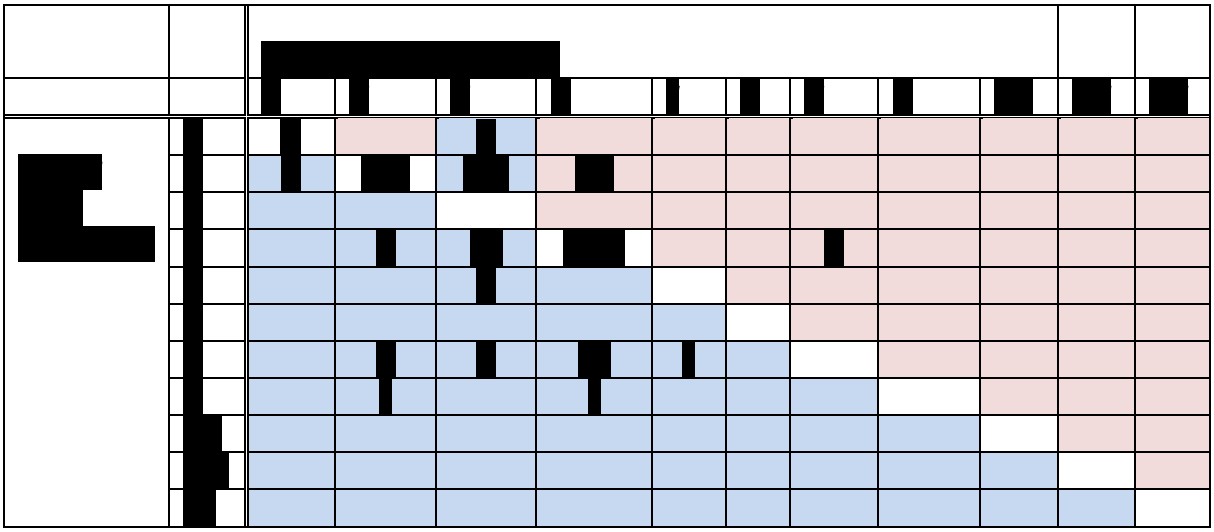


This table denotes the total amount of Option occurrences at Vendor C.

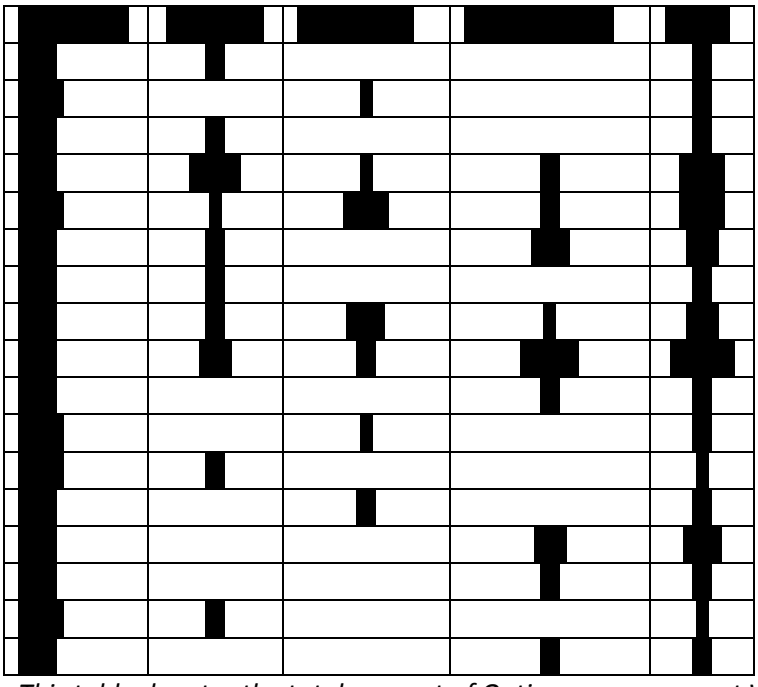
Appendix O. Graphical Overview Options Vendor C



Appendix P. Decisions and Options Vendor D

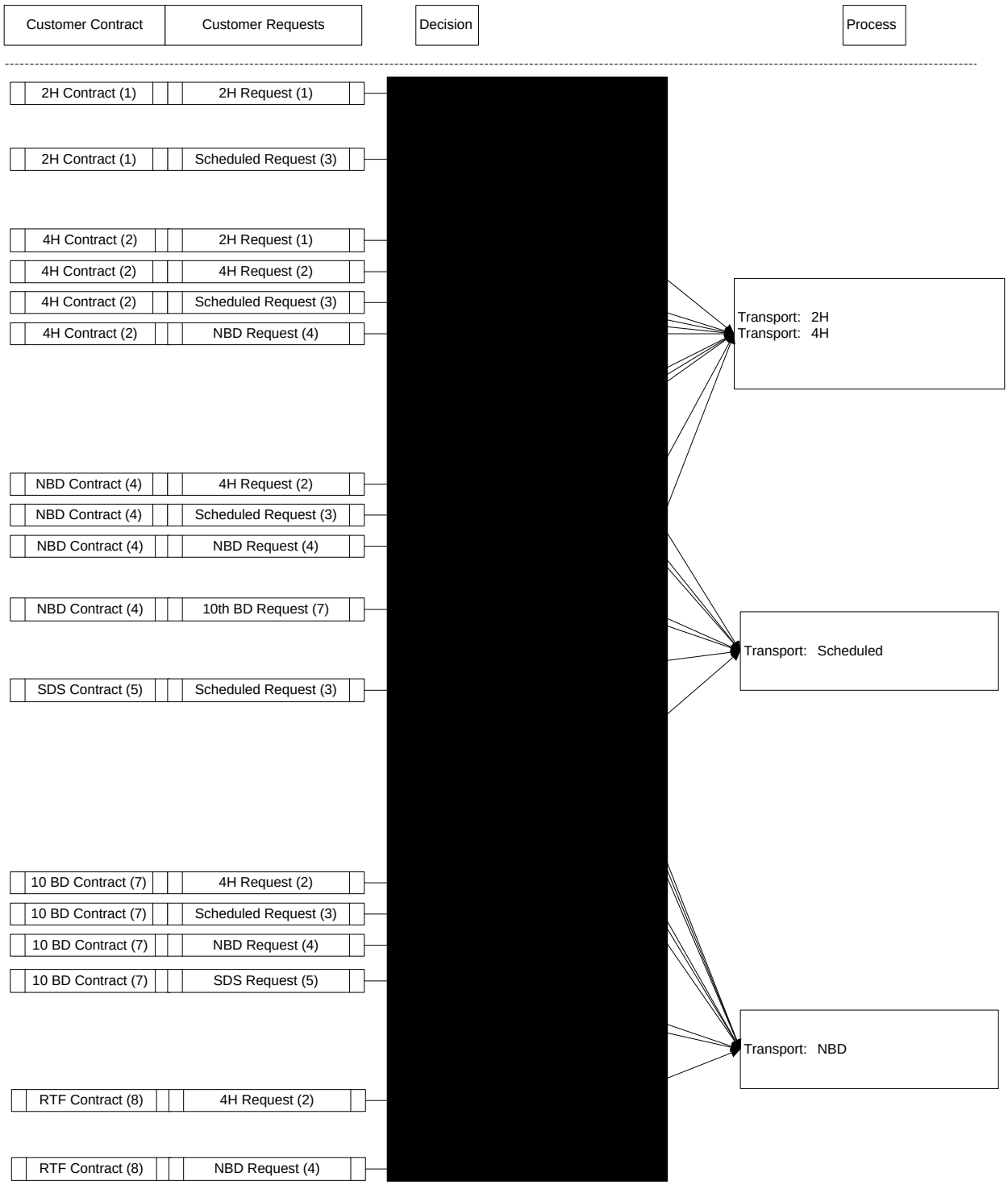


This table denotes the total amount of occurrences per decision at Vendor D.

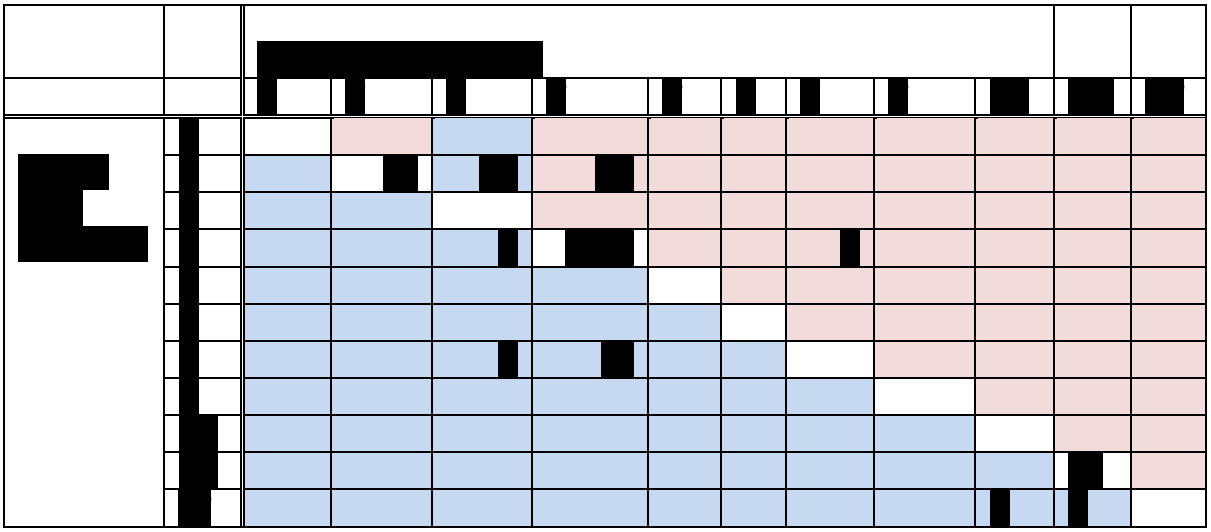


This table denotes the total amount of Option occurrences at Vendor D.

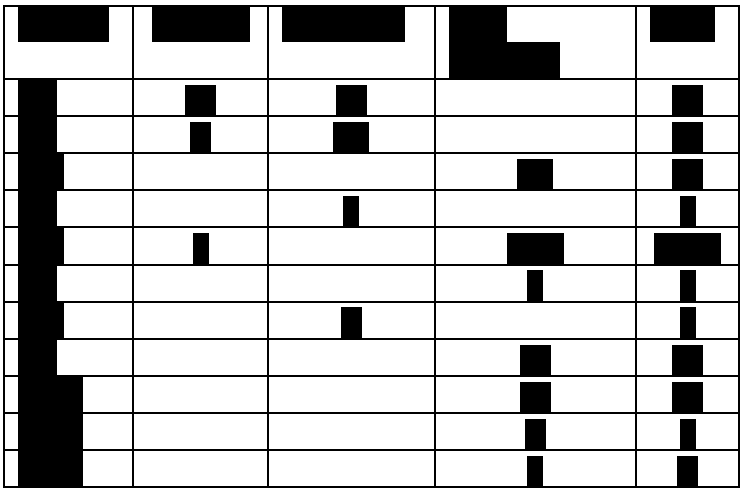
Appendix Q. Graphical Overview Options Vendor D



Appendix R. Decisions and Options Vendor E

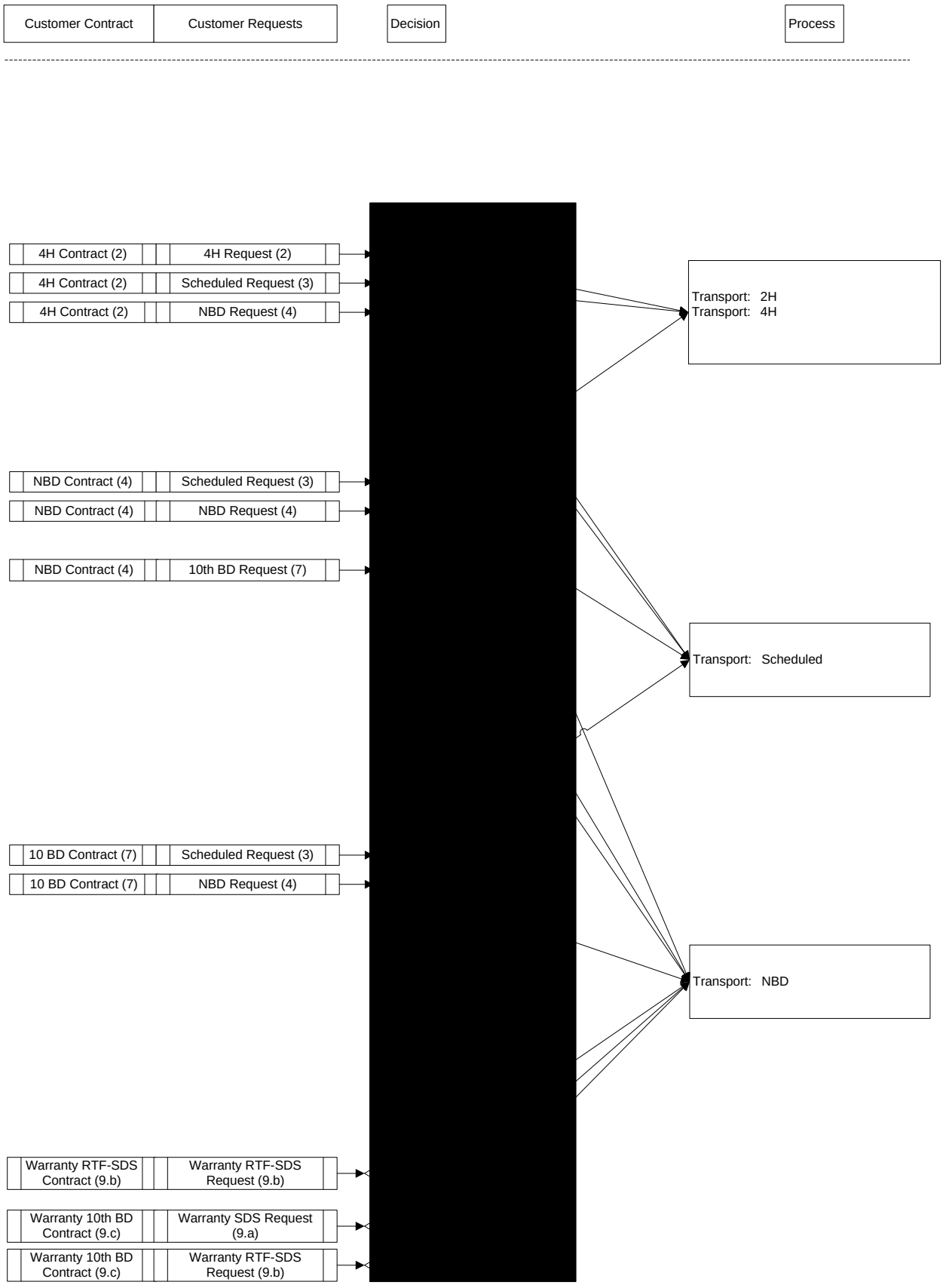


This table denotes the total amount of occurrences per decision at Vendor E.

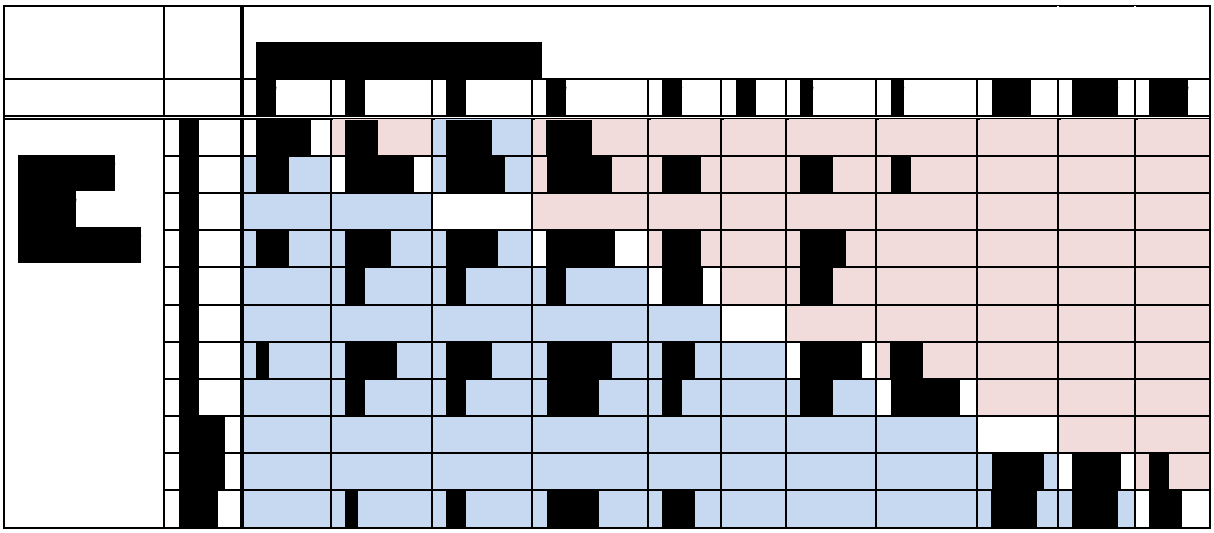


This table denotes the total amount of Option occurrences at Vendor E.

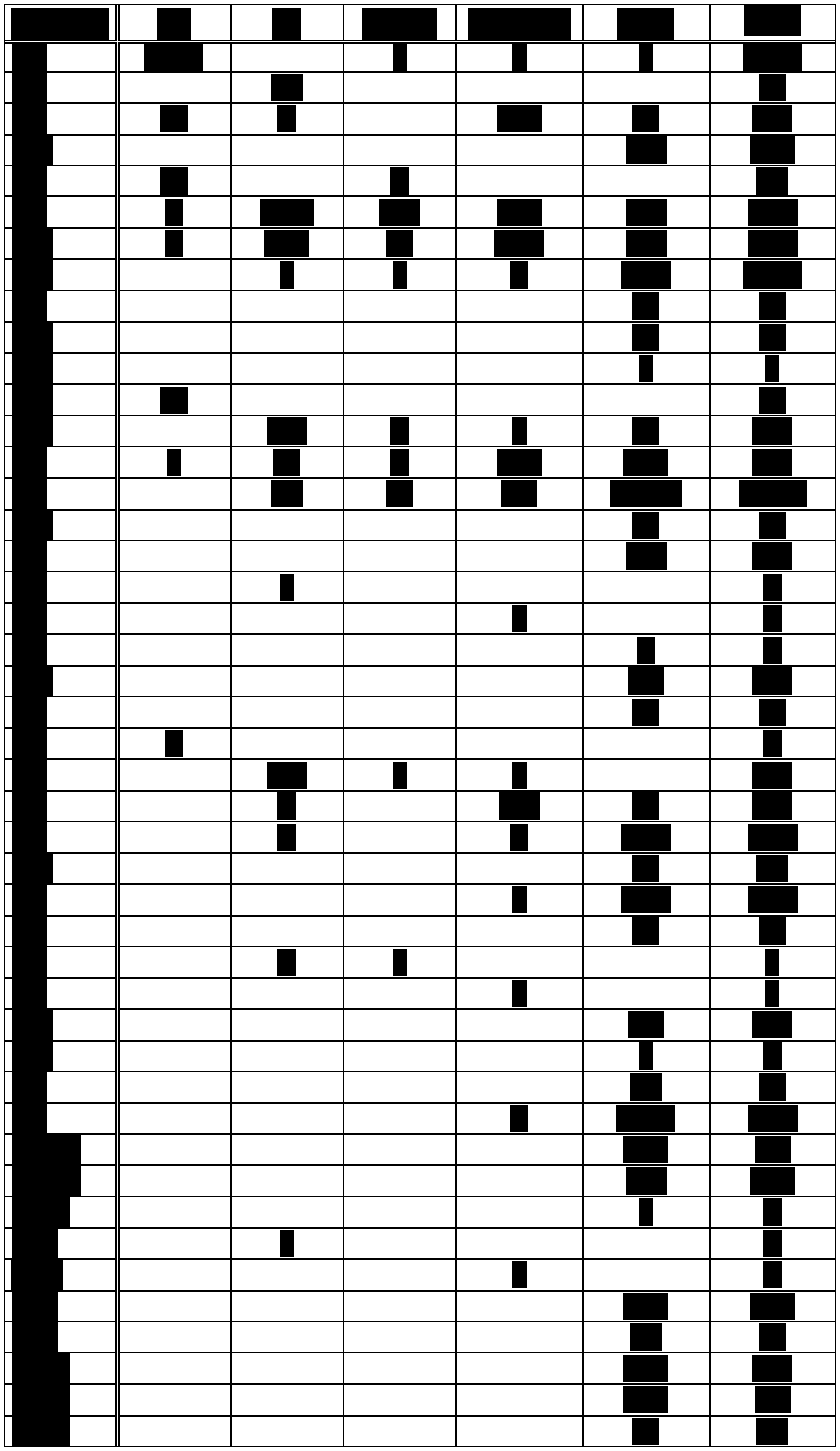
Appendix S. Graphical Overview Options *Vendor E.*



Appendix T. Total Decisions and Options

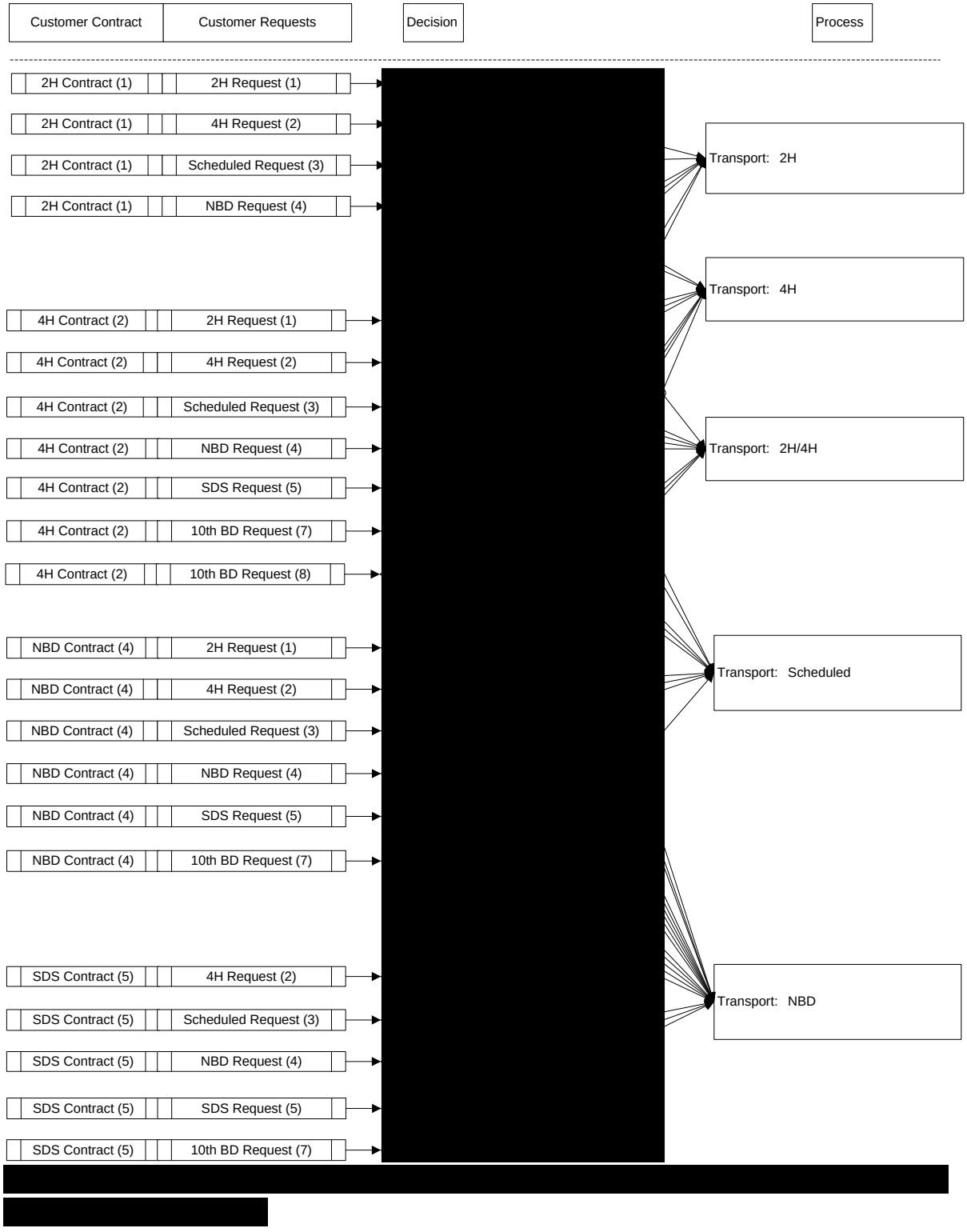


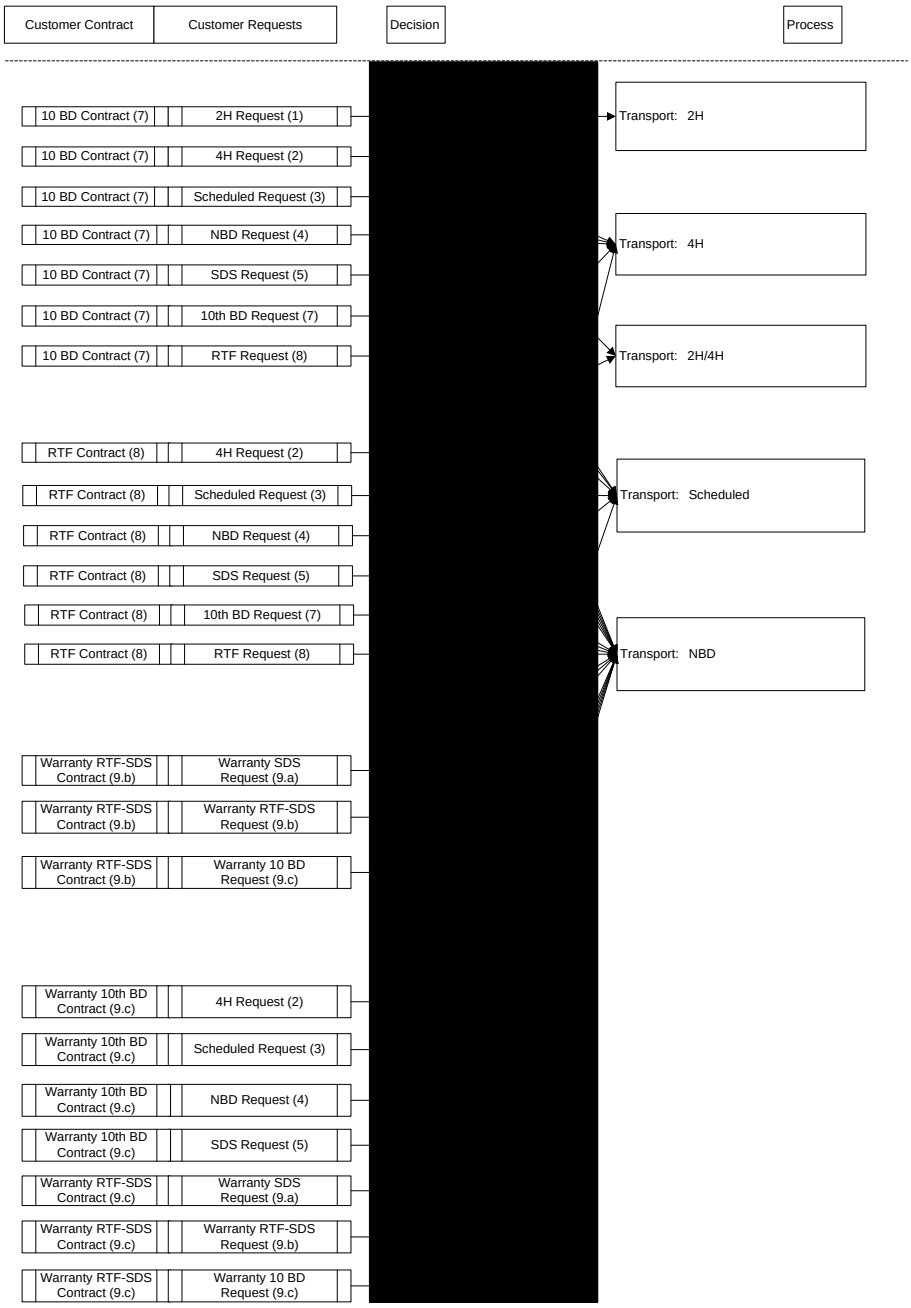
This table denotes the total amount of occurrences per decision for the five vendors aggregated.



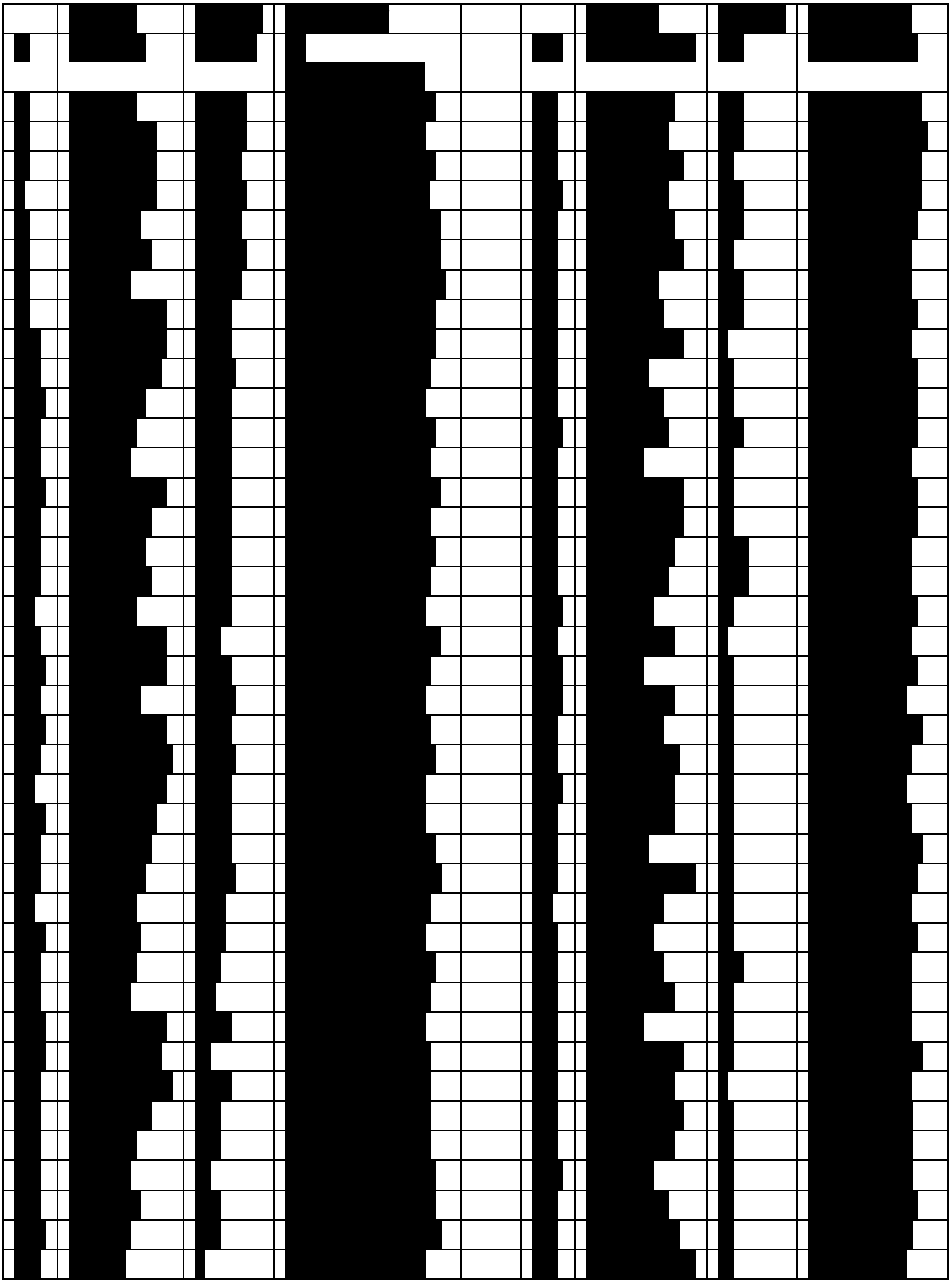
This table denotes the total amount of Option occurrences for the five vendors aggregated.

Appendix U. Graphical Overview Total Options

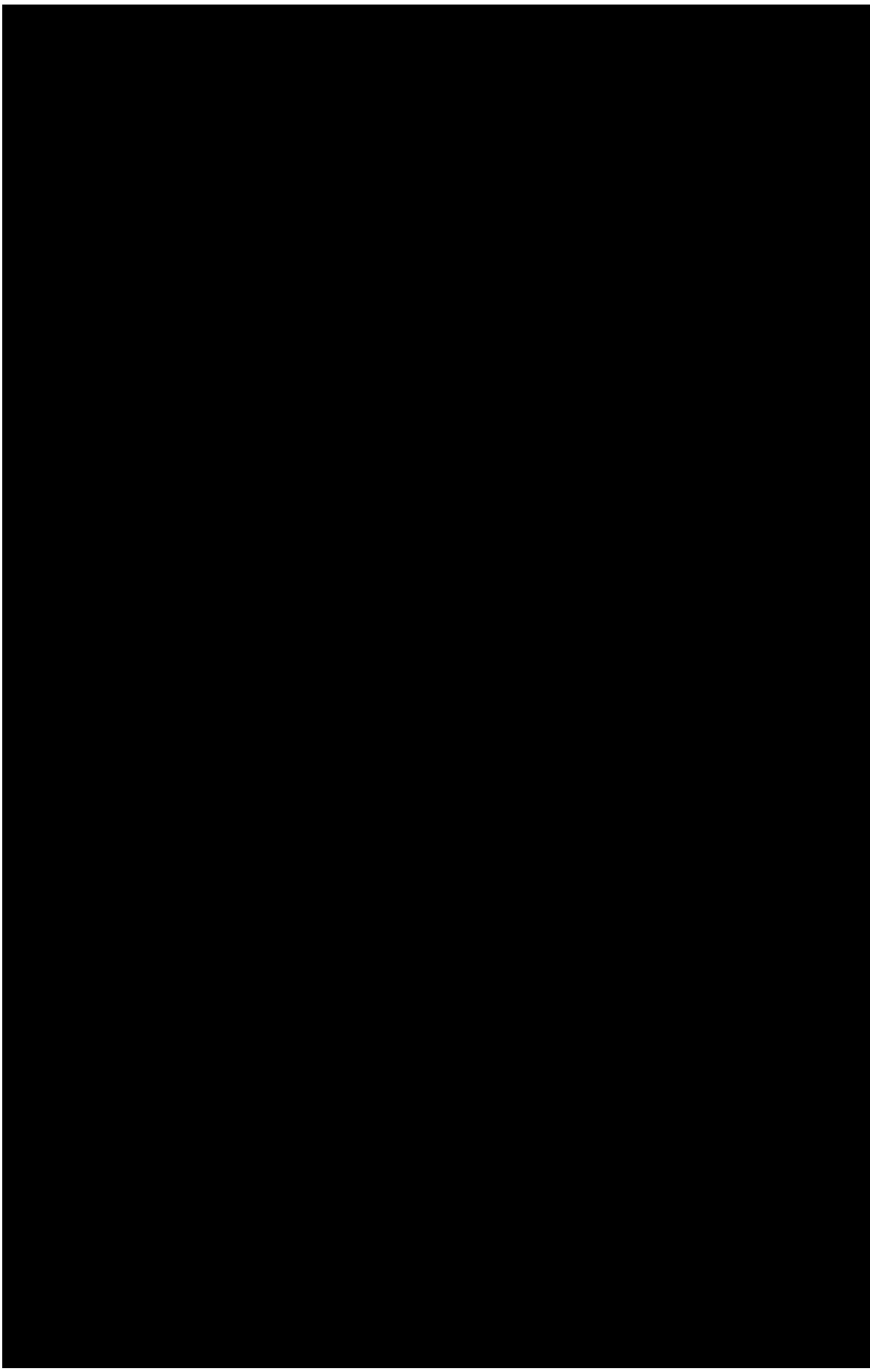


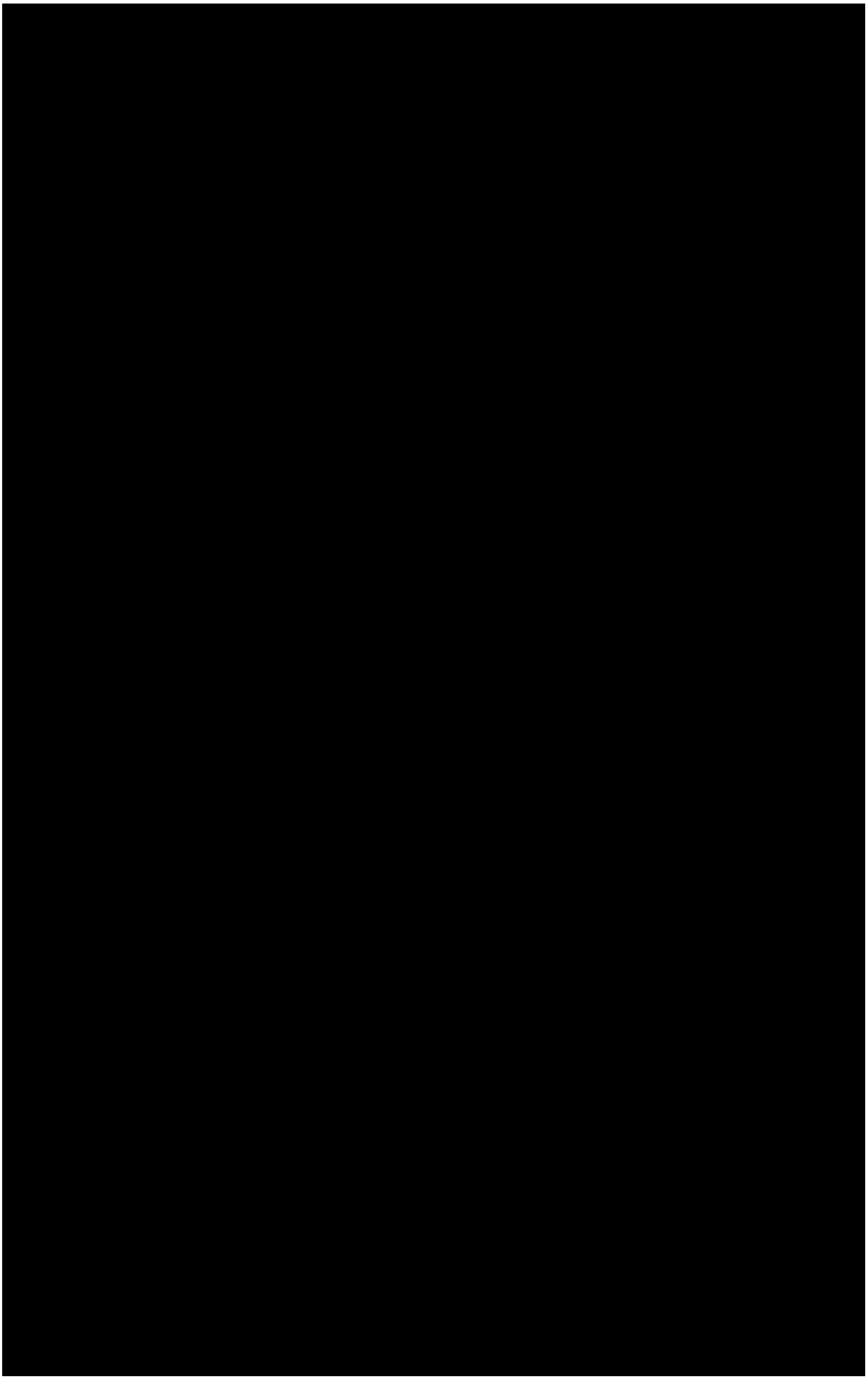

Customer Contract
Customer Requests
Decision
Process
10 BD Contract (7)
2H Request (1)
10 BD Contract (7)
4H Request (2)
10 BD Contract (7)
Scheduled Request (3)
10 BD Contract (7)
NBD Request (4)
10 BD Contract (7)
SDS Request (5)
10 BD Contract (7)
10th BD Request (7)
10 BD Contract (7)
RTF Request (8)
RTF Contract (8)
4H Request (2)
RTF Contract (8)
Scheduled Request (3)
RTF Contract (8)
NBD Request (4)
RTF Contract (8)
SDS Request (5)
RTF Contract (8)
10th BD Request (7)
RTF Contract (8)
RTF Request (8)
Warranty RTF-SDS Contract (9.b)
Warranty SDS Request (9.a)
Warranty RTF-SDS Contract (9.b)
Warranty RTF-SDS Request (9.b)
Warranty RTF-SDS Contract (9.b)
Warranty 10 BD Request (9.c)
Warranty 10th BD Contract (9.c)
4H Request (2)
Warranty 10th BD Contract (9.c)
Scheduled Request (3)
Warranty 10th BD Contract (9.c)
NBD Request (4)
Warranty 10th BD Contract (9.c)
SDS Request (5)
Warranty RTF-SDS Contract (9.c)
Warranty SDS Request (9.a)
Warranty RTF-SDS Contract (9.c)
Warranty RTF-SDS Request (9.b)
Warranty RTF-SDS Contract (9.c)
Warranty 10 BD Request (9.c)
Transport: 2H
Transport: 4H
Transport: 2H/4H
Transport: Scheduled
Transport: NBD

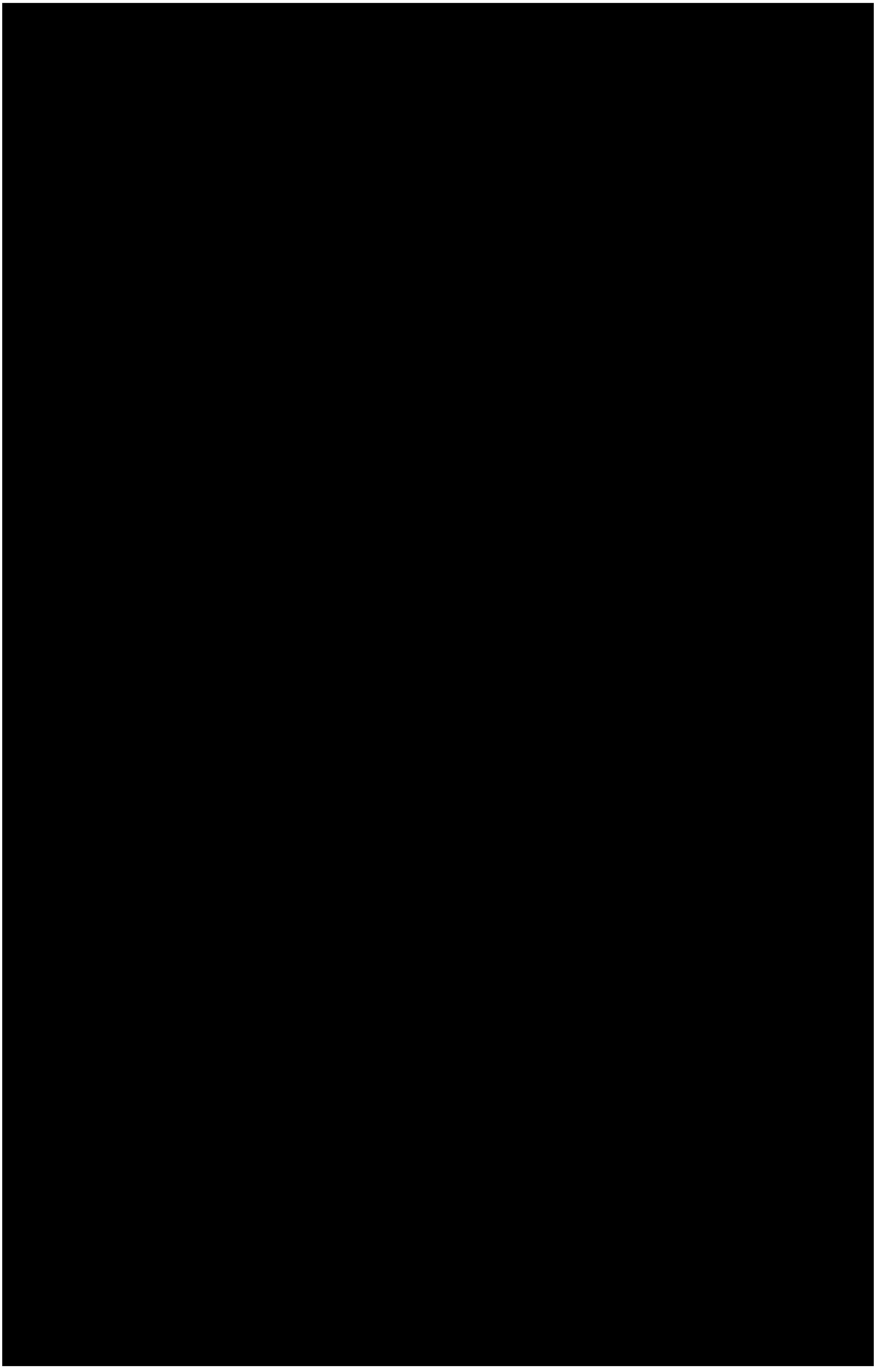
Appendix V. Cash flow per option

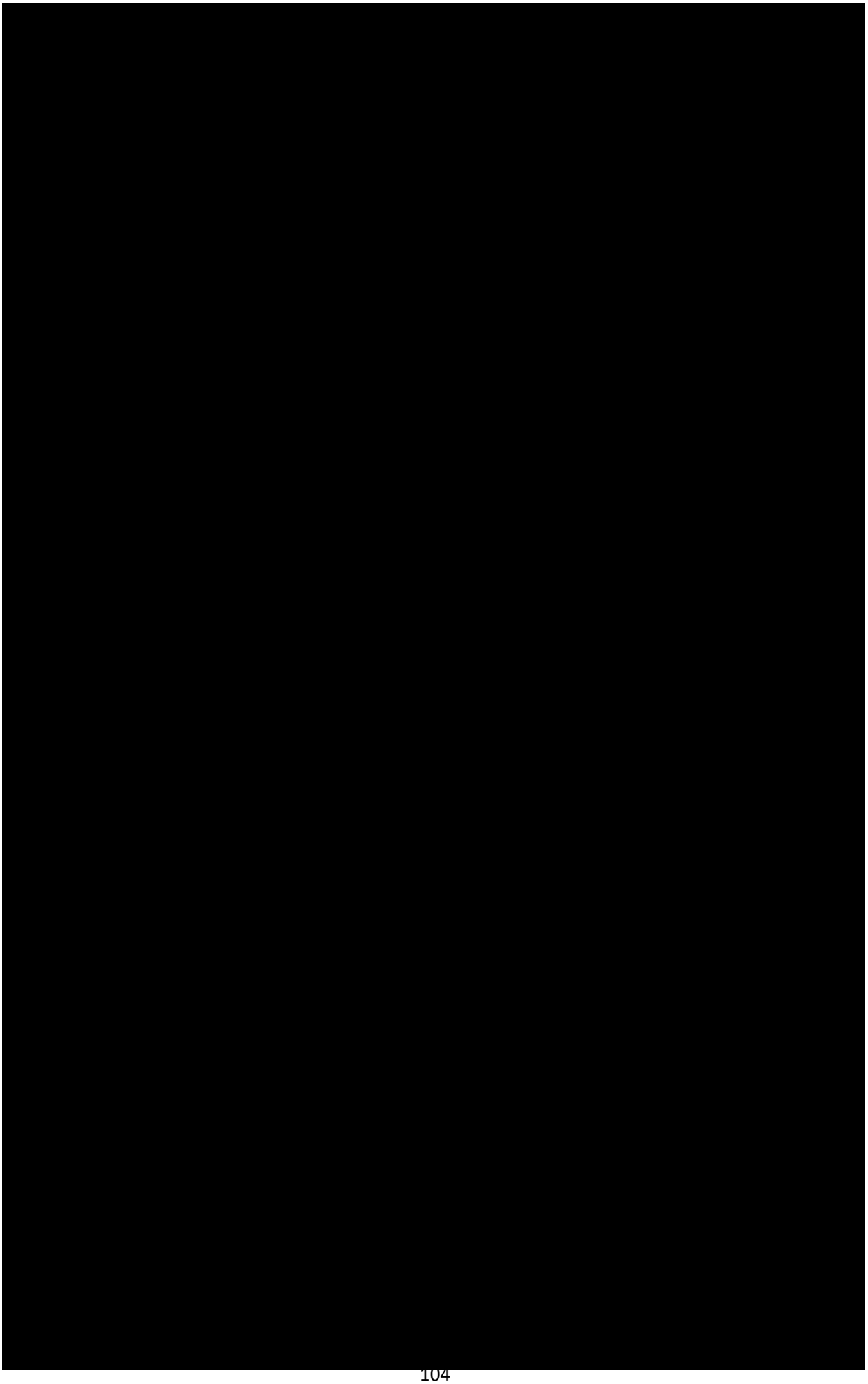


Appendix W. Cash flow per option; vendor information

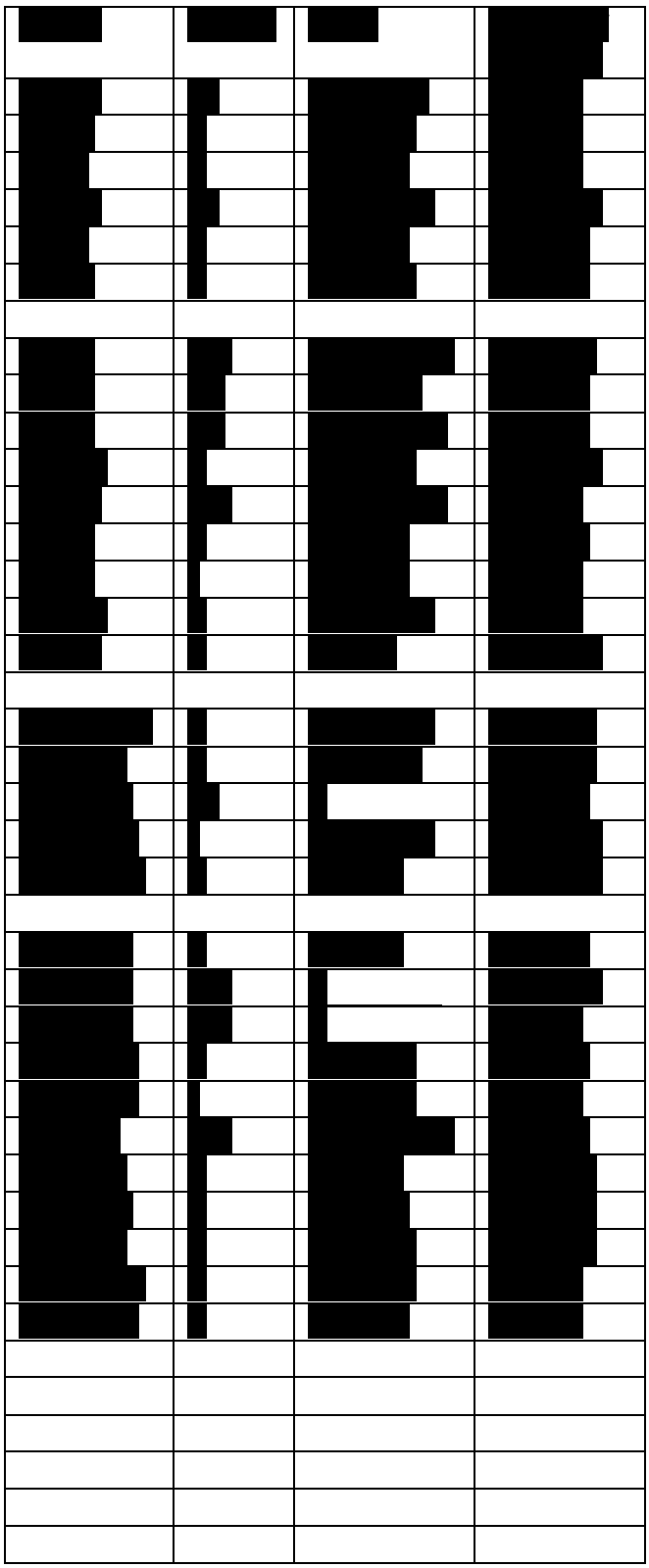


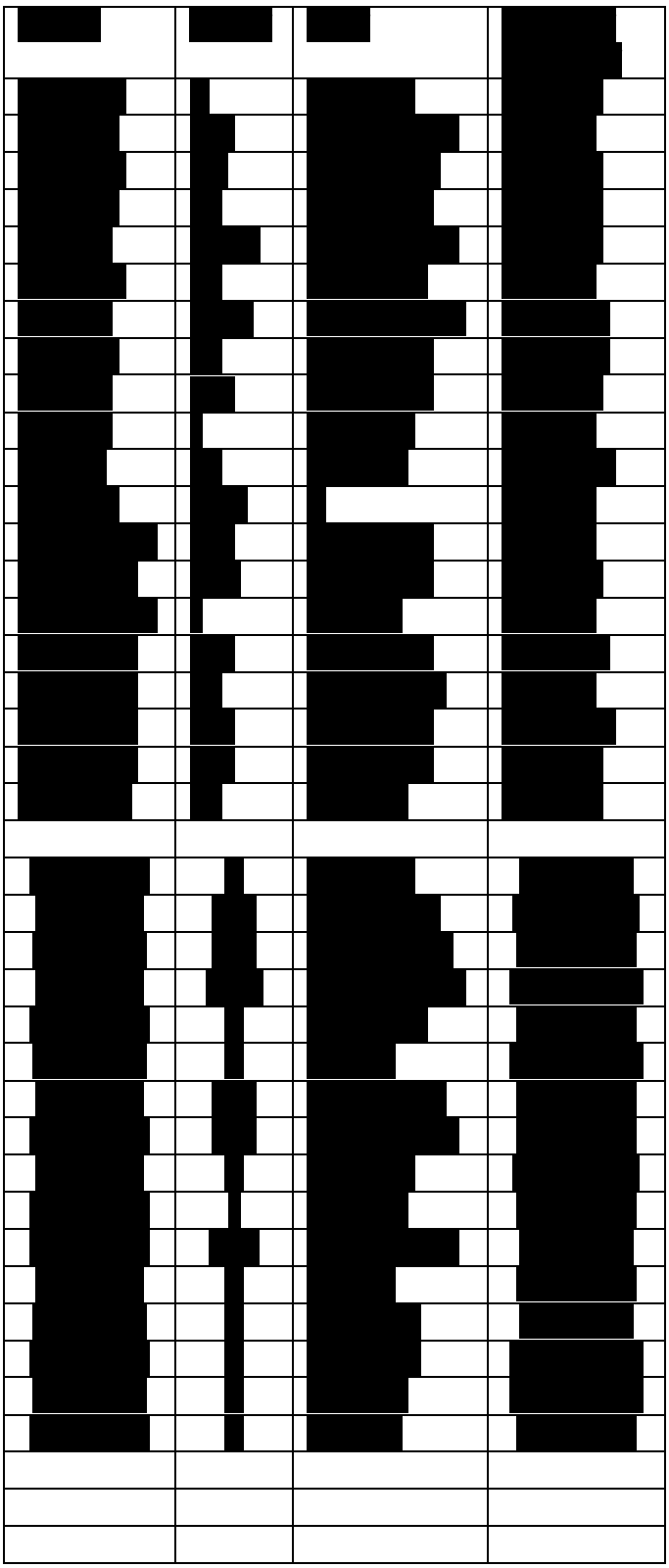






Appendix X. Options with upgrade/change to scheduled delivery





Appendix Y. Weight Distribution Vendor B orders

This graph shows the weight distribution used in chapter 7. The x-axis represents the bins of weights whereas the y-axis represents the percentage of orders in that bin.

Appendix Z. Poster Master Thesis

Technische Universiteit Eindhoven University of Technology

Managing Decision Making

An in depth analysis of the effects of decentralized decision making at Cisco Services

by M.R.C. Wolters

Industrial Engineering & Innovation Sciences

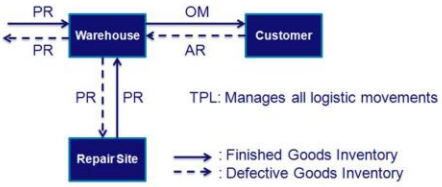
Operations Management and Logistics

Supervisor: Dr. M. Slikker

Introduction

The Service Supply Chain Delivery (SSCD) department is the logistics arm of Cisco Services, tasked with delivering hardware replacement support to Cisco's customers. The flow of goods is organized according to a closed loop supply chain model and the SSCD tasks are executed by four teams:

- Order Management (OM): orders forward flow of products
- Asset Recovery (AR): orders reverse flow of defective products
- Planning and Repair (PR): orders repair flow of products
- Third Party Logistics (TPL): management of vendors and logistic movements.



All logistic movements are outsourced to logistic service providers, which are managed by the TPL department.

Research Question and Goal

TPL is not managing its business in a pro-active manner as they primarily manage logistic movements ordered by he departments OM, AR, and PR, without having control on any decisions of ordering these services.

The main **research questions** is:

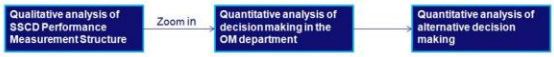
- *How can the decision making process at the SSCD department of Cisco be aided, using the (cross departmental) relationships between decisions and KPI's, as to find a better trade-off between costs and performance.*

The **goals** of the project are:

- Gaining insight in performance measurement at the SSCD department to be able to understand decisions taken at SSCD's sub departments
- Determine the impact of decision making on the performance figures of the SSCD department and its sub departments.

Methodology

A qualitative analysis of SSCD´s implicit performance measurement system leads to an identification of suboptimal decision making. Zooming in at the OM department, decision making concerning overdelivery (higher service level delivery) is analyzed. Subsequently, a quantitative analysis of alternative decision making provides input for an explicit trade-off between performance measures relating to expenses and customer satisfaction.



Results

Analysis of decisions instigating overdelivery shows:

- Customers request for overdelivery in 6,94%* of all cases
- Cisco grants higher customer request in 99,28%* of all requests
- Cisco provides overdelivery in 19,99%* of all cases.

Considering overdelivery, no consideration is given to the trade-off between expenses and customer satisfaction; Cisco grants almost all customer requests for higher service and furthermore, Cisco is responsible for overdelivery without any customer request for overdelivery.

Next, alternative decision making provides input for an explicit trade-off and indicates a big difference in relevant costs for four groups of orders for which more service is delivered than stated in the customer's contract:

Conclusion

An extensive analysis of SSCD's performance measurement system delivered insight in suboptimal decision making. The current measurement system is not proficient and needs consideration to prevent suboptimal decision making. The impact of an instance of current decision making on the budget is determined and is to be used as input for an explicit trade-off between expenses and customer satisfaction.

Industrial Engineering & Innovation Sciences/ Operations Planning, Accounting and Control

* Due to confidentiality agreements the percentages are adjusted