

MASTERING THE SUPPLY CHAIN

Simple is the most difficult.

- *Johan Cruyff*

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FOREWORD

To be determined by whom. E.g. one person from industry and one from the academic world. One by Egge?

PREFACE: SIMPLE BUT NOT EASY (1)

“Many students learn best when they are actively doing things and not only studying ideas in the abstract: when their curiosity is aroused, when they are asking questions, discovering new ideas, and feeling for themselves the excitement of these disciplines.”

– Ken Robinson & Lou Aronica (2015)

MASTERING THE SUPPLY CHAIN: PRINCIPLES, PRACTICE AND REAL-LIFE APPLICATIONS

Truth be told, there are already many books about Supply Chain Management and very good ones too, but it has not been our objective to add yet another textbook to the list. On the contrary, we wanted to create a supplementary textbook with a clear and strong focus on practical application by students. Thus, in allusion to Albert Einstein, to provide the conditions in which students can practice and learn, in this case about how to master the supply chain. We use The Fresh Connection business simulation game as our main vehicle for the practical application.

In the first section of the book we will be presenting a helicopter view of the main important ***principles***, i.e. theories, frameworks and concepts of supply chain management, which effectively can be found in most books on the topic. Although the list itself is quite extensive we want to keep it as simple as possible for this book and that is why instead of going into much detail, we will limit ourselves to brief and to-the-point introductions and refer to other textbooks in which they are explained in greater detail. That enables us to ultimately keep our focus on setting the scene for ***practice*** and ***real-life application*** of the principles in Parts Two and Three. In other words, active

analysis and decision making by the student, putting them in the driving seat of the supply chain, enabling them to explore the topic in the widest possible sense. So, all the relevant principles presented in Part One will come back in some form or shape in a practical and applied way in Parts Two and Three.

Mastering the Supply Chain is written for people studying Supply Chain Management. It can be used as part of courses within specialized supply chain or logistics programmes, but also links well to courses within programmes of a more generalist nature, from Bachelor level up to (Executive) MBA, as well as In-Company trainings.

As mentioned, the inspiration behind the book started with the notion that there are already plenty of good textbooks available about Supply Chain Management in which relevant topics, concepts and frameworks are covered in detail. We have tried to make the theoretical concepts as tangible as possible and the dilemmas in their application as real and visible as we possibly could via a written text. We address the topics not only from the perspective of the person interested in knowing which steps to take (“what do I need to do and consider?”) but also to aid readers who need to make the important decisions themselves (“how do I actually do it?”).

In doing so, we intend to involve the student actively into the matter at hand, for which the learning will be much more direct and profound. The book is therefore based on the principles of learning by doing, or experiential learning. An integral learning process is offered comprising of not only an exposition of the most relevant concepts of supply chain management illustrated by some real-life examples, but especially also

including the setting for direct application of the concepts via practical first-hand experience, exercises and reflections.

As the main vehicle for the first-hand experience, we have chosen The Fresh Connection business simulation, a so-called “serious game”. It provides a very realistic base case for extensive analysis of supply chain issues and includes the opportunity for real decision making as well as seeing the impact of those decisions. The use of business simulations falls into the category of ‘experiential learning’ and fits very well with the need for training relevant skills for the 21st century.

THE AGE OF ACCELERATION, 21ST CENTURY SKILLS AND EXPERIENTIAL LEARNING

Although given its relevance a slightly more extensive description about the age of acceleration, 21st century skills and experiential learning can be found in the Annexes, a brief introduction seems appropriate here. We allegedly live in the age of accelerations, the world is changing faster and faster, calling for other skills as the ones that were valid in the past (Friedman, 2016). In this context, people also speak about the need for training 21st century skills (World Economic Forum, 2016, Robinson and Aronica, 2015).

Experiential learning seems to be a very appropriate way of training such skills. I’d like to particularly reference the work of David Kolb, whose book “Experiential learning” is a classic on the topic. Among other important contributions like for example the concept of individual learning styles, Kolb is well-known for what is called the learning cycle.

Figure 0.1 The learning cycle

[! Insert Figure 0.1 here !]

Source: after McLeod (2017), based on Kolb (2015)

The main idea behind the learning cycle is that “*knowledge results from the combination of grasping and transforming experience. Grasping experience refers to the process of taking in information, and transforming experience is how individuals interpret and act on that information. [...] This process is portrayed as an idealized learning cycle or spiral where the learner ‘touches all the bases’.*” Kolb (2015).

In experiential learning, the focus is on going through a first-hand experience, which allows for reflection on what happened and why, leading to forming a conceptual view on the situation, potentially reinforced by existing theories and/or frameworks. This combination will then be the basis for an improved view on the situation, which can then be applied in the next experience, either in class or other study environment, or directly in a real-world situation.

MASTERING THE SUPPLY CHAIN

The objective of this book is to fully facilitate for the “*learner touching all the bases*”. The Fresh Connection business simulation game will be at the heart of this learning experience in Part Two and Three. In subsequent steps it serves as a vehicle for grasping experience, as well as transforming experience, by using the simulation of rounds of gameplay complemented by conceptual frameworks, as well as active reflecting by the student, leading into a new round of simulation, creating a steep learning curve based on first-hand experience. In addition, fields of direct application outside the simulation tool will be touched upon, to widen the student’s perspective even further.

SIMPLE BUT NOT EASY

The phrase ‘simple but not easy’ is one of the central threads throughout the book. It refers to the fact that many of the underlying concepts and frameworks in supply chain management are relatively straightforward and therefore ‘simple’ to understand, but that there are a number of reasons why their application in practice is ‘not easy’.

Firstly, the supply chain area is full of concepts that describe the elements at play in certain topics. For example, when talking about outsourcing, there are frameworks which highlight the factors to be taken into consideration when a company wants to decide about whether or not to outsource a particular activity. Application of such a framework will lead to a list of arguments in favour or against outsourcing. Some of those arguments are quantifiable, but there are also some parts which are more qualitative in nature and this combination of quantitative and qualitative arguments brings in the (subjective) dimension of judgment. In other words, the elements of the framework are simple to understand, but to make a concrete decision on the basis of applying the framework might not always be that easy and straightforward.

Secondly, even though the individual concepts might be simple to understand, it is the sheer number of those at play at once all the time and with an infinite number of interdependencies between them, that makes it a very challenging area to manage, especially from a global holistic perspective. For example, we can speak about the main considerations of inventories, or the physical aspects of warehousing, or developments in transportation, all relatively straightforward at the conceptual level, but when we have to come up with an integral distribution network solution for a certain company,

then suddenly the puzzle becomes quite a lot more complex because we need to bring all of those aspects into the equation.

Add to this the very realistic dimension of incomplete information, assumptions, ambiguity, time pressure, different opinions and a world around us which is moving on continuously, and we get an even more complex picture.

So, in the book, ‘simple but not easy’ will be a recurring theme. Many of the individual concepts of supply chain management will be dealt with, but always with the objective to finally arrive at the point of specific and explicit decision making within a global holistic context. Indeed, mastering the supply chain management is complex, but in my opinion, that’s precisely what makes it such a fascinating area to work in.

THE MULTIPLE DIMENSIONS OF SUPPLY CHAIN MANAGEMENT

Supply chain management has many faces and it covers a wide array of activities as far as scope is concerned. But also, does it have very distinct dimensions, which are very different in nature.

Firstly, supply chain management has a clear strategic, or “**business**” dimension. In the end, the supply chain is an integral part of a company, contributing together with the other areas and departments to the overall business success. This implies that decision making within the supply chain must fit with the overall direction that the company has defined for the future. Here we would speak more about the vital and direct links between supply chain and corporate strategy and competitive positioning. Or for example, the impact of market segmentation and value propositions on supply chain strategy and the relationships between supply chain and the financials of the company, as expressed for example in the Return on Investment.

Secondly, supply chain has a clear **technical** dimension, for example when dealing with aspects of manufacturing and distribution infrastructure, technology, forecasting and planning models, or supporting IT-systems. This is the part that relates more to the engineering face of supply chain.

And thirdly, supply chain management has a clear **leadership** or people dimension. Because of its cross-functional nature spanning activities from purchasing all the way down to sales and after-sales, there are many interrelationships with other functional areas in the company. In practice, many of the functional areas might have different objectives, leading to potential conflicts which need to be aligned and managed somehow. In this part, we would speak about topics like decision making processes, Key Performance Indicators, team dynamics and stakeholder management.

Because of their importance and because of their differences, these three distinct dimension of supply chain, technical, business and leadership, will be dealt with explicitly and separately in the book. In fact, together they form the backbone of the structure of the book.

Figure 0.2 The three dimensions of supply chain at the core of the book

[! Insert Figure 0.2 here !]

STRUCTURE OF THE BOOK

To break down the complexity of the topic of supply chain into manageable parts, the book consists of three sections, each of them dealing with the three aforementioned dimensions of supply chain in a different way.

Part One: Exploring the fundamentals focuses on the basic concepts and frameworks of supply chain management. Step by step, these main concepts and frameworks and their importance will be discussed, as well as the relationships between them. Wherever relevant, reference will be made to leading textbooks from the supply chain area, as well as the most important areas touching the supply chain, such as strategy and marketing. Most of the topics covered will be accompanied by some initial exercises to have the student actively work with them in order to get acquainted with them. These exercises serve to *explore* the topics at hand. This first section thus provides the basis for the remainder of the book.

Part Two: Mastering the fundamentals then focuses on practically applying the fundamental concepts from Part One. Here, The Fresh Connection business simulation will be the main vehicle that will serve for the application of the individual concepts that were introduced in Part One. The basic setup of the simulation used in this second section presents a relatively stable environment in which to make a wide variety of basic supply chain related decisions, to make the supply chain run smoothly and the company profitable. In this way, the student will get the first-hand experience of *analyzing real company data* from different functional areas in order to *make good decisions*. Reflections and exercises in this section will thus be structured in two steps: *analyse* and *decide*. By running the simulation, there will be a clear and visible link between cause and effect (decisions & results).

Part Three then elaborates on what happens if we start ‘Imagining beyond the fundamentals’, in case the status quo of a supply chain is challenged. For example, what are the implications when new products or sales channels are introduced, new geographies explored, or major supply chain risks are being taken into consideration? Reflections and exercises in the third section fall under the umbrella of *imagining the impact* of certain internal corporate directions, or external trends and developments. All aspects covered in *Part Three* will be related to the company at the heart of the gameplay in *Part Two*, so wherever possible, real company data from the simulation will be used.

In each of the three parts, the three dimensions of supply chain (technical, business, leadership) will be dealt with. This gives the book the overall structure that can be seen in the figure below.

Figure 0.3 Overall structure of the book

[! Insert Figure 0.3 here !]

In addition, the content of the book is supported by a number of web-resources containing for example more detailed information about The Fresh Connection business simulation, as well as some templates, supporting videos and so on.

PART ONE:

EXPLORING THE FUNDAMENTALS

The first part, exploring the fundamentals, focuses on the basic concepts and frameworks of supply chain management. Step by step, these main concepts and frameworks and their importance will be discussed, as well as the relationships between them. Wherever relevant, reference will be made to leading textbooks from the supply chain area, as well as the most important areas touching the supply chain, such as strategy and marketing. Most of the topics covered will be accompanied by some initial exercises to have you actively work with them in order to get acquainted with them.

These exercises serve to *explore* the topics at hand. This first section thus provides the basis for the other two parts of the book, in which you will have a chance to practice and come to *master* them, and *imagine* their application beyond the pure fundamentals.

In Part One, the three dimensions of supply chain (technical, business, leadership) will be explored, each in a separate chapter.

CHAPTER ONE: SUPPLY CHAIN: GENERAL INTRODUCTION

[! Start box !]

In this chapter, we will start the journey of exploring the fundamentals of supply chain and take a first look at:

- The role of supply chain within the context of a company
- Some definitions of supply chain and related terms
- How big our supply chain would need to be?
- The impact of the size of a company
- The building blocks of the supply chain

[! End box !]

WHAT IS SUPPLY CHAIN?

Importance of supply chain: technical area or business function?

What is supply chain, and why should we bother to study the topic altogether?

There are many ways to answer that question, but rather than going into statistics about supply chain expenditure on company or country level, perhaps an easy way to visualize the importance of Supply Chain as an integral area of business is to see what happens if it doesn't seem to work properly.

Frequently, we can read stories in the newspapers which illustrate the consequences of disruptions in the supply chain. By the way, the articles might not even necessarily use the term supply chain as such, but speak for example of suppliers, manufacturing or logistics. Because such supply chain disruptions are happening all the

time, we'll propose an exercise about it later in this section. But first let's go to some recent examples of a larger scale that happened around the time of writing of this book in 2017-2018. Examples that come to mind are the story about the apparent problematic ramp-up of Tesla's Model 3, due to a wide variety of issues ranging from production difficulties with robots, obliging to switch to manual labour, to continuous product design changes causing problems with tool makers, to supplier relationship management problems (Financial Times, 2017). As CNN published in March 2018 (Isidore, 2018): 'the company had originally promised it would be making 5,000 Model 3's every week by the end of last year [2017], but delivered only 222 in the third quarter, and another 1,542 throughout the entire fourth quarter. It has now pushed the 5,000 a week target back to the end of June' [of 2018]. Meanwhile, Tesla is obviously working hard to fix the issues and get back on the original track. On April 3rd, 2018, the company in an official press release states that 'Tesla continues to target a production rate of approximately 5,000 units per week in about three months, laying the groundwork for Q3 to have the long-sought ideal combination of high volume, good gross margin and strong positive operating cash flow. As a result, Tesla does not require an equity or debt raise this year, apart from standard credit line.' (Tesla, 2018). Independent to the questions of why and how this could have happened and who might be blamed for it, the matter is probably not that simple and straightforward. A company could run the risk of burning its cash and experience a drop in share prices, should the problem persist. In addition to this, customer trust could potentially be harmed in the process. Hopefully, Tesla will indeed be able to turn things around, but for the moment it looks like it's being a long and tough supply chain ride for them.

Or take the breaking news about global ocean shipping giant Hanjin, at the time a Top-5 player in the industry, filing for bankruptcy while large quantities of containers were still waiting for their ships at numerous ports around the world, and a large number of their ships were still at sea full of containers, but with no liquidity left in the company to bring them to shore (Guardian, 2016). Or the story about supply problems of paper-fibre manufacturers in Brazil, plus a season with a more than average amount of forest fires in Canada, leading effectively to toilet paper shortage in Taiwan, with the subsequent run on the product in supermarkets throughout the country. Share prices of the producing companies dropped sharply as a consequence (Horton, 2018).

Or take the example of Kentucky Fried Chicken (KFC) deciding to close “*hundreds of restaurants*” in the UK due to shortage of chicken. The reason for the shortage was that KFC changed their logistics partner and together with the new company they just didn’t quite get the logistics operation straightened out before the go-live date. Consequently, KFC and its new logistics partner were on the news around the planet, restaurants didn’t open and therefore didn’t sell, customers got disappointed, and restaurant staff had to be sent home (BBC, 2018).

And there is many factors beyond the question of whose responsibility it might have been detailing why things haven’t worked out so well in the examples, the main message for the moment is that Supply Chain seems important enough for companies to worry about managing it well. The stakes are just too high if it doesn’t work.

[! Start box !]

Exercise 1.1 Explore Supply Chain hiccups

EXPLORE

The examples are dated around the time of writing of the book in 2017-2018, but such hiccups happen all the time. Go to the Internet and search for 5 recent supply chain disruptions, let's say from the last 6-12 months. Try to identify the reasons why the disruption could have happened, and what the direct and indirect consequences for the company or companies in question might have been.

[! End box !]

Definitions of supply chain

After this short introduction into the importance of supply chain and what might happen if it's broken, let's try to define more clearly what a supply chain actually is. In fact, many definitions of supply chain exist, just go online and search for "definition supply chain" or something similar. Probably, many of the definitions you find have something in common, but at the same time most likely they also have differences. First of all, as the examples in the previous section show, it is interesting to highlight the validity of the "chain" metaphor. In many languages a variation exists of the expression: "a chain is as strong as the weakest link". Applied to a supply chain context it puts an important emphasis on the idea of interdependencies between the various players involved. If one of my suppliers fails and consequently I'm not able to produce and deliver myself, I cannot really hide behind my supplier towards my own customers. After all, they are dealing with me and not with my suppliers.

A widely used definition of the supply chain comes from the Supply Chain Council, an industry association which some years ago joined colleague organization APICS. They are behind the development of the Supply Chain Operations Reference, or SCOR model. It provides a 'process oriented' view on supply chain management,

distinguishing the steps of plan, source, make, deliver and return in any company involved in any supply chain. Please see Figure 1.1 for an overview. Obviously, as we will comment upon at a later stage, the supply chain can also be extended further into suppliers' suppliers and into customers' customers. Stanton (2017) in his practically oriented book on supply chain refers to the SCOR model extensively. APICS has also recently launched an app for iOS and Android covering an overview of the entire model.

Figure 1.1 SCOR model overview

[! Insert Figure 1.1 here !]

Just to take a few more examples of supply chain definitions from leading textbooks on the subject, let's look at some of them. Rushton, Croucher and Baker (2017) phrase it like this:

Logistics = Materials Management + Distribution. Supply Chain = Suppliers + Logistics + Customers

Christopher (2016) states that supply chain management is 'the management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole'.

Simchi-Levi et al (2009) define supply chain management as '[...] a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize systemwide costs while satisfying service level requirements'.

A definition I personally use in workshops and trainings is the one that Chopra & Meindl (2016) propose ‘A supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request’. Although it might seem a very open definition with a rather open-ended view on the boundaries, that’s one of its interesting characteristics: you must define for your own case how long and how wide you want your supply chain to be.

What all definitions have in common, explicitly, is that supply chain is about flows of goods, information and money (costs and revenues), and, maybe even more importantly, is that it is aimed at satisfying the needs of a customer at the end of our chain (we call this the downstream end, as opposed to the suppliers, who are upstream). In other words, the customer, the paying figure at the end of our direct chain, is clearly part of our supply chain.

It might be interesting to note that Simchi-Levi distinguishes and explicitly connects what he calls the ‘development chain’ and the supply chain. The latter is covered by his definition as cited before, focussing on the stable supply, manufacturing and distribution of existing goods, while the development chain deals with new product development and the design of the processes to supply, manufacture and distribute those new products (Simchi-Levi, 2009).

More and more attention can be noted towards circular chains, in connection to the wider topic of corporate social responsibility and sustainability. The return processes as defined in the SCOR model already open the possibility to include that dimension.

Please note a difference between customers and consumers. Every company along the chain has customers, but with the term consumers we normally refer to the

final users of a product at the end of the entire chain. Retailers like Tesco or Carrefour might be customers of mineral water producer Evian, but the consumers are the people in the stores buying the water. This distinction between customers and consumers will come back at a later stage when we discuss the concept of “customer value” in Chapter Two, as well as when working on “business models” in Part Three.

Importance of definitions

These definitions were presented to give you a flavour of what standard textbooks say about the subject. In my experience of working with supply chain professionals around the world, having the correct definition of supply chain is not necessarily a topic to worry about too much in practice. It doesn't occur many times that we do not understand each other when talking about the supply chain from a holistic point of view, not even when we cross functional borders with other departments. In most cases this doesn't cause any serious problems.

However, this might be different in case of definitions of areas which are part of the supply chain. There I do see more confusion about terminology, depending on background, company context or even national frames of reference. The word ‘logistics’ is a good example. For some this is pretty much a synonym for supply chain, in the holistic end-to-end view. For others, logistics is more of an operational activity, for example mainly related to warehousing and distribution. One can understand potential confusion occurring when two people have a discussion together, but each working from a different understanding of the term. In a similar fashion, there is the difference between the functions of purchasing and procurement. Check the Internet and you will

find a wealth of different explanations, in some cases even exactly the opposite of one another.

So even though in practice there isn't that much confusion about the term supply chain itself, in these latter examples in which less clarity exists, obviously definitions are important, not in terms of determining who is right or who is wrong, but especially from the pragmatic point of view of clarifying them with your counterpart, allowing then to move on productively with the conversation.

WHAT DOES THE SUPPLY CHAIN LOOK LIKE?

The length and width of the supply chain

Let's go back for a moment to the question of how long and how wide your supply chain should be. Does it make sense for you in a case to include the suppliers of your key suppliers into your company policies? Or the customers of your customers? Obviously, answering these questions with a "yes" doesn't come for free, it has implications on what you do and how, but if it makes sense, then include them and decide on the best way to manage that. If not, then 'just' deal with your own direct suppliers or customers.

[! Start box !]

Exercise 1.2 Explore how long and wide the Supply Chain is

EXPLORE

In which cases do you think it might make sense to go beyond a company's own direct "upstream" suppliers and "downstream" customers and include their respective suppliers or customers also into the company's supply chain view and policies?

What are the reasons you can think of? Another way of phrasing this question would be to think of which risks the company could run if they didn't go beyond the first level suppliers and customers.

[! End box !]

A similar choice would be valid for some of the internal departments in the company. For example, could the Research & Development (R&D) department considered to be “directly or indirectly involved” in fulfilling a customer request? Arguably in most cases not in the current day to day business, but within R&D technologies and/or products are being developed and choices are being made which sooner or later might have an impact on activities in the supply chain. The same could be valid to more or lesser extent for departments like IT, Legal, Human Resources, etc. The challenge is to identify how they potentially impact on the supply chain and how best to manage that, without creating large and inefficient organizational structures and an infinite number of meetings.

The impact of size and power in the supply chain

As the term supply chain indicates, it's not about individual companies, but about the whole they form part of. But obviously, relationships between companies are not going to be great and wonderful just because they happen to be part of the same supply chain. An element to keep in mind is that the size of the companies involved in any bilateral or multilateral relationship is most likely going to play some sort of role in what happens between them. The exception might be the smaller company that has something special to offer in which they are so unique that even the larger ones will have to adapt, but in most cases, size is an important factor to take into consideration.

First of all, larger companies have more negotiation power than smaller ones. They move larger volumes and because of this, large companies have the possibility to impose their rules upon the smaller ones. Vice versa, the smaller ones might have a more difficult starting point to negotiate contract conditions or might have more difficulties in case of trying to convince the large companies into joining them in improvement projects.

However, there might also be an opportunity to leverage the buying power or conditions of the large company into the schemes of the smaller one. For example, in case the large company because of its large volume has certain favourable contracts for transportation with their transport providers, or attractive financing conditions with their banks, they might offer the possibility to the smaller firms to join those agreements. In other words, the conditions of the large company become available to the smaller company.

Companies like Toyota, Ikea, or Spanish supermarket chain Mercadona use their relationships with key suppliers in order to leverage best practices across those. So, if they see that a joint initiative with one key supplier has given good results, they might propose something similar to another or even ask the two suppliers to join forces between them for a particular project. Such examples show that a difference in size is not by default negative for the smaller company. The way things will work out between companies of different sizes is sometimes difficult to predict. But the impact of size is something that cannot be ignored.

Building blocks of the supply chain: the pieces of the puzzle

Before going into the details of what the supply chain covers, already a few words about how it is embedded into the company. Historical thinking is that the starting point for defining any supply chain solution is the strategy of the company, which leads to the development of partial strategies for different functional areas, among which also the areas involved in the end-to-end supply chain can be found. This would then lead to the definition of logistics or supply chain targets, which then form the input for determining the right supply chain setup, consisting of the right. Lately, there is a stronger notion that supply chain strategy is not just a consequence of the strategic decisions, but a relationship that is much more reciprocal, with a 2-way dependency, in which commercial strategies change due to supply chain capabilities within the company. We will come back to this more extensively in Chapter Two.

So, what exactly are the building blocks we consider when talking about supply chains? To begin with, I would like to refer to what Visser and Van Goor (2011) have dubbed the “Integral Logistics Concept”. They coined the term already in the 1990’s, and it is still widely used and as it turns out it covers pretty much what we would nowadays call supply chain.

Figure 1.2 Integral logistic concept

[! Insert Figure 1.2 here !]

Source: after Visser and Van Goor (2011)

Their original concept also starts with company strategy, markets/segments and value propositions, leading then to the design of the integral supply chain. To be coherent with the notion that strategy and supply chain are not so much sequential steps but are much more intertwined, the arrow between the two boxes goes into two

directions now. The building blocks of the supply chain as depicted in the model are then the following:

- *Physical infrastructure*, for example decisions about factories, warehouses, ports and other transportation hubs, the applied manufacturing or logistics technologies, having inhouse or outsourced operations, pursuing a push-based or pull-based supply chain (more about this later). Obviously, there is one other key element of the physical infrastructure: the materials which are moved through it. Normally we refer to these as goods flow or material flow. A specific term used a lot in companies to identify their products is *sku*, which stands for stock keeping unit, or reference number, or article. Sku can be applied to components as well as to finished goods;
- *Planning and control mechanisms*, such as forecasting, production planning and sequencing, inventory management, transportation planning, etc. This would cover the relevant processes in the company, as well as the alignment between them;
- *Information and subsequent systems requirements*, in order to provide the relevant information for planning and execution of aforementioned processes;
- *Organizational setup*, stating who does what and in which processes: roles & responsibilities.

As shown in Figure 1.2, the four blocks at the bottom are placed in sequence, one leading to the other, starting with making network choices. Some arrows are flowing backwards, thus highlighting the iterative nature of designing of a coherent integral supply chain solution.

When addressing the ‘technical dimension’ of supply chain in Chapter Three, we will follow the structure and sequence of the integral logistics concept. The approach from the integral concept is pretty much coherent with the building blocks of supply chain that can be found in other textbooks.

Another distinction of decision making in supply chain is related to the time horizon of the decisions and their impact. Typically, we would distinguish three levels of decisions in this context:

- *Operational*, short term decisions (for example for the next three months);
- *Tactical*, medium term decisions (for example, with a 3-18 month horizon);
- *Strategic*, long term decisions (for example, with a horizon of 18+ months).

How exactly short, medium and long term are defined might differ per company and/or industry. Due to the speed of technological innovation, in the high-tech industry 2 years into the future might seem like an eternity, while in the airplane business things simply don’t go that fast (the reader interested in different speeds in different industries might want to check out Charles Fine’s classic book “Clockspeed” from 1998). The distinction between the timeframes of decisions will also come back at a later stage in Chapter Three.

What does my supply chain look like: supply chain mapping

A widely used technique to establish a clear view on a given supply chain (existing or planned) is called *mapping*, simply meaning ‘creating a map’. Different types of maps exist, all with a slightly different focus, such as the following commonly used ones show:

- *Network flow diagram*: focused on showing the logical connections between facilities in a network, so that the complexity becomes visible. The diagram can also be enriched by adding qualitative and quantitative data to it, highlighting for example volumes, service levels, inventory levels, numbers of shipments;
- *GIS-diagram*: GIS stands for Geographical Information System, implying that certain types of data, such as demand, shipment frequencies, shipment sizes, number of customers, etc. are visualized on a geographical map, for example based on postal code zones;
- *Process flow diagram*: aimed at showing logical connections in business processes and the flow of decisions. These could include a dimension related to responsibilities, for example having the flow of decisions be depicted on a background representing each corporate department as a column (“swimming lanes”);
- *Geographical flow diagram*: like the network flow diagram, but now instead of focusing on logical flow from left to right, this one highlights the geographical dimension on a geographical map.

Three of the abovementioned mapping types will come back in Part Two.

[! Insert Figure 1.3 here !]

Figure 1.3 Some of the most commonly used types of mappings

SUMMARY

In this introductory chapter we have addressed some of the main basic definitions and building blocks of the supply chain. Now, as part of our journey of exploring the fundamentals of supply chain management in Part One of the book, let's take a closer look at the *business* dimension (Chapter Two), the *technical* dimension (Chapter Three) and the *leadership* dimension of supply chain (Chapter Four). The figure below gives a high-level overview of the topics that will be covered in each of the dimensions.

Figure 1.4 Topics covered per each of the three dimensions of supply chain management

[! Insert Figure 1.4 here !]

CHAPTER TWO: SUPPLY CHAIN: THE BUSINESS DIMENSION

Supply chain is an integral part of the overall business, covering different (mainly operational) functional areas and co-existing with the other functional areas in the company. In this chapter, we are going to explore that relationship between supply chain and a company's business more deeply.

We will address:

- The topic of competitive or corporate strategy
- The concept of value towards the customer: value propositions (what?)
- What needs to be done to deliver that value: competitive advantages (how?)
- Typologies of supply chain strategies
- The relationship between supply chain and the financials of the company (how much?)
- An integral view on business models: business model canvas (what, how and how much?)
- The potential impact of the company's external environment on its supply chain
- Supply chain risk and resilience

Please note that in Chapters Two and Three a number of exercises are featured for you to explore the different aspects of the business and technical dimensions of supply chain management. Select a few companies of your specific interest and their corresponding industries so that you can work on those during the exercises (preferably companies involved in physical products). You can keep those at hand throughout Chapters Two and Three.

INDUSTRY PERSPECTIVE: COMPETITIVE STRATEGY

About industries and markets

When defining strategy, we need to clearly distinguish between industry and market. In simple terms, *industry* refers to the competitive landscape a company is operating in, so the other companies addressing the same or similar customer segments with the same or similar products and services or competing for the same money the customers spend.

Market refers to the group of customers a company is addressing, in other words the people or companies that would potentially be buying their products or services. More about those in the next section of this chapter.

Starting with the industry, the first question is how much pressure there is within the industry and who the competition is and secondly, how to beat them in the competitive race. Porter (1985), has proposed his famous and widely used 5-forces framework to get a clear view on the competitive landscape by identifying the competitive rivalry between direct competitors, the threat of new entrants, the threat of product/service substitutes and the pressures derived from suppliers and customers.

Competitive strategy

Once the industry situation is clear, a company decides on how to best compete within the chosen industry. Porter recognises three basic strategies: a *cost leadership* strategy, a *differentiation* strategy or a *focus* strategy. The first two are straightforward, the third one means acting towards a specific and relatively small, niche segment, not or at least much less attended by other industry incumbents.

Another widely used framework to define competitive strategies is the one proposed by Treacy and Wiersema (1995). They also distinguish three basic strategies, although slightly different from the ones by Porter:

- *Operational excellence* focused on low cost and a good service but based on a rather small product/service portfolio;
- *Customer intimacy* focused on extreme levels of customer service, large product/service portfolios and total solution provision;
- *Product leadership* focused on highest quality state of the art products based on continuous product development.

Although slightly different in their definitions, an interesting similarity between Treacy & Wiersema and Porter is that they all advocate for making clear strategic choices.

Porter called this avoiding to get “stuck in the middle”, i.e. if you don’t make a clear choice, you’re in fact trying to be everything to everyone, with the result of not being really good at anything.

[! Start box !]

Exercise 2.1 Explore industries, players, strategies

EXPLORE

Take the one or few industries you’ve chosen because of your interest in them. Do some desk research into the different players active in this market. On the basis of the information you can find, try and define which of the basic strategies the different industry players are pursuing. You are strongly suggested to try and use both the frameworks of Treacy & Wiersema and Porter, so that you can find out how they are different, but also how well they work for you. Create a separate table for each framework, indicating the corresponding different strategy types and allocate the companies according to their strategies.

Which conclusions can you draw from the table(s) created? To what extent are strategies clear? To what extent have you found companies that look “stuck in the middle”?

[! End box !]

Whichever of these strategies a company chooses will ultimately also determine which actions need to be taken in the supply chain. More about that after this brief outlook on industry and competitive strategy, let's now look at those we are selling to - our customers.

THE ‘WHAT’ OF THE COMPANY’S BUSINESS: CUSTOMERS AND VALUE PROPOSITIONS

The concept of value: why would they buy from me?

A company generates revenue by selling to its customers. That is the starting point of business and when speaking about definitions of supply chain earlier on, it is clear that the customer has an important position in the supply chain. In this context, the word ‘value’ is also often used. A company must give its customers something they value and that they are willing to pay for. I would call that the ‘what?’ of the company, in other words, what is it that we promise to our customers that they perceive as valuable?

In academic literature about marketing there are a wealth of references and frameworks about the concept of value, for example in the famous work of Philip Kotler (2015). A generally accepted expression is that value is a function of the benefits perceived by a customer, in relation to the price paid for the product or service. In a way, this refers to the term ‘price-and-quality relationship’ that we are all used to in our daily lives.

So where are these perceived benefits coming from, or which are the elements of the ‘value proposition’? In marketing literature there are plenty of frameworks and concepts dealing with the definition of value propositions, from the ‘product levels’ of Kotler (2015), to the Value Proposition Canvas (Osterwalder et al, 2014) and the 5 value attributes and corresponding 5-4-3-3-3 strategies as proposed by Crawford & Mathews (2001). DeSmet (2018) combines the latter framework of Crawford & Mathews in a very original way with the basic strategies of Treacy & Wiersema as introduced at the beginning of this chapter. Lastly, Sharp (2010) also addresses the topic of value extensively, mainly focused from the angle of brands and branding, in combination with smart segmentation and specifically adapted marketing policies.

All the frameworks are detailed approaches with different definitions and dimensions of value. It would be outside the scope of this book to go into the detail of each of those. For our purpose we simplify a bit and turn to the framework of Christopher and Rushton et al, as published in their respective books on supply chain management. When considering the world of goods, which are most relevant for supply chain, as an example and following Christopher (2016) as well as Rushton et al (2017), it starts with the core product at the heart of its value. Some people would discuss the basic or core benefits of the product. Aspects like the product quality, functionality, product features, and durability come to mind: an umbrella should effectively protect you from the rain, a medicine cure a disease and mineral water relieve your thirst.

But in some markets, especially mature ones where products from different companies are very similar to one another, those basic benefits might just not be enough to differentiate towards the customers, unless you would successfully pursue a cost leadership or operational excellence strategy. For the other companies, differentiation

could take place at what Christopher and Rushton call the “service surround” or “product surround”. In this additional layer aspects beyond the pure physical product come into the play, like for example delivery speed, delivery reliability, flexibility to change an order before delivery, after-sales service, choice of packaging variety, or the possibility of adding customised labelling.

Figure 2.1 Value, core product, service surround

[! Insert Figure 2.1 here !]

Source: after Christopher (2016) and Rushton et al (2017)

As we will discuss later, a proper and accurate definition of the value proposition towards our customers is one of the key starting points to determining what our supply chain should be looking like.

Being everything to everyone vs. one size fits all: smart customer segmentation

Please note, that most companies do not only attend one single customer segment, they normally deal with various segments. In marketing literature many references can be found about customer segmentation, but the basic thought behind it is that customers are not all 100% identical and that ‘one size fits all’ might be very efficient, but results in hardly anyone receiving exactly what they want. The opposite would be to give every individual customer exactly what they ask for, but the downside of that approach would be that efficiency and therefore prices and/or margins would be at stake.

That is where the art and science of smart customer segmentation comes into the scene: how to determine as many useful segments as necessary while at the same time keep the number as low as possible, thus optimizing between customization and efficiency. The exact concepts, methods and tools of customer segmentation are a bit beyond the focus of this book, but for the moment it would be sufficient to understand that most companies work for multiple segments and that each of these segments might call for different value propositions (even though more or less overlap might exist, they would not be 100% identical). And in turn, those different value propositions might require different supply chain solutions, each playing with the same tension between customization and efficiency.

For example, think about a laptop producer like HP or Acer. They might sell to large chains of household appliance retailers like Mediamarkt or Curry/PC World, but also to supermarket chains like Tesco or Carrefour. Furthermore, their products are sold directly to smaller shops, as well as via large distributors like Ingram Micro. At the same time, their products can be found on the platforms of e-Commerce retailers like Amazon, as well as on the company's own web shops. Each of those, commercially speaking, are different segments, sometimes even segmented into more detail according to size and/or geographical scope (international, national, regional). And as you can understand, each of those segments, although potentially interested in buying the same products might have very distinct service requirements in terms of frequency of deliveries, repackaging, relabelling, delivery reliability and speed, electronic systems connections, and a large list of etcetera's.

Customer and consumer: not (always) one and the same

It was briefly hinted at already earlier on, but in any given company situation there might be a difference between characteristics which are important to the direct paying customer of a company and those characteristics that are important to the (final) consumer. When considering a local convenience store owner in the city centre of town, their customers in most cases would be the same as the end consumers, so there is no need for me to differentiate between customer and consumer.

But for example, in the case of a pharmaceutical company, the final consumer is the patient and they are obviously interested in what a medicine will do inside their body, referring to the core benefit of the product caused by the so-called ‘active ingredient(s)’ it contains. However, the pharmacy which is buying the medicine from the pharmaceutical company, is probably not interested in the core benefit because in the end they will not use the medicine themselves. For them the core benefit of the product is mainly important because they know it will represent a potential sales volume to patients - for example. looking for a medicine against headaches. In addition to that, the pharmacy will most likely be very interested in delivery-related aspects, like delivery lead time, flexibility, packaging types, product availability etc.

So even though it is tempting to focus only on why a consumer might want to buy a certain product from a company, it’s crucial not to forget the aspects which provide value to the ones who directly pay us, our customers, especially in case they are not the same. From a supply chain perspective, we need to make this distinction explicit and include both points of view, since they might have different implications for the different supply chain building blocks. In literature about industry types, business models and marketing, commonly the distinction is made between business-to-consumer (B2C) and business-to-business (B2B). However, even a B2B company

selling to other businesses will ultimately have a consumer at the end of the chain, so it might be tempting to mix up the concepts of customer and consumer.

[! Start box !]

Exercise 2.2 Explore market segments

EXPLORE

For the industry you chose in the previous exercise and the players you identified there, try to find more detailed information about the different market segments they attend.

For each of the segments you have identified for a specific company, try to find information about their respective value propositions towards these customer segments.

[! End box !]

The viewpoint on industry, competition and value propositions about the different customer segments gives us a starting point for defining what the supply chain should look like.

THE ‘HOW’ OF THE COMPANY’S BUSINESS: COMPETITIVE ADVANTAGES

On how to create value: the value chain

As soon as a customer has expressed interest in what the company promises, and this customer has decided to buy, then ultimately a delivery needs to take place, according to or even exceeding the expectations of the customer. Everything needed to successfully deliver on the promise is what I would call the ‘how?’ of the company.

If a company competes by promising shorter lead times than its competitors, it effectively needs to find ways to become faster than them. If it promises better delivery

reliability (also called service level), it has no choice but to become more reliable than the others. If it offers lower prices, then it would need to become cheaper. At the highest level, it's as simple as that.

Obviously, now the real supply chain puzzle starts, and serious doses of creativity are required. Because how do you become fast? Or more reliable? Or cheaper? And above all, consistently being able to carry out the job day after day. Once more, we turn to Porter for a reference, since he also addressed the how-side of the story when he described his famous 'value chain' (Porter, 1980). Although the concept is wider than just supply chain, there are many overlapping elements. On the one hand, Porter distinguishes primary activities, such as marketing & sales, production, logistics, all directly involved in the creation and delivery of the product or service at hand. On the other hand, there are the supporting activities, such as human resources, research and development, and so on.

According to Porter, a company can make a competitive difference by achieving excellence in any (combination) of the areas, leading to achieving competitive advantages. Obviously, in which areas it must excel will be defined by the decisions made with respect to corporate strategy. For example, to be a world leader in fundamental research aimed at new material discoveries and new product development is mostly relevant for product leadership strategies and not so much when aiming at becoming a cost leader.

As I noted in my previous book, *The Perfect Pass*, Porter talks firstly about the objective of performing strategically important activities cheaper and/or better than the competition. In other words, Porter says that one must understand that for improving the

competitiveness of a company, a difference can be made in any one or more of the strategically important activities. Competitiveness is related to the operational capabilities of the company. It is also something which is perceived by their customers, and ultimately is at the heart of a company's profits. The implication of this is that each of the activities in the value chain can be used to create a competitive advantage and that a view of the big picture is required to put everything into perspective.

Secondly, Porter stresses the fact that activities are interdependent and not isolated. Consequently, anyone who achieves a good alignment of these activities would either create optimization or improved coordination between areas. This could manifest itself in a set of high-quality and smart business processes across different areas, leading to cheaper and/or better performance. At the same time, given the interdependency of all areas, one would have to make sure that action or initiatives in one area would have to be coherent with the actions and initiatives in another (Weenk, 2013). Both abovementioned aspects of Porter will come back when talking about the integrated view of business models later in the chapter.

Key to superior performance: competitive advantages

The key idea of competitive advantages is to identify in which areas the company is or should be better, faster, cheaper than competitors, as well as knowing why. Is it because of more well-developed processes? Because of more advanced technology or patents, because of better qualified or more motivated people in one or more of the primary and/or support activities? This combination of distinguishing factors is called the 'competitive advantage' of a company, it describes why the company is able to compete successfully with the other companies in its industry,

hopefully in a sustainable way, meaning in the long term. The more elements it has as part of the competitive advantage, the more difficult it will be for competitors to copy and catch up and the more likely it will be that advantages can indeed be sustained into the future.

Any of the elements mentioned when dealing with the building blocks of supply chain earlier on, as part of the integral logistics concept (physical infrastructure, control structure, information & systems, organisation) would potentially be on the list as part of a company's competitive advantage. For example, Amazon can achieve its same-day delivery service because it has invested in having many local storage facilities and applying advanced robotics technologies on most of them. Amazon is able to provide reliable information about availability of products or the status of deliveries because of extensive investments in development of advanced IT-systems, as well as having the processes and contracts in place to manage an enormous wide portfolio of suppliers. All of those ingredients of their supply chain together, and probably some more, make that Amazon has created an overall competitive advantage, difficult to copy for others, at least in the short to medium terms.

[! Start box !]

Exercise 2.3 Explore competitive advantages

EXPLORE

Go back once more to the industry you chose in the previous exercise and the players you identified there. Try to find more detailed information, for example in their Annual Reports about what the elements could be of their competitive advantage. In what are they better, faster, cheaper than the competition?

Why are they better, faster, cheaper, what's their secret?

How sustainable do you think the different competitive advantages are, how easy or difficult would it be to be copied by competitors or even new industry entrants?

[! End box !]

SUPPLY CHAIN AND A COMPANY'S FINANCIALS: THE "HOW MUCH?"

It's clear that to survive, all businesses need to make profit, so spend less than they earn, at least in the long run. At the same time, there needs to be a healthy balance between the profits generated and the investments done in order to achieve them. This part of financials I would call the 'how much?' of the business. We will now look at the impact of the area of supply chain on profit & loss and investments. Although all major supply chain textbooks write about supply chain and finance, Christopher (2016) and Rushton et al. (2017) even dedicate an entire chapter in their respective books on the topic. In part, we will refer to their work here. The same goes for DeSmet (2018), already mentioned before, whose recent book is entirely dedicated to the links between supply chain strategy and financial metrics.

Receive and spend: the income statement

The first important financial statement in the annual report of a company is the income statement, or profit and loss statement (P&L). It shows if a company has made a profit or a loss and shows the details of how it's built up, starting with the revenue and subtracting all expenses.

Figure 2.2 Items on the income statement (Profit & Loss or P&L)

[! Insert Figure 2.2 here !]

As can be seen in the overview above, there are plenty of direct links between the supply chain and the income statement. Firstly, it can be argued that superior supply chain performance in terms of delivery service, speed or flexibility will lead to sustainable revenue, or might even very well lead to additional sales if performance is better than the competition. Furthermore, there are obviously very clear links between supply chain and the money spent, as expressed in the costs of goods sold (for example purchasing of raw materials, inbound transportation, energy and labour costs for manufacturing and warehousing. In addition, there are the costs for distribution to customers, which are normally to be found as part of the Sales expenses.

All in all, the income statement gives us a clear view on what is called the top line (revenue), and the bottom line (profit). From this statement it can also be deduced that a market strategy aimed at top line growth is not necessarily the same as one aimed at bottom line improvement.

[! Start box !]

Exercise 2.4 Explore topline and bottomline

EXPLORE

Strategically speaking, in which cases do you think that the focus of a company might be on “topline growth?”.

And in which cases on “bottomline improvement”?

Which specific actions can you think of that would fit well with a topline growth focus?

And with a bottomline improvement focus?

How are these two strategies different and/or similar?

[! End box !]

Now that we have clear what earnings and expenditures have been like, let's look at the investments that have been done in order to make that happen.

Own and owe: the balance sheet

The second important financial statement in the annual report of a company is the balance sheet, also sometimes called “financial position”. It shows the assets, liabilities and equity of the company, in other words, the resources that the company owns, as well as the money it still owes to others.

Figure 2.3 Items on the balance sheet (financial position)

[! Insert Figure 2.3 here !]

Although the financial position includes more than just supply chain related items, the main important ones from a supply chain point-of-view are the snapshots of inventories, trade accounts receivable (A/R) and property plant & equipment (PPE) on the part of the assets and the trade accounts payable (A/P) on the part of the liabilities. One could potentially also add cash as related to supply chain, when thinking about the relationship between deliveries done, delivery reliability and even invoice accuracy. A/R and A/P have direct links with topics like payment terms, order sizes, and so on. Inventories are relatively straightforward to understand, and together with the accounts receivable and accounts payable they make up the working capital of a company (see next section). Property, plant and equipment have a direct link with the supply chain infrastructure and production and logistics technologies and equipment applied.

Hot topic: working capital & Supply Chain Finance (SCF)

Over the last few years an increasing attention can be noted for the topic of working capital. It has even lead to the rise of an almost totally new field of expertise: Supply Chain Finance (SCF). The first conference by the international Supply Chain Finance Community was only organized as recently as 2013. It would be outside the scope of this book to go too much into detail about it, so for the moment we keep it at clarifying the why of this attention.

A company's "Net Working Capital (NWC)" is defined as follows:

$$NWC = \text{Inventories} + \text{Trade Accounts Receivable} - \text{Trade Accounts Payable}$$

When expressed in days rather than in amounts of money, we speak about the "Cash-to-cash Conversion Cycle (CCC)":

$$CCC = \text{days of inventory} + \text{days of accounts receivable} - \text{days of accounts payable}$$

Days of accounts receivable sometimes is also called 'days of sales outstanding (DSO)', days of accounts payable is sometimes also called 'days of purchasing outstanding (DPO)'.

As can be deduced from the formula, the way a supply chain is designed and operated, using inventory, having shorter or longer delivery lead times, achieving better delivery reliability, agreeing shorter or longer payment terms or different Incoterms, etc., generates more or less working capital.

For example, if I have high levels of inventory of finished goods in my company, then the money for this inventory is spent already, because first I bought the components from my suppliers and then I have spent money on producing the finished goods, but for the moment I have not had any return on it yet, because the goods are still

in my inventory ready to be sold (this is also why we call inventories “tied-up capital”, i.e. money invested and this money I cannot use anymore since it’s been used already). On top of that, the invested money has come from somewhere, for example from a loan or credit line from my bank, for which my bank obviously will charge me an interest rate, as well as some fees to make the arrangement.

That’s why the finance people are becoming so much more involved in the supply chain, since decisions taken there will have a direct impact on the actions they have to consider to finance those activities.

For example, think of a leading supermarket chain. When people go shopping there for supplies they normally pay on the spot, so the supermarket has an amount of days of accounts receivable which is very low or even zero. Those same leading supermarkets normally put a lot of effort into optimising their product portfolio in such a way that they maximise the sales per meter of shelf space, which also leads to focusing on products with a high rotation, which in its turn facilitates having a lower overall amount of days of inventory. Finally, they usually pay their suppliers on the basis of fairly long payment terms, for example 90 or 120 days, leading to a reasonably high amount of days of accounts payable. In this way their working capital or cash-to-cash conversion cycle is as low as they can possibly get it (or sometimes for some retailers even negative): relatively low inventories + relatively low number of receivables – relatively high amount = relatively low amount of net working capital, reducing the need to spend money on financing.

Below framework shows a recent vision on the topic of Supply Chain Finance (de Boer et al, 2015). Currently, much attention is on the operational level related to

working capital, but the tactical and strategic level are also getting more and more attention.

Figure 2.4 Supply chain finance instruments

[! Insert Figure 2.4 here !]

Source: de Boer et al, 2015

Integrated financial view: ROI

Bringing the above two parts on income statement and balance sheet together in one picture, we will arrive at an overall indicator that is widely used in companies in general, but also specifically in the supply chain area: the *Return on Investment (ROI)*. In fact, different definitions of ROI exist, but for the purpose of the book we use one that reflects a clear relationship between supply chain decisions and financial impacts. Please see Figure 2.5, after Christopher (2016) and Rushton et al (2017). It contains elements from both the profit & loss statement (earn and spend) as well as from the balance (own and owe) in a company's Annual Report. In addition, the Figure indicates how supply chain can have an impact on the different elements.

Figure 2.5 Supply chain and ROI

[! Insert Figure 2.5 here !]

Source: after Rushton et al (2017) and Christopher (2016)

Another interesting feature of ROI as an indicator is that it is applicable across industry sectors and across strategies. DeSmet (2018) highlights this point. He is using

so-called Return on Capital Employed (ROCE) as an indicator, in fact almost the same as the ROI above and argues that different corporate strategies might have a very different operational focus, but that this should not affect ROI or ROCE in the end. In other words, there are different ways of being successful, just if strategic choices are implemented coherently.

Given its relevance to the company and the supply chain, as well as the relative simplicity of the concept of ROI, in The Fresh Connection business simulation game it will also be used as a central key performance indicator and Part Two and Three.

[! Start box !]

Exercise 2.5 Explore annual reports and financial KPI's

EXPLORE

Go to the Internet and find a few recent Annual Reports of a number of companies. It might be interesting to look at different companies from the same industry, as well as looking across different industries. Analyse the Income Statements and Balance Sheets and how the numbers and ratios are similar or different between companies and industries.

For example, specifically compare the:

- *the Costs of Goods Sold as percentage of total revenue*
- *the number of days of inventory and/or inventory as percentage of revenue*
- *the cash-to-cash conversion cycle*
- *the PPE-ratio (revenue / PPE)*
- *ROI or ROCE*

Try to find plausible explanations for the similarities and differences of these ratios between different companies. This exercise will give you a better understanding of the structure of the different businesses.

[! End box !]

[! Start box !]

Exercise 2.6 Explore financial impact of the Supply Chain

EXPLORE

What do the indicators you analyzed in the previous exercise tell you about the financial impact that the supply chain can have on a company?

[! End box !]

SUPPLY CHAIN AS PART OF A SUSTAINABLE BUSINESS

Outside-in: what and how together as part of the business model

Let's try and bring 'what?' and 'how?' as well as the 'how much?' together into one integral view, so that the underlying connections and interdependencies between these different aspects become as clear as possible. In an earlier book I phrased it with a number of reflections (Weenk, 2013):

“What is the promise towards your clients ('what')? What are you particularly good at to fulfil the promise consistently, day-in day-out ('how')? Why do the answers to the previous answers form a winning combination, or in other words: why are you different/better than your competitors” [leading to a profitable business ('how much?')?].

Since the above reflections were written, I have been working a lot on business models, using a framework called the ‘business model canvas’, as developed by Osterwalder and Pigneur (2010). According to Osterwalder “a business model describes the value an organization offers to various customers and portrays the capabilities and partners required for creating, marketing, and delivering this value and relationship capital with the goal of generating profitable and sustainable revenue streams”. In practice, the business model concept and the corresponding canvas as a tool provide an excellent basis to work from.

Osterwalder proposes a canvas consisting of 9 different areas, which together make up the business model. Below figure shows the canvas.

Figure 2.6 Business model canvas

[! Insert Figure 2.6 here !]

Source: Osterwalder (2010), www.strategyzer.com, under Creative Commons

Attribution Share Alike

Osterwalder refers to part of the canvas as “front stage” (this would be the ‘what’, on the right-hand side), and part as “back stage” (the ‘how’, on the left hand side).

Figure 2.7 The ‘what?’, ‘how?’ and ‘how much’ of business models

[! Insert Figure 2.7 here !]

Source: After Osterwalder (2010)

Please note that the business model canvas is nicely coherent with the approach of the integral logistic concept as introduced before in the preface (Figure 0.2) and of

which the different elements were discussed in detail in Chapter Two and Three. The part referring to strategy, markets and value propositions can be related to the side of the ‘*what?*’ in the canvas, whereas physical infrastructure, processes, information & systems and organization can be located on the side of the ‘*how?*’.

In my opinion, there are various attractive dimensions to the business model canvas, which also makes it into a fine tool from a supply chain point of view:

- It shows the connections between *what* and *how* in one integral simple image;
- Joint development by different departments of the canvas of a certain business forces to discuss and create one ‘agreed’ version of the business model;
- The canvas allows for checking if indeed all elements of the *what* are supported by elements of the *how*, thus testing the strength and coherence of the business model. In the same line, discussions might also raise relevant questions about elements of the business model which are maybe not so clear (“*know what you don’t know*”);
- It allows people active in the supply chain area to position themselves in the wider scheme of things, i.e. clearly showing their role and purpose within the (strategic) context of the overall company;
- In addition, as a tool, it provides an excellent basis for effective discussions, since at the end of the day, it provides empty boxes that need to be filled with content, almost like a checklist. In my experience, conversations become much more to the point consequently, leaving more time for searching answers to the questions raised.

[! Start box !]

Exercise 2.7 Explore business models

EXPLORE

Of a few companies you chose for the previous exercises, try and develop a view of the entire business model using the business model canvas.

[! End box !]

The business model canvas will also come back later in Part Three, then in relation to The Fresh Connection.

Inside-out: the external environment

Apart from looking at a particular market and the industry a company is active in, every business is also part of society at large, in which many things are happening which might have an impact in the shorter or longer term on any of the activities a company has currently, and obviously the supply chain been not an exception. One of the most widely used frameworks for looking at the external environment is the PESTEL analysis. The results of this analysis lead to identifying the opportunities and threats a company might be looking at in the future. Like so many things in business studies, PESTEL is an acronym, the elements of which are explained below, along with some generic examples relevant to supply chain. Since the topic will come back later in a more extensive way, at this stage we leave it with a brief introduction.

- *P = Political*, such as instalment of trade bans, the tensing of relationships between countries, the application of import/export quota, etcetera;

- *E = Economic*, such as ups and downs in the economy, economic growth or decline of countries or regions, cyclical industries which react strongly to upswings or downswings in the economy, etcetera;
- *S = Societal / sociological*, such as the trend of increasing individualism, generational trends such as changing preferences of Generation-X or millennials versus the older generations, but also the increase of environmental awareness or sensitivity to human rights in developing countries, etcetera;
- *T = Technological*, such as the wider trend of Industry 4.0, new technologies appearing, blurring barriers between technological areas that used to be separated, etcetera;
- *E = Ecological*, such as global warming, changing weather patterns, increasing issues with scarcity of raw materials, the ‘plastic soup’ in the oceans, recycling, etcetera;
- *L = Legal*, such as stricter legal rules, for example regarding waste, pollution, total-lifecycle-responsibility, requirements for product registration, etcetera.

Per each of these factors, companies at a strategic level have the task to identify relevant trends and developments and decide what they are going to do about them. As said, this will in many cases ultimately also affect the supply chain in some way or another, not only in terms of products, services and markets, but also in relationship to what a company can and maybe cannot do anymore in its supply chain. This will become all the clearer in the next two sections, about the Triple Bottom Line and about Risk and Resilience.

The Triple Bottom Line: how responsible is your supply chain?

Although arguably connected to a number of factors in the external environment as might have become obvious through a PESTEL analysis, over the last decades Corporate Social Responsibility (CSR) has gained a lot of attention. The key message of CSR is that companies should not only focus on maximising profit, but at the same time at behaving as if they were responsible citizens.

John Elkington (1997) allegedly was the first one to speak in this context of the “Triple Bottom Line”, or TBL, or 3BL. The first bottom line is the one we have spoken about before, the financial bottom line, but Elkington suggested to complement these by a social bottom line, as well as an ecological bottom line, thus coming to the 3 P’s of “People, Planet, Profit”. As said, the relationship between supply chain and finance we have already touched upon, but it is easy to see that the supply chain has large potential connections also with the People dimension (own workers, staff of suppliers, fair trade, local communities, people in society at large, etc.), as well as with the Planet dimension (use of natural resources, use of land, energy consumption, waste, pollution, etc.).

A more recent trend in the same line, taking things one step further, is proposed by Kate Raworth (2017), in her recent book “Doughnut Economics”. After working at United Nations for a number of years, she moved on: *‘I left to fulfil a long-held ambition and worked with Oxfam for a decade. There I witnessed the precarious existences of women – from Bangladesh to Birmingham – employed at the sharp end of global supply chains’*. This ultimately has led her to create a new vision about economics, not starting from financial profits, but from the human side, basically asking herself that if we want to achieve human welfare, then what the economy would need to do to help achieve that. From the collapse of the Rana Plaza Building in Bangladesh in 2013 to reports in 2017 that companies in the UK who manufacture clothes for high-

street fashion retailers pay their factory workers only half of the legal minimum wages, it seems that indeed in company supply chains not all is well and that the push for lower costs has had important negative side effects.

In terms of supply chain, part of Raworth's original thinking apart from the sourcing and off-shoring dimension, also gives lots of attention to concepts like circularity: the re-use and recycling of materials. It is clear that such ideas might or will have lasting impacts on supply chains, from alternative raw materials down to return flows and changed activities in manufacturing (see Figure 2.8). And indeed, '*circular economy*' and the related term '*cradle to cradle*' seems to be gaining a lot of attention recently also in the wider supply chain community. Figure 2.8 shows the Ellen MacArthur Foundation Circular Economy model, which includes a number of the corresponding concepts, building on the work by Braungart & McDonough (2002).

Figure 2.8 "Butterfly diagram" of circular economy

[! Insert Figure 2.8 here !]

Source: Ellen MacArthur Foundation, adapted from *cradle to cradle* (Braungart & McDonough, 2002)

Catherine Weetman in her book on circular economy for business and supply chain also builds on this concept. She argues that to facilitate true circularity, the design of products should already take return, reuse and recycling into consideration, thus leading for example to the concept of '*D4D – design for disassembly*'. Given the importance of the topic, she dedicates an entire chapter of her book to the 'design and supply chain', setting the basis for the many examples further on in her book. "The 'design and supply chain' is fundamental to the circular economy, with major

implications for business strategy and future success. It can reduce operating costs; buffer against resource risks (cost and security of supply); help create safer, healthier products; contribute to ecosystem restoration; and create desirable, well-designed and durable products for customers” (Weetman, 2017). Please recall Simchi-Levi’s connection between the development chain and the supply chain to see that Weetman’s approach is perfectly coherent with that, and taking it one step further, into the circular economy,

We will look more in detail into the topics of triple bottom line and circular economy in Part Three.

About things that can go wrong: risk and resilience

As tends to become clear from a thorough PESTEL analysis, the world is getting more and more complex and this undoubtedly has an impact on company supply chains. This leads to the wider topic of supply chain risk management, as more are presented under the umbrella of *corporate resilience*, particularly by the notable work of Sheffi.

The first step in risk management is to identify the risks. Sheffi cites an interesting framework as developed by Debra Elkins at General Motors, distinguishing 4 risk categories:

- *Financial vulnerability*, ranging from more internal policy factors like debt & credit ratings, provisions for health care and pension plans, to macro-economic factors like interest and currency fluctuations or economic recessions and so on;
- *Strategic vulnerability*, ranging from internal aspects like ethics violations, budget overruns, ineffective planning to external factors like attacks on the brand, new competitors, merger and acquisitions, and so on;

- *Operations vulnerability*, ranging from internal risks like theft, harassment & discrimination, to vulnerability of manufacturing equipment, staff, to more external factors like supplier or service provider failures;
- *Hazard vulnerability*, referring to both random and malicious disruptions, such as intentional property damage, intentional land or water pollution, terrorism as well as weather or nature related risks such as earthquakes, insect plagues, floodings, and so on.

These dimensions together lead to a diagram dubbed the ‘concentric vulnerability map’, in which the risks represented towards the outside of the circles are coming from outside the company, whereas the risks towards the middle come more from within the company (see figure below, adapted from Sheffi, 2007).

Figure 2.9 Risk management dimensions: concentric vulnerability map

[! Insert Figure 2.9 here !]

Source: adapted from Sheffi (2007)

After identifying the risks, they need to be classified, allowing priority setting. Traditionally, the probability and the impact of risks is looked at when classifying risks. High probability risks which in addition have a high impact when they occur, should receive a higher priority when thinking about countermeasures and mitigations than lower probability and/or lower impact risks. Sheffi reports on another dimension from more advanced risk management practice, which he calls ‘detectability’: “some types of disruptions can be forecasted or detected well before they have an impact, while others hit without warning. Detectability adds a time dimension to the classification of

disruptions and is defined as the time between knowing that a disruption event will take place and the first impact. Note that the detectability of an event can be positive (detection before the impact), zero (realization at the instant of occurrence), or even negative (detection after the disruption has taken place)". (Sheffi, 2015)

Risks are part of (corporate) life and companies will have to make choices about where to put their priorities. We will also get back to this topic later in Part Three.

SUMMARY

The objective of this chapter has been to explore the fundamentals related to the business dimension of supply chain, in other words the role that supply chain plays within the context of the entire business and its financials, as well as the potential impacts from the external environment. In the next chapter we will continue the journey of exploring the fundamentals, now shifting attention to the 'technical' dimension of supply chain, zooming in to the details of the many different building blocks it has.

Figure 2.10 Recap of topics of Chapter Two, the business dimension of supply chain

[! Insert Figure 2.10 here !]

CHAPTER THREE: SUPPLY CHAIN: THE TECHNICAL DIMENSION

From the topics of the business dimension of supply chain, as discussed in the previous chapter, the direction where the company wants to go is now clear, product-market combinations have been decided and the way to compete against the other incumbents is defined. Now it's time to work out the technical details of the supply chain. In this chapter, we are going to explore the following topics more deeply:

- Typologies, or archetypes of supply chain strategies;
- The physical infrastructure (push and pull, facilities and transportation, outsourcing and collaboration);
- Planning & control (processes, forecasting, inventories, production);
- Information & systems, organizational aspects.

FROM CORPORATE STRATEGY TO SUPPLY CHAIN STRATEGIES:

TYPOLOGIES

Predictability and volatility drive supply chain design: efficient or responsive

You might have heard the term *efficient supply chain*, or some people would speak about 'lean', or 'low cost', or 'cost-driven' supply chains. On the other end, we have *responsive supply chains*, which some people might call 'agile', or 'flexibility-driven' supply chains. By the way, please note that the term 'lean' in the context of a typology of a supply chain strategy isn't the exact equivalent of the same term in the context of the 'lean management' approach, which is more about a process-oriented methodology for continuous improvement (and in fact applicable within the context of any supply chain strategy).

Arguably, a cost-driven supply chain is very different from a responsive supply chain, even though in both cases there will probably be production, as well as inventories stored in warehouses, and trucks driving around to deliver things. But the way they are structured physically, and the rules that apply in planning and control, the way systems are used, or the organization is set up are probably very different in one case versus the other.

The way we use the different building blocks of the supply chain will to a large extent depend on the chosen company strategy. If my customers want a high delivery reliability from me, then I might want to decide to keep slightly higher levels of inventory so that I always have product available or invest in very fast production machinery which allows for quick make-to-order policies. On the other hand, if my customers prefer low cost over reliability, then this picture will obviously change, the focus shifting to producing larger production batches or buying larger quantities from cheaper suppliers.

So, the first thing we need to do is to establish a clear link between corporate strategy and supply chain strategies. A famous and ground-breaking article addressing this topic was written by Fisher (1997), who basically took a product-based view, stating that some products have more unpredictable demand, either because they are newer to the market and their success has not been proven yet, or for example because they have more variety in their final versions since there are many different features to choose from, causing many different possible combinations, or because there are many product promotions taking place in the retail channels. Fisher coined those as *innovative products*.

Other products have more stable and therefore predictable demand, because they have already been around for some time and demand is pretty much known, or because they have fewer features to choose from, or less promotions. Fisher called those the *functional products*. Fisher's point was that innovative products require a different supply chain approach than the functional products. He labelled the two extremes as *physically efficient supply chains* for the functional products and *market-responsive supply chains* for the innovative products.

The world is changing: more refined supply chain typologies are required

Since Fisher's article, many other scholars have built on this first concept of supply chain differentiation. Chopra and Meindl (2016) also follow the terminology proposed by Fisher in terms of efficient or responsive supply chain. However, citing also the work of Lee (2002), they have widened the scope of the uncertainty dimension from pure demand uncertainty or variability of a certain product to also include supply uncertainty, caused by machine breakdowns, lack of supplier reliability, lack of supplier and/or production flexibility, use of immature technologies, etc. They speak in this context about achieving strategic fit between demand and supply uncertainty on the one hand and supply chain capabilities expressed on the responsiveness spectrum on the other (see Figure 3.1).

Figure 3.1 Supply Chain differentiation based on demand uncertainty and supply uncertainty

[! Insert Figure 3.1 here !]

Source: adapted from Chopra & Meindl (2016)

Christopher (2016), besides a variation on the abovementioned strategies in function of demand and supply uncertainty, presents another dimension to take into consideration, which is the demand volume. He then comes up with a framework, which in a way in terms of supply chain strategies stays within the spectrum of efficient supply chains versus responsive supply chains, but seen from another perspective, as can be appreciated in the figure below, which is an adaptation of Christopher's work.

Figure 3.2 Supply Chain differentiation based on demand volume and demand variability

[! Insert Figure 3.2 here !]

Source: adapted from Christopher, 2016

Another interesting and slightly more recent development building further on frameworks and principal supply chain strategies has been developed by Pérez (2013) in his book “Supply Chain Roadmap: aligning supply chain with business strategy”. He proposes a step-by-step approach, including the use of a number of predefined templates, taking a number of similar elements as in the other approaches we have seen so far, leading to what he calls the “business framework” consisting of the *sourcing view* (sourcing complexity and impact on the economics of sourcing), the *technology view* (technological factors and economics of manufacturing and/or assembly) and the *demand view* (customer behaviours and the economics of the target market). Pérez defines 6 major supply chain models (he refers to them as *archetypes*) as a starting point: Efficient, Fast, Continuous replenishment, Agile, LeAgile and Flexible.

Also, Gattorna follows a similar terminology, although taking into consideration a few additional variations: collaborative, lean, agile, campaign and fully flexible. He

goes into depth when describing the different typologies, dedicating a full chapter to each one of them. A very interesting addition by Gattorna to general thinking about supply chain typologies is that for him these configurations will have to become even more dynamic in the future, due to increasing volatility, ultimately impacting not only the supply chain area but the entire firm. In his most recent book, *Dynamic Supply Chains*, he presents a compelling company-wide view, with supply chains as an integral part (Gattorna, 2015).

Finally, a more recent contribution by Martijn Lofvers links supply chain typologies directly to the corporate strategies as defined by Treacy and Wiersema, which were touched upon briefly in Chapter Two. This ‘strategy compass’ can be seen in Figure 3.3, including some examples of companies that fit with certain supply chain strategies (Lofvers, 2017).

Figure 3.3 Strategy Compass (© Martijn Lofvers, 2017)

[! Insert Figure 3.3 here !]

For the sake of argument, as well as in order to make things manageable, and because they are in fact the cornerstones of the overall typology framework and therefore very important for any supply chain student and practitioner to know about, for the remainder of the book we will work on the basis of the two extremes that all of the aforementioned approaches have in common: the *cost-driven* and the *responsive* supply chain, at the end of which we should be in the position to define what a cost-driven supply chain or a responsive supply chain could actually look like, a topic we will actively work out more in Part Two.

Decision making at various levels: strategic, tactical, operational

Before taking a more detailed look at the technical building blocks of the supply chain, I would like to go back to a topic that's been touched upon explicitly and more implicitly already on a number of occasions, which is that decision making takes place on different levels. In this case referring to the strategic, tactical and operational level.

Many of the topics and decisions mentioned in this section on the technical dimension of supply chain, following the structure of the integral logistic concept, are of a more strategic nature if a company is in the process of defining a new supply chain, or redefining an existing one. In most cases, the decisions to be made have the intention to build a new solution which should hold at least for a number of years.

Once the new or redesigned supply chain starts operations, then the decision frame becomes more tactical and operational and time horizons shorten accordingly.

Figure 3.4 Supply chain decisions (strategic, tactical, operational)

[! Insert Figure 3.4 here !]

In the gameplay with The Fresh Connection, starting in Part Two, you will be focussing on making strategic and tactical decisions, since the operational decisions and execution will be taken care of inside the simulation engine, within the tactical parameters which you have put in.

But now, let's first look in more detail at the building blocks of supply chain, which were introduced already briefly in Chapter One. Most of the concepts that will be referred to can be considered relatively standard supply chain theory, i.e. the

‘fundamentals’ and can be found with more detail in most of the supply chain textbooks that have been mentioned already on a number of occasions (Rushton et al, 2017; Christopher, 2016; Chopra & Meindl, 2018; Simchi-Levi et al, 2010; Visser & van Goor, 2016; Gattorna, 2015). In case there is the need to reference a specific concept or framework from one of the textbooks, this will be mentioned explicitly.

The structure we will follow in the coming paragraphs is that of the integral logistic concept as introduced in Chapter One (Figure 1.1). The same structure and items will come back in Part Two: Mastering the fundamentals, then in connection with The Fresh Connection gameplay, as well as in Part Three: Beyond the fundamentals, then using The Fresh Connection as a case example.

PHYSICAL INFRASTRUCTURE OR NETWORK: PUSH/PULL, FACILITIES AND TRANSPORTATION

Once the company has decided which customer segments it wants to attend, and which the corresponding value propositions are, including the specific products, the strategies for growth, geographical expansion, changes to the product/service portfolio etc. it would need to think about the physical infrastructure to support the plans. The final setup of a physical infrastructure consists of a number of interrelated items, which will be dealt with in the following paragraphs.

Products: physical characteristics and the development chain

Product characteristics play an important role in the setup of a supply chain. It's easy to see that the sourcing of raw materials, the manufacturing and the transportation of plastic soccer balls for little children, to be sold to toy stores even without packaging

materials, is very different from the supply chain for dangerous liquid chemicals, or for complex technological products like cars, or large and heavy products like cranes.

From a logical perspective, there are three different steps in the sequence of getting from idea to production: the first step is the product design, in which the specifications of the product are defined. This is followed by the process design, in which it is defined how the designed product can be best produced. In this stage decisions are made about which production process types to apply (job shop production, batch production, continuous process production, and so on), leading to decisions about types of machinery, human labour as well as detailed production process flow design. This is then followed by the step of operational execution, in other words the product and process designs are put into the daily practice of manufacturing and distribution.

Besides their logical sequence, it is not strictly necessary that one step needs to be finished a 100% before the next one can start. The so-called concept of ‘concurrent engineering’ exploits this idea: I can already start making my first sketches for the production process even though the design of the product I will be producing hasn’t been finalized.

Following the logic of the steps mentioned above, a first defining factor of what our supply chain should be like is determined by the product characteristics, such as:

- Size / volume (large, small)
- Weight (heavy, light)
- Value (cheap, expensive)
- Fragility (easy to break)
- Type of material (solid, liquid, gas, dangerous or not)

- Perishability (for example related to shelf-life)
- Complexity (number of components, “bill of materials – BoM”)
- And so on.

A specific concept related to the above is the “*value-density*” of products, the value in money of product per cubic meter (see Figure 3.5). This is especially relevant in transportation, warehousing and inventory policies. For a cheap and large size product the logistics priorities will be different than for a small and expensive product. Value density will also explicitly come back later on in Part Two.

Figure 3.5 Value-density of products and supply chain priorities

[! Insert Figure 3.5 here !]

A item among the abovementioned product characteristics is related to the Bill-of-Materials (BoM): the components out of which a product is made. For example, a chair might be made from 1 seat, 1 back, and 4 legs, whereas the seat might consist of 1 piece of wood and 1 leather cushion, etc. The reason to mention this here is twofold:

- First of all, the BoM defines if assembly is needed for a certain product, and if so, how complex the assembly is, and in which sequence it needs to be. As such it is the basis for the time-phased sourcing of components, planning for timely delivery as well as the assembly activities;
- Secondly, there has been increasing attention for the relationship between product design and the logistics aspects of the product, summarized under the term design for logistics, with the objective to simplify product architectures while increasing the flexibility for late-stage customization.

As touched upon briefly earlier on, Simchi-Levi (2009, 2010) speaks in this context about the development chain of new products, product architecture (BoM) being part of that. One ongoing trend, started already time ago, was the push for smart modular design of products. The sourcing structure in the car industry with Tier-1 suppliers providing modules, and Tier-2 suppliers delivering sub-modules or components to the Tier-1 suppliers is a clear example of this. Product modularisation has a number of advantages to facilitate such supply chain structures:

- Firstly, it reduces complexity at the final assembly because now a relatively small number of different modules will have to be put together, rather than individual components. In a way, part of the complexity will be moved up in the chain, because assembly will already be done at the Tier-1 supplier upstream;
- Secondly, it reduces the sourcing and planning of incoming materials, because the number of modules is lower than the number of components, so less items will have to be planned and less suppliers to be managed directly;
- Thirdly, if the modules are designed cleverly, out of a relatively few modules, many combinations of different finished goods can be created. And since inventory management now takes place at the modular level and not at the finished goods level, less risk is incurred.

Arguably, one of the better examples of exploiting modularity and the principles of design for logistics in the development chain is Swedish furniture retailer IKEA. In terms of product design, IKEA allegedly tells their designers to ensure that various components of different variations of a piece of furniture fit well together, so that for

example with 2 types of seats, 3 types of legs and 3 types of backs, 18 different chairs can be made.

Supported by their business model in which the customers actually take care themselves at their own homes of the final assembly, this allows IKEA to actually forecast the demand at the module level ($2+3+3=8$ modules), rather than for each of the 18 possible chair types individually. The same goes for storage: only 8 modules in the store warehouse, rather than 18 different chairs. Thus, modularity of the product design, in the case of IKEA a very deliberate design policy, allows for “late customisation”, as well as space savings. In addition, IKEA designers make sure that the individual modules or components are as flat as possible, enabling transportation without unnecessary space inside the packaging.

[! Start box !]

Exercise 3.1 Explore the development chain and design for logistics

EXPLORE

Of a few companies you chose for the exercises in the previous chapter, try and think of examples of how the principles of the “development chain” and “design for logistics” might work

[! End box !].

Please note that linked to the topic of design for logistics and the development chain, but then extended to sustainability and the circular economy is the concept of D4D – design for disassembly mentioned in Chapter Two. Not only should a company find

smart ways of putting many product variations together from a limited number of components or modules, but also the later part of return, disassembly, reuse and recycling should be considered.

Push/pull: economies of scale versus market flexibility

Once products and product designs are clear, the next decision has to do with the concepts of *push* and *pull*, as expressed by the *Customer-Order Decoupling Points* (CODP's, Hoekstra & Romme, 1994, also to be found in other textbooks such as Rushton, 2017). Or, as some people say, the *order-penetration point* or the *push-pull barrier* (remember the discussion about the importance of clarifying definitions from Chapter 1!).

Instead of using the term CODP, as suggested by Hoekstra & Romme, in practice most people are more familiar with the names or the acronyms of the different CODP's. Following the example in the simplified figure below:

- *CODP 1*: Make to local stock (MTS)
- *CODP 2*: Make to central stock (MTS)
- *CODP 3*: Make to order (MTO)

Figure 3.6 Customer Order Decoupling Points (CODP's)

[! Insert Figure 3.6 here !]

Source: adapted from Hoekstra & Romme (1994) and Rushton (2017)

The difference between CODP's 1 and 2 can serve as an example of the concept of “*risk-pooling*” as described by Simchi-Levi (2009, 2010), who states that “*demand variability is reduced if one aggregates demand across locations*”. Because of this

reduced variability for example less safety stock is needed. The application of risk pooling implies centralised inventory (CODP 2).

Hoekstra and Romme, having a background in Dutch tech firm Philips, based themselves on an industry in which assembly plays a major part, so their proposed terminology obviously reflects that particular background (they actually positioned assemble to order -ATO- between CODP's 2 and 3 in the figure above). Since then, other diagrams expressing the same principle have been suggested by others, introducing for example terms like Make to Forecast (MTF) and Engineer to Order (ETO), later even expanded further to include the concept of postponement, which has gained a lot of popularity given the potential for supply chain optimization it promises.

Postponement can be explained as being a variation on Assemble-to-Order (ATO), but with specific customization of product taking place at a very late stage in the chain, normally somewhere between the original CODP's 1 and 2. A typical example would be bringing components or semi-finished products manufactured to forecast to a specific region, and then assemble those into customized customer- or country-specific finished goods, as soon as a specific order comes in.

The concept of postponement is very powerful, for example in cases where a limited number of components can be used in different combinations to form a wide variety of finished goods, because of the aforementioned principle that forecasting demand at the component level is less complex than forecasting demand at the finished goods level (and linking back to the 'design for logistics' principles at the same time). This supposes at least partially that the time needed for the activity of customization,

being it assembly, or packaging or similar, fits within the lead times the customer expects.

Take the example of a certain non-prescription, or so-called Over-The-Counter (OTC) drug sold in pharmacies worldwide. The pills are packaged in blisters, and then together with a brochure in the local language go into a box, again with local branding and/or language on the box. Traditional concepts were to do forecasting of local demand and have inventories in each country to supply to pharmacies in different countries. However, since the medicine and the blisters are equal for all countries in the world, and only brochures and packaging are country-specific, it could also be decided to have a regional stock of already blistered pills, plus a separate stock of local boxes and brochures. Since boxes and brochures are relatively cheap in comparison to the medicine, and since the activity of bundling blister, brochure and box can be done relatively quickly and cheaply, this activity can be postponed until there is more certainty, or even a fixed customer order from a specific country.

Back to the topic of physical infrastructure, the relevance of the CODP-concept lies in the fact that a decision for choosing one or another CODP lays the foundation for the integral logistics concept and for a start, it determines the physical infrastructure. For example, if Make to Order is my chosen CODP, then I wouldn't need any central, regional or local finished goods warehouses in my network because I would ship out the product to the customer as soon as it would be produced. Also, it defines the starting point for the planning and control approach, because medium term material requirement forecasting would need to be at the component level, rather than at finished goods level. Also, the operational focus of activities upstream of the CODP would normally be on

scale and efficiency, and the operational focus downstream of the CODP would normally be on speed and flexibility.

In other words, determining the CODP is a major design choice for any supply chain.

[! Start box !]

Exercise 3.2 Explore customer order decoupling points (push/pull)

EXPLORE

It can be argued that in an “ideal world”, CODP 3 (Make to Order) or even a potential CODP 4 of Buy and Make to Order would be the perfect option, because no risk for getting stuck with excess stock of components, nor finished goods would exist, since activities only start when an order has been received from the customer. However, this ideal scenario is in many cases not possible. Which reasons can you come up with that “push” companies in the direction of having to choose CODP’s more downstream than CODP 3? Try and find at least 5 different reasons.

[! End box !]

Facilities: the warehousing and manufacturing hubs in a network

Once the CODP has been determined, then the physical infrastructure can be designed. In terms of facilities, we need to think about production or assembly plants, warehouses, transportation hubs like ports and airports or cross-docks. Decisions for each of these types of facilities include for example:

- the number of facilities;
- the locations;

- the physical sizes;
- the operational capacities in terms of volume to be handled;
- the machines or equipment technologies to be used;
- human resources availability required, and the desired number of working hours;
- whether the operation should be inhouse or outsourced;
- even, decisions could enter into equation about the reliability of the estimated volumes coming out of the facilities, independent of whether they are owned or outsourced, but considering factors about technology maturity, political situation, risk of strikes, qualification of labour force, etc.

Obviously, many of these factors are very much geographically determined, even sometimes influenced by specific local circumstances such as legal regulations, trade blocks and government subsidies. Of many of the dimensions of the available alternatives, cost calculations can be made, allowing for comparison of the different scenarios. Most likely, also a number of qualitative arguments exist, which do enter into the equation.

[! Start box !]

Exercise 3.3 Explore possibilities for capacity expansion

EXPLORE

Imagine that your company on the basis of future expectations would require additional manufacturing capacity. Which would be the options you think exist for providing such additional capacity?

Which are the pros and cons related to each of the options?

Which of those pros and cons can be quantified and which not? How time consuming would quantification be? Where would inputs need to come from? How reliable would they be?

What does that tell you about the final decision making?

[! End box !]

Transportation: the spokes between the hubs

At the same time as looking at the facilities, the available options for transportation need to be investigated. In the end, if the facilities are the ‘*hubs*’ in the network, whereas transportation represents the ‘*spokes*’, so both dimensions are directly connected, and it could be that the (in-)availability of certain options in transportation might have an impact on the choices about facilities and vice versa.

Decisions need to be made about modes of transportation, taking into consideration their respective characteristics in terms of capacity, speed, security, flexibility and costs. Also, the decision needs to be made about taking transportation as an inhouse activity or if it’s preferable or even necessary to outsource. In a similar fashion as with the facilities, many of these factors are very much geographically determined. Transportation infrastructures, the available alternative transport modes, specific legislation and transportation industries might vary a lot between different countries.

[! Start box !]

Exercise 3.4 Explore transportation in a geographical context

EXPLORE

For a number of different countries, preferably in different continents, analyze the topic of transportation. For example, take a look at:

- *Population density across the country, indicating distribution patterns;*
- *Available infrastructure (roads, rail, river, sea);*
- *Available transport modes (road, rail, boat, air);*
- *Maturity of service provider industry.*

Which conclusions can you draw from the comparison?

[! End box !]

Forward and backward integration: outsourcing and external collaboration

When deciding about facilities and transportation, one aspect that needs to be covered is whether to outsource a certain activity. This is the famous make-or-buy decision, valid for manufacturing, storage, as well as transportation, freight forwarding, distribution and logistics services.

[! Start box !]

Exercise 3.5 Explore outsourcing

EXPLORE

Which are the pros and cons you can list in terms of outsourcing to a third party? Make separate lists of pros and cons for:

- *Manufacturing;*
- *Storage;*

- *Transportation;*
- *Freight forwarding services;*
- *Distribution and logistics services.*

[! End box !]

What are the differences and similarities you have found?

In the exploratory exercise, you will have found a number of arguments that appear under the pros as well as the cons, the exact answer depending on the specific product or service and the company considering outsourcing. For most products or services, the decision whether to outsource is a very strategic one, not the least because the implications can be long-lasting, meaning that the consequences of the decision will make themselves be noted for a number of years. This is not only in terms of financial consequences, but also specific competencies will need to be built up (managing a factory is not the same as managing a supplier contract and relation) and changing back to the initial situation if things might not have turned out so well, is not that easy.

Once the decision has been made, it needs to be decided in which way to manage the relationship. Not all components are equally important, nor all supplier markets are the same, and obviously also in managing the supply we want to spend our time and efforts where it makes most sense. Kraljic, in a classic article written already in 1983, suggested a framework for segmenting suppliers and define supply and supplier management policies accordingly. Over time different variations of the initial concept have been suggested, based on different criteria, although the original thinking of segmentation making sense because different items requiring different policies has remained. See figure below for an example.

Figure 3.7 Supply and supplier policy matrix

[! Insert Figure 3.7 here !]

Source: after Kraljic (1983), Rushton (2017)

The diagram distinguishes between the importance of purchasing for the business (cost of materials versus total cost; value-added profile; profitability profile, etc.) and the complexity of the supplier market (supply monopoly or oligopoly conditions; pace of technological advance; entry barriers; logistics cost and complexity, etc.). Simply put - the business impact of a certain component or service versus the supply risk.

The different quadrants suggest applying different policies. For example, on the supply of components which represent only very little cost on the total expenditure of the company and which can be bought anywhere (business impact low and supply risk low), you would want to minimize your management attention. On the other extreme, if you spend a lot of money on a certain component or service, and in case there are only few suppliers in the market who can do the job for you, then you want to treat that relationship in a special way, because the breakdown risk is just too high. So once again, segmentation is very helpful to establish priorities for putting your time and efforts where it makes most sense.

Please note, that the quadrant of high value, high risk, would be directly linked to the key partners area of the business model canvas we looked at earlier on.

[! Start box !]

Exercise 3.6 Explore strategic long-term relationships

EXPLORE

Which elements would you see as possible parts of a “strategic, long-term relationship” with a key partner? Which activities or projects would you propose which go beyond pure and simple buying and selling?

Which costs and benefits would you expect?

What would be the implications of the proposed initiatives in terms of human resources on both sides? How much time do you think the implementation of such projects would require?

[! End box !]

Network design: connecting the dots

The activity of defining the optimal infrastructure for a specific supply chain is normally referred to as *(distribution or logistics) network design*. Nowadays, with the help of sophisticated software different alternative network structures can be modelled and the impact of different scenarios in terms of for example costs and delivery service levels analyzed. Parameters to play with are number and location as well as sizes and costs of facilities, transport modes, inventory levels, demand volumes, and so on.

It is vital to keep an end-to-end holistic view on total costs and resulting service levels. This implies that the scope of supply chain activities included in the network study should be sufficiently wide to cover this. In this context, sometimes the terms *total cost of ownership* (TCO), or *total cost to serve* (TCS) are used. In most cases these refer to including not only goods-related operationally oriented costs like transportation

and warehousing (space and people), but also inventory related costs (financing, insurance, security, obsolescence), overhead costs, production related costs, and even costs beyond the boundary of the company, for example costs at suppliers (material costs, space costs, transportation costs, etc.).

Obviously, widening the scope this way calls for much more information, it probably slows down the process of modelling, but the alternative is simple: missing part of the picture, which is fine if it's a deliberate choice, taking into consideration the associated risks. The final decision about scope, in the light of complexity, level of detail, information availability, resources required, and time pressure is therefore a typical trade-off.

Figure 3.8 Network optimization of different scenarios with advanced software

[! Insert Figure 3.8 here !]

Source: from own project using advanced network optimization software

As a last step in this part of the Chapter, let's try and get a grasp on the challenge of dealing with the complexity and need for alignment in relation to the elements of the supply chain strategy and the physical infrastructure we have just seen. Using below figure, you can express your thoughts on who is involved (directly or indirectly) in the various decisions regarding strategy and infrastructure.

Figure 3.9 Matrix of strategy and infrastructure decisions and functional departments

[! Insert Figure 3.9 here !]

Once filled out, which conclusions can you draw from the figure above? What does it tell you in terms of interdependencies, in terms of the complexities of alignment? Which potential solutions would you see to deal with this in the best possible way? Write down your notes, we will get back to the topic later in Chapter Ten.

Now that the network structure is defined, the appropriate setup for planning & control can be decided upon.

PLANNING & CONTROL: PROCESSES, FORECASTING, INVENTORIES, PRODUCTION

Getting things done via supply chain processes: O2C, P2P, D2S

Supply chain activities consist of many different steps. Normally, those steps are clustered and organized into ‘logical’ processes. How many processes are distinguished in a company and which names they have is very different from one company to another. However, there are some main processes which seem to be becoming part of ‘standard’ process nomenclature. Also, companies that work with one of the larger enterprise software systems like SAP or Oracle tend to adopt the terminology of the processes the way they are named in the IT system.

The main high-level supply chain processes at the tactical and operational level are:

- *Purchase-to-Pay* (or *Procure-to-Pay*, or *P2P*), which contains the steps involved from the moment we send a purchase order to our supplier, to the moment the corresponding payment is done;
- *Order-to-Cash* (or *O2C*), which contains the steps involved from the moment an order is received from our customer to the moment we receive the payment from them;

- *Demand-to-Supply* (or D2S), which contains the steps involved from forecasting future demand to the moment the materials are ready to be shipped to the customer.

From an overall business point of view, the processes related to Sales and Purchasing can be added:

- *Sales process*, in which negotiations with customers take place, in order to sell them goods on the basis of agreed product and service specifications. Typically, an increased service promise will lead to higher prices paid by the customer. The outcome of the sales process are concrete customer orders;
- *Purchasing process*, in which the appropriate suppliers are identified and service level agreements are negotiated, specifying component and service specifications. Typically, a better service required from the supplier will lead to higher prices to be paid by you. The result of the purchasing process are concrete purchase orders.

Figure 3.10 gives a representation of those high-level tactical and operational supply chain processes, complemented by the sales and purchasing processes.

Figure 3.10 High-level overview of the main tactical and operational supply chain processes

[! Insert Figure 3.10 here !]

As can be seen in Figure 3.10, the first two processes, P2P and O2C, have slightly more focus on the material and money flowing between customers and the company and between the company and suppliers, whereas the third one, D2S, is more focused on the internal activities involved in producing and storing raw materials and finished goods.

Uncertainty in demand and supply

One first factor to take into consideration when thinking about planning & control of a given supply chain is the impact that uncertainty in demand and supply have. Rather than going into listing the reasons why demand or supply are more or less predictable here, I'd like to propose this as an exercise, since probably you can come up with the main important considerations yourself. Keep in mind that uncertainty can potentially come from each of the boxes in the diagram: sales process, purchasing process, D2S, O2C and P2P.

[! Start box !]

Exercise 3.7 Explore uncertainty in demand and supply

EXPLORE

Which reasons can you think of that make demand less predictable?

And which reasons you can think of that make supply less predictable?

[! End box !]

The answers to these questions determine in large part how you would deal with forecasting, inventories and the determination of production batches. For example, the more uncertainty in either one of the sides, the more difficult the important task of balancing supply and demand in a cost-efficient way and probably the more effort and sophistication put into people, processes and systems is justified.

In the following sections, a number of key activities within these major supply chain processes are highlighted.

Key 1 to D2S: Forecasting market demand

Referring to the choices made in terms of customer order decoupling point, we now know that material requirement forecasting needs to be done at the level of components, intermediate or semi-finished products or finished goods. In terms of forecasting, I'd like to highlight a few aspects:

1. As the saying goes, rule number 1 of forecasting is that “forecasts are always wrong”. Despite this, forecasts will never be perfect and probably not even when in the future we will have the support of Artificial Intelligence;
2. Many mathematical formulas and heuristics exist for making forecasts, like the moving average model, exponential smoothing, regression analysis, etc. (the classic book by Silver et al, 1998, provides a wealth of those, as nowadays even does Wikipedia). And even a basic tool like Microsoft Excel nowadays already contains a number of formulas and in addition plenty of advanced planning and optimization software exists to provide even more alternatives. However, reality is that most approaches still have one fundamental underlying assumption, which is that history will repeat itself. In other words, what happened in the past will somehow be representative for what will happen in the future. In some cases that might be true, but there are also indicators that this assumption might be more and more challenged in the future (think back to the discussion about the age of accelerations in the preface of the book);
3. There seems to be plenty of proof that clever human interaction with advanced planning systems is the key to more accurate forecasting;
4. In company life there is an enormous challenge with respect to forecasting which is the amount of priority that accurate forecasting has for the people best

positioned to provide those. In many cases, marketing and sales people probably have the best actual insights for providing accurate forecasts based on mathematical projections enriched by practical knowledge about customer and competitor movements, planned promotions, new product introductions, etc. However, in many cases they don't see sufficient benefits for actually spending time and effort to make those forecasts. And let's face it, reality is that they have much to lose. If rule number 1 of forecasting is indeed true, then they will always be at the risk of being personally held responsible for providing wrong information. That's of course not a very attractive starting point.

Key 2 to D2S: Capacity planning

In many production environments, machine capacity is expensive. The other day, a client of mine explained to me about a new factory his company was currently building to be prepared for dealing with future expected demand, as well as anticipating future new technologies: an investment of 750 Million Euro (as you remember from the part on Finance, a large portion of this would go into the PPE-item on the Balance Sheet, just think about the impact on ROI if you just increased PPE with 750 Million). Once such money is spent and production capacity is available, it should be used well, and this is where capacity planning and production planning and scheduling comes into the picture.

In the case of having multiple factory locations worldwide with the capability of producing the same goods, we need to make sure that overall world demand will be allocated to the different production locations. Such allocation decisions are normally part of what is called Rough-Cut Capacity planning. This decision becomes specifically

important in case overall demand is expected to be higher than available capacity. In widely used terminology, a certain product or component then will be “under allocation”, meaning that the different local markets might be competing between them for getting part of the production pie. Companies are then forced to have set rules for deciding which market would get which part of the total production volume.

Key 3 to D2S: Production planning & scheduling, batches, frozen periods

Once allocation to factories has been done, production planning and scheduling at machine level can be done. Key decisions here, to align expected time-phased output in terms of products produced on the one hand and maintaining a good level of production efficiency on the other hand, is to decide on the size of the *production batches*, sometimes also called *production lot sizes* or, when expressed in time rather than in quantity, the *production intervals* (every how many days do I launch a production batch of a certain article?). The larger the production batches, the more economies of scale can be achieved. The shorter the production batches, the more times the machine will switch from making one product to another. This will obviously increase responsiveness to changes in demand, but at the expense of efficiency, since the machine will have to be stopped, cleaned and started up again more frequently.

Compare the two diagrams in the figure below and assess the differences in terms of:

- Number of times production capacity is ‘lost’ because of switching to another batch. This impacts available net production capacity, but also the amount of start-up losses of new production batches;
- Number of times new product arrives to the next stage in the supply chain;

- Average amount of inventory as a consequence of the batch size (this is called the ‘cycle stock’) and the implications;
- The average degree of freshness of the product;
- Amount of times you’re getting into the dangerous area of running out of stock;

Figure 3.11 Comparison of large batches versus small batches

[! Insert Figure 3.11 here !]

Please keep in mind that in the Figure above no reference is made to a particular article. As you can imagine, the situation becomes more complex in case the variety of articles produced on the same machine is larger. Typically in large-scale production, a fixed sequence is defined in which the articles are produced, which has implications for the time that passes until a particular item is produced again. This concept is often referred to as the ‘production wheel’.

Another important concept to be taken into consideration during production planning is the so-called ‘frozen period’, meaning for how long into the future do I not allow any changes to the production plan and schedule anymore, whatever happens. Think of it this way: we prepare a production plan that covers for example the next three months, and a more detailed production schedule covering the next month. If we set the frozen period to be one month, the implication is that whatever happens during the first month will not affect my detailed production schedule. After one month, we once again prepare a detailed schedule for next month and we update the production plan again for the next three months (rolling horizon). In a way, even though external uncertainty (market demand) is of course not impacted by the frozen period, setting it for a longer time, does reduce internal uncertainty by ‘freezing’ the production schedule.

While the disadvantage of the frozen period might be that no immediate changes can be made in order to quickly respond to changes in the market, the advantage of the frozen period is that everyone involved (production managers, machine operators, team leaders, HR managers, suppliers, maintenance people), will know exactly what needs to be done every day during this frozen period. This creates stability, the possibility to better prepare for something which is already fixed and therefore enabling more efficiency in the chain.

Key 4 to D2S: Production and Quality

Once production planning and scheduling has been taken care of, we move to the real execution of the plans. Now we need to deal with operational hiccups such as lacking staff availability, machine breakdowns, necessity to running into overtime and supply interruptions from suppliers. Many different functional disciplines interfere here. In order to buffer against such hiccups, inventories can be built up, the topic of the next section. An important indicator used to measure the amount of hiccups is called '*production plan adherence*', it measures to what extent the original production plan has really been carried out.

Key 5 to D2S: Inventory management (warehouse replenishment)

From the earlier section on Finance, you might remember the financial importance of managing inventories effectively. The management of inventories has a number of different dimensions, which we will deal with in the coming paragraphs. The cornerstone of inventory theory is formed by two decisions: *how much* to order and *when* to order, as expressed by the figure below.

Figure 3.12 Sawtooth diagram of inventory management

[! Insert Figure 3.12 here !]

The diagram above contains the main cornerstone concepts of inventory management:

- *Inventory level*: expressing the amount of inventory over time;
- *Re-order point*: the level of inventory at which an alert indicates that new materials must be ordered (when to order?);
- *Order quantity*: the amount of inventory which is ordered each time an order is placed, either to internal production or to external suppliers (how much to order?). A basic theoretical concept called the Economic Order Quantity (EOQ) states that the optimum order quantity is a trade-off between the costs of ordering versus the costs of having product in inventory. For example, if I order once for the whole year, I will spend little time and money on ordering but have a high average inventory. In the opposite case I will order smaller quantities very frequently, so that average inventory will be lower, but more time and money will be spent on ordering, checking, invoicing, etc. Please note that the amount of inventory due to the specified order quantity is called the '*cycle stock*', mentioned earlier under Key 3 to D2S. Please also note that the concept of order quantity also appears in there when referring to batch sizes from a production perspective;
- *Lead time of replenishment*: the time it takes between the moment of ordering a replenishment of inventory and the actual delivery;
- *Bridge stock*: the amount of inventory needed to cover average demand or consumption of the product or component during the lead time of replenishment;
- *Safety stock*: the amount of inventory needed to cover the uncertainty in supply or demand during the lead time of replenishment.

Also, here, like in the case of forecasting, a wide range of sophisticated formulas exist, to calculate the optimum order quantity and particularly the amount of safety stock (Silver et al, 1998). Normally, each of those formulas only takes into consideration just one or more specific factors at play, thus providing a partial view on possible outcomes. The perfect all-inclusive formula doesn't seem to exist (yet...).

In addition to the sawtooth-diagram above, there are a few other reasons for which on a given moment inventory might be held. Whereas the sawtooth deals mainly with aspects of inventory and ordering costs as well as storage efficiency and supply and demand uncertainty, other elements in the equation might be related to production efficiency or purchasing strategy. We speak in this context about two additional types of inventory, apart from the bridge stock and safety stock as mentioned before:

- *Anticipation stock*, for example due to strong seasonality effect in demand, or planned maintenance or holiday shutdowns in production.
- *Strategic stock*, for example in the case of possible supply shortage of specific components or hedging against material price fluctuations.

[! Start box !]

Exercise 3.9 Explore order quantities

EXPLORE

In one of the previous exercises, you already thought about the reasons that make supply and demand less predictable. These reasons would as a consequence lead to higher safety stocks to cover for this uncertainty. Now think of arguments that would influence on the optimum order quantity.

Already explained was the reasoning behind the Economic Order Quantity (EOQ), but which arguments can you think of that would make order sizes in purchasing and/or production different from the EOQ and larger than justified by the short term demand? For example, if the EOQ calculation would tell you that you should each time order 105 units of product from your supplier, which reasons could there be to actually order more than that quantity each time you order? Or less? Think of the concepts of cycle stock, anticipation stock and strategic stock and try to find examples of those on Internet. In which industries are you likely to find examples of each of these three types of inventory? Why is that so? How big can the impact be (e.g. peak season sales as % of yearly sales)? Or think of aspects like perishability, obsolescence, fluctuations in production and component costs and try to find example of those on Internet. In which industries are you likely to find examples of these aspects?

[! End box !]

Please note that the sawtooth diagram as shown in Figure 3.12 is based on what we call a ‘continuous review’ model of inventory, based on a re-order point. The continuous line of the quantity of inventory implies that the inventory level is monitored and known continuously, in real-time and that a replenishment order is launched as soon as the inventory level crosses the line of the specified re-order point. Another type of review method is the one based on ‘periodic review’, meaning that inventory levels are only checked at certain (fixed) moments. This would be like the traditional shop owner taking stock once a week when closing his shop on Saturday evening and then deciding on if and how much to order from his suppliers, and who doesn’t know the exact inventory levels at any time during any day. The longer the review period and the higher

the demand, the more differences there are between the continuous and periodic review systems. In practice, the following inventory policies can be found frequently:

- (s,Q) : continuous review, re-order point, fixed order quantity. s expresses the re-order point, ie whenever the inventory level crosses this point a replenishment order is placed. Q expresses the replenishment order quantity;
- (s,S) : continuous review, re-order point, order-up-to level. s expresses the re-order point, ie whenever the inventory level crosses this point a replenishment order is placed. S expresses the quantity of the order-up-to level, ie the total desired level of inventory when the replenishment arrives;
- (R,S) : periodic review, order-up-to level. R expresses the review period, ie every how much time is the inventory level checked. S expresses the quantity of the order-up-to level, ie the total desired level of inventory when the replenishment arrives;
- (R,s,S) : periodic review, re-order point, order-up-to level. R expresses the review period, ie every how much time is the inventory level checked. s expresses the re-order point, ie whenever the inventory level has crossed this point at the moment of checking a replenishment order is placed. S expresses the quantity of the order-up-to level, ie the total desired level of inventory when the replenishment arrives.

In Chapter Eight, we will take a look at which specific inventory policies The Fresh Connection applies for their components and finished goods.

Keys to O2C and P2P: payment terms and INCO-terms

Although much more can be said about the O2C and P2P processes, from the perspective of this book, I will limit myself to only a few basic concepts, that appear in both processes, although in O2C aimed at the customer, and in P2P aimed at suppliers.

Starting with the payment terms, this basically specifies the amount of time that a buyer has in order to pay the seller. A payment term of 60 days means that the buyer has 60 days to pay to the seller. It is quite common practice to give a discount to the buyer if the payment term is shorter, since the seller will have the cash available quicker. Think back to the concept of Cash-to-Cash Conversion Cycle from the part about Finance to understand why faster payment could be of interest to the seller. As can be understood, payment terms are agreed upon between a company and its suppliers on the one end, and between a company and its customers on the other end.

The second concept is about the moment at which the clock starts ticking for the payment term, is specified by the Incoterms© (International Commercial terms, as defined and registered as trademark by the International Chamber of Commerce - ICC). These terms specify at which point in the chain between seller and buyer the transfer of risk (i.e. ownership) takes place and who is responsible for which part of the costs, e.g. of transport, port and customs handling, intermediate storage and so on. In the most recent version of the terms in total 10 different possibilities are specified. See Figure 3.12 for three examples of widely used terms:

- *EXW* – ex works (named place of delivery): in its most extreme form the seller leaves the goods ready for pickup at their premises (factory, warehouse, or similar). The buyer is then responsible for pickup, transport and so on. In supply chain terms sometimes also known as factory gate

pricing, since the price quoted by the seller ends at the factory gate, i.e. no further services or delivery included.

- *FOB* – free on board: the buyer indicates a ship on which the goods must be loaded. Until the goods are on the ship, ownership and costs are for the seller. These transfer to the buyer when the goods are on board the ship.
- *DDP* – delivery with duty paid: the seller takes care of everything until delivery in the country of the buyer, on a site indicated by the buyer, e.g. their factory or warehouse, or a third-party location. The buyer or their third party take care from unloading onwards, this is the moment when cost and ownership pass from seller to buyer.

Please note that in all the 3 examples the transfer of costs and risks take place at the same point. This is not the case for all the specified terms. In some cases, ownership of the goods already shifts to the buyer, while costs for transport still are in the hands of the seller.

Figure 3.13 Examples of 3 widely used Incoterms©

[! Insert Figure 3.13 here !]

Source: Self-drawn

Among some other things, these incoterms specify at which moment the responsibility and ownership of a product shift hands from seller to buyer. Which incoterms are used between a specific buyer and a specific seller is normally a result of either standard common practice in an industry, or a negotiation between the companies involved. Given the size and market power of company, and/or the volumes they buy or sell from a supplier, they might be interested in applying a specific incoterm.

A third concept which has an impact on the O2C and P2P processes is a scheme called *consignment stock*. It basically refers to the fact that components or products are inside the facilities of the customer, but still property of the supplier, until the moment that the customer sells or uses them. For example, in the automotive industry it is quite common that components are stored in a warehouse at the car brand's assembly site, but the supplier only gets paid for those once they really have been used to assemble a car. The time that this component has been in stock before usage is then obviously seriously influencing the time that the supplier must wait for their money, so effectively risk is shifted.

Lastly, there is the topic of credit limits and credit risk. There is of course a direct relationship with the O2C and P2P processes and therefore with supply chain execution, since credit limits or certain credit ratings might for example provide a hard stop for a customer order being accepted at a given moment. However, since decisions about credit limits and policies of dealing with credit ratings are normally being taken outside of the scope of the supply chain operation, we will leave it here and not dive deeper into the topic, apart from saying that The Fresh Connection has another family member in the suite of simulations called The Cool Connection, in which such financial aspects do need to be addressed by the participants in the game.

Before moving to the next section, let's look for a moment once more at the challenges of dealing with complexity and creating alignment. Similarly to the discussion of strategy and infrastructure, we can now take a view on the roles of the various functional departments in relation to the more tactical and operational processes we have just seen in detail. The matrix below could help you to visualize your ideas on who is (directly or indirectly) involved in the various O2C, P2P and D2S processes.

Figure 3.14 Matrix of O2C, P2P and D2S sub-processes and functional departments

[! Insert Figure 3.14 here!]

Which conclusions can you draw from the figure above? What does it tell you about interdependencies, and the complexities of alignment? What are the potential solutions in dealing with this? Write down your notes, and we will return to this topic in Chapter Ten. The following chapter will cover topics such as information, systems and organizational aspects.

INFORMATION & SYSTEMS & ORGANISATIONAL ASPECTS

Information at the heart of decision making: ERP-suite systems

Now that physical infrastructure and the setup for planning & control have been defined, we know which information would be required to carry out the planning at the various levels as well as perform the operational execution. This information need is inseparable from important choices to be made in terms of IT-systems. As mentioned before, many companies nowadays work with what are called Enterprise Resource Planning (ERP) systems. The promise of such integrated systems is that by working with aligned data structures, different parts of the business can work with the same interconnected system, thus uniting for example sales with HR with finance with production and supply chain.

Although within the context of this book we do not go much into detail into the subject of systems, it is important for now to mention the difference between various types of systems:

- *Planning systems*, or Decision Support systems. These are aimed at calculating different scenarios for the future, so that a more substantiated choice can be made about what to do. Within the context of supply chain, separate planning modules typically exist for example for production planning & scheduling, transportation & route planning, forecasting & demand planning, as well as network design;
- *Execution systems*. These are normally the core of ERP-suite systems. This is where the real-time information related to the goods flows and the corresponding administrative aspects is created and processed. Within the context of supply chain this would be related to customer orders, transport orders, production orders, purchase orders, and so on;
- *Analytical or datamining systems*. These normally have a large data repository at the heart, sometimes called data- or business warehouse containing historical data about past transactions coming from the Execution systems. These data repositories can either be part of the datamining systems or, more common, connected to them via IT-interfaces. Analytical systems are aimed at performing user-defined queries, data visualisation and the creation of specific reports and ‘dashboards’ with Key Performance Indicators.

In the game the execution system will be taken care of by the game’s engine, but in terms of planning and analytical systems you can develop your own ‘intelligence’ using standard Office tools and/or more advanced software. As you will notice during the gameplay using The Fresh Connection, availability of data is one of the keys to effective decision making. We will come back to this in Part Two.

A last comment about information & systems. Currently, there are myriads of new developments in terms of technology and they are going really fast as well, digital transformation is a trend in itself and expectations by some people towards for example artificial intelligence are sky-high. Although there is plenty of speculation, no-one really knows what will come out of those and exactly how fast.

Organizational aspects: the supply chain department and the Chief Supply Chain Officer (CSCO)?

After defining the network, the planning & control setup and the systems to be put in place, as a last step we need to think about who will do what, which people will take on which tasks, what will be the exact roles and responsibilities of each one involved?

All companies involved somehow in the creation, transformation and/or movement of materials are executing supply chain activities. However, in practice, many different organisational models exist for shaping those. Although organisation by functional areas seems to be the norm in most companies, it is not always that clear if supply chain is a functional area by itself or that it goes together with other parts.

Some companies do have departments called “supply chain”, others do not. For some, supply chain is part of the wider area of Operations, for others these are equal functions in the organisation chart. In some companies, supply chain is not part of the Board of Directors, while at companies like Apple and GM people with a supply chain background have already made it to the CEO position. And even, in an article on Forbes.com, Hans Thalbauer, a senior VP from SAP wonders raises the question “*is*

Chief Supply Chain Officer Most Important Role In Executive Suite?” (Thalbauer, 2016).

For now, the main conclusion is simply that many different models to organise the company exist and that given the differences between companies it seems very difficult to determine if “a best way” to do it exists.

SUMMARY

After covering the fundamentals of the business dimension in Chapter Two, in this chapter we have looked in detail at the technical dimension of supply chain, taking the chosen corporate strategy as a starting point and consisting of the physical infrastructure, the processes, the information systems and the organizational model.

Figure 3.15 Overview of topics of Chapter Three, the technical dimension of supply chain

[! Insert Figure 3.15 here !]

Now, let’s continue the journey of exploring the fundamentals and move on to the third dimension of supply chain management: the leadership dimension.

CHAPTER FOUR: SUPPLY CHAIN: THE LEADERSHIP DIMENSION

After dealing with the business and the technical dimensions in the previous chapters, in this chapter we will look at the last of the three dimensions of supply chain: the *leadership* dimension. We are going to explore the following aspects of leadership more deeply:

- Performance management & target setting;
- Stakeholder management, functional silos and corporate culture;
- Trust and coordination, from the perspective of internal collaboration and team performance;
- Trust and coordination, from the perspective of external collaboration and end-to-end transparency.

Even if the role of supply chain for the overall business of a company is understood, and the technical dimensions have been worked out in detail, then still there is another dimension that cannot be ignored: the leadership, or people dimension. Many process designs seem perfect. Until people appear. Because people come with moods, opinions, irrationality, motivations, backgrounds, family situations, health complexes and many etcetera's that can simply not be denied. This leadership and people dimension poses additional challenges on successful execution of supply chain operations, so let's look at which ones these challenges are.

MAKING PEOPLE MOVE: PERFORMANCE MEASUREMENT & TARGET SETTING

In the end, companies are made of people, and supply chain as part of that is obviously no exception. Since just the corporate mission and vision statements are in most cases not enough to have people move in the ‘right’ direction, companies put in place certain performance measurements and targets, in order to set a goal to be reached within a certain time frame. Sometimes these targets form part of individual yearly plans, sometimes they are also connected to (financial) incentives. Although performance indicators and target setting by many is considered more of a ‘technical’ topic (like in the case of measuring outcomes of operational process as starting point for defining potential process improvements), we deal with the targets under the umbrella of the leadership dimension. This is because in my opinion, the decision of how to go about performance measurement and target setting is a leadership decision. The role and importance a leader gives to KPI’s and targets defines how they are going to work with their people, it will be an important, a visible part of the working climate that will be created. The manager in question has an impact on whether these performance indicators are creating a healthy challenge to make things happen or put an intense pressure on the people leading to a stressful situation. This is particularly the case when such indicators and targets are connected to individual (financial) bonuses.

A widely used concept in the context of KPI development is that of ‘SMART’ KPI’s, alluding to the fact that the KPI’s should be intelligently chosen, and in addition each letter of the word SMART representing a specific aspect to be taken into consideration. Although different explanations of each letter exist, the following ones typically work well:

- *S = Simple*: meaning for instance that the naming of the indicator, as well as the formula to calculate it should be clear and understandable to the users. If not,

people might simply not trust the outcome, because they don't have a grip on the underlying concepts.

- *M = Measurable*: meaning that it should be possible to capture the concept in a number, a percentage or a value (e.g. yes-no). Since most things can be measured in some way or another, a second dimension of measurable should be considered, namely if it can be measured in a timely and cost-effective way. If a certain indicator should be tracked on a weekly basis but measuring and getting results takes more than 2 weeks of time, either because data is difficult to obtain, or because it requires a lot of work to get the reports done, or because the suppliers of those data take a relatively long time to make data available, then maybe another KPI should be considered.
- *A = Acceptable*: meaning that the audience for which the indicator is intended accepts it as being representative for what it is supposed to measure. If someone proposes to measure delivery performance based on the number of complaints received from customers, but a direct colleague is of the opinion that that would be measuring customer satisfaction rather than real delivery performance, then the proposed KPI would not be acceptable for both, and therefore not suitable, since at every publication of new results the discussion about its validity would start all over again.
- *R = Realistic*: meaning that the target value should be within reach. If not, it is very likely to only have demotivation as a result, instead of stimulating people to reach the objective.

- *T = Time-constrained*: meaning that there should be a deadline of some kind, otherwise people will lose interest, or they will say “it’s OK, we will reach it someday”.

Norton & Kaplan (1992) already came up with their concept of the balanced scorecard long ago and nowadays in practice, probably because we are technologically in a better position to do so than in the past, we see more and more *KPI Dashboards* appearing, presenting a ‘balanced’ collection of KPI’s together creating a multidimensional view about the status for the user in question. We will speak a bit more on those dashboards when addressing data visualization software in Chapter Eight, as well as in Chapter Nine when coming back to the leadership dimension of supply chain, applied to The Fresh Connection.

An element to keep in mind when developing meaningful KPI Dashboards is to distinguish between KPI’s which measure final desirable results, and KPI’s which measure in some way the path to getting to the final result. For example, if I want to lose weight, my individual KPI for the desirable result could be my actual weight. The KPI expressing the path could be to express the number of steps I have walked in a given period. Obviously, to be able to define both types of KPI’s supposed a good understanding about cause and effect relationships between parameters.

[!Start box!]

Exercise 4.1 Explore KPI’s and dashboards

EXPLORE

Using the means you have at your disposal, such as the Internet, libraries, course textbooks, databases, magazines and so on, explore the topics of KPI's. What can you pick up from these publications?

[!End box!]

Since performance indicators and targets will come back in the gameplay in Part Two, I don't want to expand much here at this stage, but not without saying that creating KPI's and corresponding targets that provoke and stimulate internal collaboration are quite difficult to establish. Unfortunately, some of most widely used targets, defined in most occasions per functional department do quite the opposite. More about this in Part Two.

Having targets in place can be a great thing but be aware that it doesn't necessarily guarantee great outcomes. In any case, it might have a significant impact on working climate. Let's now look at some other aspects that will also have an impact on working climate and decision making in the company.

STAKEHOLDER MANAGEMENT, FUNCTIONAL SILOS AND CORPORATE CULTURE

Independent of whether 'supply chain' is a separate department or not, the activities within the scope of supply chain are touching with many other departments in the company. Decisions in supply chain will in many cases have an impact on what other departments in the company are doing and vice versa, which immediately implies the need for alignment and managing stakeholders. Remember the discussion about

those directly and indirectly involved in the supply chain, when looking at definitions in Chapter One.

However, typical organizational structures are still in most cases centred around functional departments (sales, finance, human resources, etc.) and while this might be totally understandable from a specialization point-of-view to put functional experts together, it might also have a slightly trickier side-effect. Ashkenas (2015) notes that ‘many organizations still have hierarchical, siloed, and fragmented processes and cultures. In fact, having to cope with a fast-changing global economy has led many companies to create even more complex matrix organizations, where it’s actually harder to get the right people together for fast decision-making’.

Strong organisational silos reinforce an ‘us versus them’ feeling between departments, which obviously is a barrier in the way of cross functional alignment. Ashkenas goes on to argue that Jack Welch’s approach, when he was still the CEO of GE, would still be recommendable: create cross functional forums “bringing people together across levels, functions, and geographies to solve problems and make decisions in real time”. Apparently, this has proven less easy for most companies than it looked. GE started with this already in the 1990’s but seems to be one of the few to have figured out how to do it. Or can it be that others just don’t see it as important and haven’t even tried?

Whichever way it is, apparently functional silos are going to be around for some more time and having more institutionalized cross functional platforms and mechanisms seems rather far away still in most cases. Which implies that from within the supply chain area there is going to be a strong need for active cross functional stakeholder

management. This requires strong characters not afraid of functional borders and who have other traits like sense of empathy, negotiation skills, etc.

For sure, *corporate culture* also enters the equation. If people across a company share the same (strong) corporate culture, then cross functional boundaries become less relevant, because there is another and joint ‘us’ that might be stronger than the ‘us’ of the functional departments. As states Campbell (2011), citing James L. Heskett, a famous Harvard professor on Service and Logistics, ‘effective culture can account for 20-30 percent of the differential in corporate performance when compared with ‘culturally unremarkable’ competitors’. However, reality is that certainly not all companies have such ‘effective’ cultures, and in those cases cross functional alignment might be more up to the individual supply chain manager’s talents for stakeholder management.

TRUST AND COORDINATION: INTERNAL COLLABORATION AND TEAM PERFORMANCE

Team attributes: what successful teams seem to have in common

Even in cases when effective corporate culture is in place, then still that is no more than a lower barrier for establishing communication and alignment in a company at large or, at the micro-level, in the team involved in specific decision-making processes. Recent research by MIT and RSM/Delft University of Technology based on the gameplay of students with The Fresh Connection in fact highlights two very interesting and important aspects of team characteristics and behaviour:

- *Trust between team members* seems to have a significant impact on team performance. Teams of which the individual team members independently from

one another indicate high levels of perceived trust between them create good working atmosphere leading to better results. The MIT-research also indicates ‘the fragile nature of trust’ and, in the case of virtual working teams with individual team members being located in physically different places, ‘the sharp improvement after the team-member had met face-to-face’, suggesting that team members that did not know each other previously and who until then had only communicated via email, telephone, videoconference or the like, started working together much more productively after actually having met in person. According to the research, meeting face to face gave an important boost to mutual interpersonal trust between the team members (Phadnis et al, 2013).

- *High levels of reflexivity* also seem to have a positive impact on team performance. ‘Team reflexivity is a team’s ability to consciously and reflexively react to changing and fluid situations and adapt accordingly’. According to the research at RSM/Delft University of Technology, this ability plays particularly to the benefit of teams whose mix of team members tends to favour seeking ‘accomplishment and attaining positive outcomes, and where individuals are more inclined to explore all possible means the goals they desire’. This in contrast to teams in which team members rather than on attaining positive outcomes tend to focus mainly on avoiding negative outcomes Schippers et al (2011).

So, what can we pick up from this? Because even if one would say that abovementioned conclusions can be relatively easily understood conceptually, unfortunately, trust and reflexivity cannot really be designed, and can certainly not be imposed. In a specific team trust need to be earned, it needs to be developed over time and the same might go

for reflexivity. There seem to be very little shortcuts, if any. So, what do these factors depend on? In the following paragraphs I'll try to shed a light on some of those.

Characters and personalities: team composition, team roles, and team dynamics

Before going on, it's important to mention that the composition of a 'team' in a company, whether a formal team put together for a specific purpose, or 'just' the accidental mix of people from different departments involved in a specific decision-making process, is in practice hardly ever the consequence of a thorough analysis of candidates based on technical knowledge and skills, nor of character traits and mindsets. In my experience, in most cases, the 'team' is simply the mix of available people at a moment in time.

Firstly, there is the mix of technical skills and experience that people bring to the table, that has an impact on the dynamic that will follow. The MIT research into team performance also highlights in this context that 'the ability of the individual team members, namely the analytical reasoning skills and overall intellectual competence [...] also attribute to team performance' (Phadnis et al, 2013). However, there are more dimensions at play. Five relatively unexperienced junior people meeting with a senior colleague who's been around for 20 years might generate a certain ambience that is quite different from 6 senior managers meeting to discuss an important decision. By the way, in my own experience the first nor the second team would be a guarantee for better results.

Another factor at play here is that of the character and personality that each of us carries. We are who we are, and we're not all the same. That might be working out fine

if personalities are more complementary but might also cause conflicts if personalities match to a lesser extent.

There are plenty of frameworks to describe and individual's team roles, for example the one proposed by Belbin (2010). By putting different individual's team roles together, the overall strengths and weaknesses of the team can be assessed. Or the Thinking Hats approach as developed by De Bono (1999), which also exploits the topic of team roles. The key message here is that each team, whether a formal team in a project, or an informal team of colleagues meeting to agree on some important topics, is a mix of personalities that is to a certain extent totally random, and independent from process design. And this mix of personalities can perfectly play an important role in the outcome of the team process. In similar fashion, Gattorna (2015) puts the well-known framework of Myers-Briggs's individual leadership styles in the particular context of supply chain management.

Stages in the life of the team

A second dimension to take into consideration is related to how long the team has been together and how well developed they have as a team. The famous psychological framework of Tuckman (1965) from the area of group dynamics describes this as a 4-phase evolution: forming, storming, norming and performing, later on even complemented by an additional closing stage called adjourning, transforming and mourning. Basic thought behind the framework is that all groups go through the same stages of development, from a chaotic initial stages in which people are getting to know each other, profiling themselves and taking position within the group as a whole, to stages in which the group establishes its own internal rules and ways of working

together and really starts performing. In order to highlight this phenomenon, many teachers involved in gameplay with The Fresh Connection prefer to create mixed teams of people who preferably have not worked together a lot in the constellation of the team for the gameplay.

Motivation

The following aspect to take into consideration would be motivation, in this case of the individuals in the team. In a way it starts already with whether team members have chosen to be in the team or not. If they haven't but they still like the team and/or the activity, they might end up happy. If they haven't chosen themselves, but they don't like the task and/or the team, it will most likely have a negative impact on their behaviour, ultimately affecting team performance.

Libraries are full of books explaining many more aspects around motivation of people. Let's highlight a few dimensions just in order to create a bit of awareness and to enable useful reflection on the topic later on. An interesting angle is to look at intrinsic and extrinsic motivation. Intrinsic motivation comes from within the individual and represents a drive to learn new things, to meet new people, to deal with new challenges. Extrinsic motivation has to do with other people giving either rewards (positive) or punishment (negative) to the individual, thus causing an external motivation to do certain things.

There seems to be plenty of scientific evidence that intrinsic motivation is a much stronger driver for positive behaviour than extrinsic motivation. It can easily be observed in schools and universities: students who are there because they are genuinely interested in learning something new and useful and who have a much more positive

mindset than those who are mainly there for getting the diploma or because their parents told them to go. In companies this is not very different. Some team members are just there because they need a job to pay the bills and their boss told them to go to the meeting whereas others might be driven by intrinsic motivations and come with a very positive mindset, ready to get things done. So in any team in any setting you might find one or both of these sources of motivation to be more or less present, with the potential of impacting the team's performance.

Communication: questioning, listening, using common language

But there is yet another dimension to team performance, also very relevant, which is communication. The risk is that this topic becomes very vague. Many times, I hear in companies that communication is perceived to be insufficient and/or ineffective, but it's most of the times much less clear what exactly that might mean and, more importantly, what can be done about it. For one thing, better communication doesn't necessarily mean talking more.

There is a simple and straightforward role play in communication and decision making between sales and production that I often do in my company trainings. Pairs of 2 people, each assuming a different role and having received a description of the hypothetical situation are sent out for a meeting and must reach an agreement to solve the issue at hand. Obviously, the issue is potentially conflictive between the two roles. Afterwards there is a debrief of the activity in which potential solutions that have come up in the meeting are explored, but above all in which we try to get our finger behind the key success factors of reaching an agreement. I've done this activity many times in

trainings and in the debrief almost all the times the same factors appear as key success factors, for example and in random order:

- Active listening, give explanations and ask for explanations
- Empathy and willingness to listen, attitude
- Clarity on expectations and ways of working
- Try to work based on facts, trying to avoid unsubstantiated opinions
- Try to establish a 'common language'
- Willingness to solve the issue
- Contextualise, explore alternatives
- Come to the meeting prepared, with your homework done
- Try to avoid seeing questions as criticism towards a person
- Create atmosphere that allows challenging the assumptions
- Look for mutual interest, prepared for making compromises

I find it very interesting to see that this list turns out very similar in all cases I do this activity (and obviously without me pushing or imposing any inputs). Apparently, most people intuitively and/or from personal experience know the key success factors to making such potentially conflictive conversations work, but apparently, we are very successful at failing in doing it well. For me it's another clear example of "simple but not easy". The mix of people, their backgrounds, skillsets, characters, personal situations, motivations, bosses, career perspectives, the stress of a particular day, and so on, all play a role in making it work.

Overall team performance: tasks and relationships

The fact that the supply chain is full of such potentially conflictive issues within and between different functional areas is what makes leadership such an important aspect of supply chain. So, after all the previous paragraphs talking about elements of team performance, now we're coming back to evaluation of the leadership dimension: how well is it going in our case?

To measure the outcomes of the team process and understand how the 'leadership', implicitly or explicitly, has worked, we can on the one hand look at how the team actually achieved the results and on the other hand at how team atmosphere has actually been. We can use a methodology as proposed by Management Worlds, Inc, who developed questionnaires for mapping two interesting dimensions of team performance: one oriented to the *tasks* (are we getting things done?) and one oriented to *relationships* (are we OK as a team?). In a way, all dimensions like technical and intellectual skills of the individuals, their characters and personalities and social skills, the trust in the team, and the degree of reflexivity, the implicit and explicit manifestations of leadership, all come together in this analysis. These questionnaires will come back later in Part Two, connected to The Fresh Connection gameplay and applied to your own team.

[!Start box!]

Exercise 4.2 Explore team performance

EXPLORE

Go back into your own practical experience. This could be working experience in a company, an internship, workgroups at school, teams in sports or other hobbies, and so on. Try to recall to what extent you have noticed the influence of the topic discussed

before, such as functional silos, 'corporate' culture, team roles, communication, team performance in terms of tasks and relationships. What are your observations? How could these observations be useful to you when gameplay starts?

[!End box!]

TRUST AND COORDINATION: EXTERNAL COLLABORATION & TRANSPARENCY

Let's go one step further. We defined the supply chain including other companies upstream and downstream. Now link that to the topic of trust and coordination. If establishing trust and coordination internally within the company is already an important challenge, as shown in the previous paragraphs, imagine doing the same with external parties, from whom on the outset it might not even be clear to everyone involved what they have in common with you. In principle, since it's about establishing relationships between people, all the aspects dealt with in the last section on internal collaboration are equally valid in the case of external collaboration. But there is an additional dimension, because in the end, between companies' relationships are more formal, you're not direct colleagues reporting to the same boss, and goals & objectives are not necessarily the same. So as part of the chapter on the leadership dimension of supply chain, I would like to come back to the topic of trust here in particular.

Lack of transparency: bullwhip effect

One of the most famous phenomena in supply chain, which is at least partially due to lack of trust and therefore lack of transparency in terms of information between companies, is called the bullwhip effect. If my customer doesn't want to share their

views on their future demand forecasts with me, then the only thing I can do is guess for myself, to the best of my possibilities. And as sound and extensive academic research into the bullwhip effect shows, I then will tend to build in more securities than strictly necessary. And in every stage of the supply chain upstream, the effect becomes stronger, leading to “*excessive inventory investment, poor customer service, lost revenues, misguided capacity plans, ineffective transportation, and missed production schedules*” (Lee et al, 1997).

See Figure 4.1 which were generated based on the results of playing a famous supply chain game with MBA students in a business school. In the graphics, the quantities of product ordered by each one of the stages in the supply chain to their direct supplier week by week are shown. So the graphic of the shop shows the quantity of product as ordered by the shop week by week to their supplier, which is the wholesaler. One can easily imagine the negative aspects as highlighted by Lee, because how do you build up inventory in such a situation, if the behaviour of your customer is so erratic and unpredictable? How much operational capacity in terms of warehousing, or production, or transportation should each stage in the supply chain build up? What are the consequences for cost efficiency and ultimately profit? What are the consequences for my delivery reliability to my customer and ultimately their loyalty to me?

Figure 4.1 The bullwhip effect

[! Insert Figure 4.1 here !]

Source: own observation from beer game simulation game as done in class

There are a number of causes for the bullwhip effect to occur, one of them clearly related to the aforementioned lack of transparency between suppliers and customers. We will come back to the topic in Part Three.

Vendor managed inventory (VMI): a potential solution to lack of transparency?

For now, let's take the concept of Vendor Managed Inventory (VMI) as an example of establishing or improving information transparency between suppliers and customers. It has been around for quite a while and can be considered one of the possible (partial) solutions to reducing the impact of the bullwhip effect. At the heart of the concept is the shift of responsibility from the customer ordering product from their supplier to the supplier taking responsibility for maintaining sufficient stock in the customer's warehouse.

In order to do this, the supplier needs reliable information about existing stock levels in the customer's warehouse and the level of sales as done by the customer. Ideally speaking, this information would be complemented by a sales forecast from the customer. With this, the supplier should have all of the information needed to be able to 'proactively' replenish inventory in the warehouse of the customer and thus guarantee availability of product within the agreed range of quantity.

Figure 4.2 VMI versus 'traditional' order based systems

[! Insert Figure 4.2 here !]

[! Start box !]

Exercise 4.3 Explore Vendor Managed Inventory (VMI)

EXPLORE

Which key success factors for a successful VMI-implementation can you think of? For example, think of:

- *Product characteristics: size, weight, packaging*
- *Product portfolio: number and diversity of SKU's*
- *Sales volumes and sales patterns*
- *Supplier size versus customer size*
- *Importance of supplier for customer*
- *Importance of customer for supplier*
- *Systems sophistication of supplier*
- *Systems sophistication of customer*

In which situations would VMI be more likely to work well? And how would 'leadership' fit into the equation?

[! End box !]

At the conceptual level initiatives like VMI are all fairly straightforward, but as it turns out, such types of projects, apart from the technical side of design of processes, implementation and connection of systems, definition of roles and responsibilities and finetuning of parameters, do actually require an important dose of trust, especially if the initiative is suggested and pushed by the supplier.

Because why would I share (confidential) information about my sales with my supplier? Why would they need to know in real time what is selling well and what not? Why would I open up my books and tell them how much inventory I have? How would

I make sure that they would not overstock my warehouse, just to make it easier for themselves? How would we deal with new product introductions? And why would my supplier be able to do a better job at forecasting and replenishment than I could do myself, am I not the expert of my own products and sales instead of them? And besides, even if all this would work well, with how many suppliers could I do this in parallel, my resources are limited, aren't they?

Although most people would intuitively understand that mutual trust leading to more open communication between companies would enable improved performance and a reduced bullwhip effect, via solutions like VMI, apparently this is a bit harder in practice than the concept itself would suggest. Unfortunately, also in the context of external collaboration, mutual trust cannot be imposed, it requires a lot of time and effort to establish, but above all a positive predisposition to begin with.

A friend of mine works at a well-known multinational company and he told me that recently his company had won an industry award for supply chain innovation. Part of the project was to establish forward integration with key customers, including the integration of processes and systems. When I asked with how many customers they had been successful so far and how much time that had taken it turned out that they had achieved launching the implementation of customer number 4 after about 1,5 years down the road in the project. And none of the previous three customers could really be considered a "finished implementation" yet. Change is indeed slow. And by the way, a fair number of their customers had actually friendly but firmly declined the invitation to participate.

In summary, benefits of such changes are sometimes easy to see at the conceptual level, but they require a lot of vision, insisting and leadership to get done. In that sense, many elements of the example of VMI can be extrapolated into any collaboration project crossing borders between supplier and customers. This then also links back to the topic of supplier segmentation and particularly collaboration with the strategic suppliers, as discussed in Chapter Three.

THE ROLE OF LEADERSHIP IN THE SUPPLY CHAIN

As the topics in the chapter so far have hopefully illustrated, making things happen in the supply chain is not an easy task. The technical complexity can already be quite overwhelming, but then to get all the involved people, internally and externally, on board, poses quite an additional challenge. This is why leadership is called for.

The concept of the T-shaped manager was allegedly first coined by David Guest (1991), possibly after certain principles as applied at the time by McKinsey and company and its principles promoted a lot since then by famous design firm IDEO, the company behind much of the ‘Design Thinking’ school of thought. The central idea of the T-shaped manager is that they combine the benefits of deep (technical) knowledge and problem-solving skills in a particular functional or business area, with broad communication skills across different areas, within or across firms.

Interestingly enough, in an article in the Harvard Business Review, Hansen & von Oetinger (2001) give a slightly different, and in my opinion compatible interpretation of the T-shaped manager. For them it’s not so much about the mix of deep functional and wide cross-functional skills, but about the mix of moving oneself and spreading knowledge and experience vertically within one unit of the firm, and doing

the same horizontally between units of the firm, a concept that can be expanded to places outside the firm in order to reach more of the supply chain's end-to-end way of looking. In other words, they focus a bit more on behaviour rather than on pure skills. From my point of view, both views are very relevant to the nature and character of what's going on in the end-to-end supply chain.

Christopher (2016) places the T-shape in the context of the supply chain from a very high level perspective and supply chain recruitment company Inspired-Search has taken the concept of the T-shaped manager a big step further and has actually created a detailed supply chain specific version of it. This has been the starting point for a series of blogposts I wrote in 2013 titled 'The supply chain manager's daily decathlon' which were published on the website of magazine SupplyChainMovement.com.

Figure 4.3 the T-shaped supply chain manager

[! Insert Figure 4.3 here !]

Source: © Inspired-Search

The central idea of the blogs was to use a number of well-known and some self-invented games requiring very different skills to create a supply chain decathlon, alluding to the fact that *“given the diversity of the challenges in their job, supply chain managers need to be versatile, multi-skilled people, chameleonic in a way. A bit like the decathlon athlete, they need to perform well on a lot of different disciplines, not necessarily the best at each, but good enough to have a good shot at becoming the overall number 1 in the tournament”* (Weenk, 2013). The games & skillset dealt with were the following:

- SimCity™ – holistic thinking, big picture, perspective

- Mighty Materials Monopoly – business sense, financial expertise
- Rush Hour® – logical thinking, problem solving, targets
- Power Pit-Stop Project – analytics, technical skills, project management
- World of Warcraft® – negotiation, stress- & uncertainty-resistance
- High-hope Tightrope – trade-off sensitivity, balancing objectives
- Dragons’ Den – elevator pitching, verbalize and visualize
- Diplomacy® – alliance building, political sensitivity
- Who are you? – sensibility for people, creating ambiance
- Mega Marathon – endurance, while enjoying the ride

Although not written from the perspective used in this book, of the skills mentioned in the blog as required for being successful at the 10 different games of the decathlon, at least half can be seen as part of the leadership dimension, the other ones more related to the business and/or technical dimensions of supply chain.

At the end of this Chapter I would like to go back to Jack Welch, former long-time CEO of General Electric. There is a wonderful video of him speaking about the role of a leader, focusing particularly on the people aspects of that role. According to Welch, there are four vital angles to leadership. As a leader you have to be the Chief Meaning Officer, not only explaining to people where you want to go, but also showing clearly what's in it for them if they join you on the journey. Furthermore, you need to be the Chief Broom Officer, getting rid of the organizational clutter, removing the silos. Then, you also need to be the Chief Generosity Officer, enjoy your colleague's successes, not focusing only on yourself. Finally, Welch distinguishes the role of the

Chief Fun Officer, celebrating small victories with the team and making them into big victories, having fun at the job every single (JWMI, 2015).

Linking back to the central principle of the learning cycle of experiential learning, I would invite you to track the way you apply the skills mentioned in this Chapter for example during the gameplay. This will help you first of all to identify their appearance and their importance, as well as enable you to assess your own performance in each of them.

SUMMARY

The topics of performance measurement, stakeholder management and corporate culture, team roles and team dynamics and trust and coordination bring us to the end of covering the third dimension of supply chain, the leadership dimension. In the next chapter we will finish our journey of exploring the fundamentals, and look at the overall complexity of managing the business, technical and leadership dimensions of supply chain all at once.

Figure 4.4 Recap of topics from the leadership dimension of supply chain management

[! Insert Figure 4.4 here !]

CHAPTER FIVE: SIMPLE BUT NOT EASY (2): COMPLEXITY AND ALIGNMENT

In this last chapter of Part One: Exploring the fundamentals, there will be a few closing remarks about the complexity of supply chain when combining the business, technical and leadership dimensions of supply chain, and highlighting two keys to dealing with this complexity:

- the art of making trade-offs;
- the process of Sales & Operations Planning (S&OP).

Both these topics, in addition to the previous chapters should put you in a good position to kick off gameplay in Part Two.

COMPLEXITY!

I hope that you will have seen by now that the individual concepts relevant to supply chain management are relatively straightforward. I'm quite sure that you have noticed that most of them are not that difficult to understand, from a conceptual point of view. However, it would probably be a big mistake to think that it is therefore all easy, because it's not. There are a number of reasons why supply chain management as a business area is so enormously complex from a strategic and holistic, as well as from an operational point of view:

- The sheer number of individual elements which together form supply chain management makes it complex to have the full view at all times;

- The *interdependencies* between the different elements make it complex to grasp the impact that decisions in one part will have on the other parts. The supply chain is a complex system of processes, people, companies, etc.;
- *Objectivity* is not always that straightforward. Although much can be calculated and analyzed, there is plenty of room, and need, for opinion, debating, convincing, putting another layer of complexity over the previous points;
- Now add *uncertainty* into the equation. Uncertainty about supply, uncertainty about demand, uncertainty about operational performance, uncertainty about what competitors will do, uncertainty about the pace and content of technological developments, uncertainty about what will happen in business and society, and a large list of etcetera's. More complexity to be considered.

All of the above, and probably some more, is at play at the same time. And to me, this is precisely what makes supply chain such a fascinating area to work in. Supply chain is complex and has the need for alignment on many dimensions:

- Between the short term and the long term;
- Between the strategic and the operational;
- Between supply chain execution and bottom line results;
- Between the big picture and the details;
- Between the pros and the cons;
- Between the internal and the external;
- Between facts, assumptions and opinions;
- And, ultimately, between demand and supply.

Before finally going to the gameplay in Part Two, let's finish with two very important topics, one a concept and the other one a process, which are absolutely critical to dealing with all of this complexity and alignment challenges in the supply chain in a practical way and get to effective decision making in order to move the company forward. This is the concept of “*trade-offs*” and the process of *Sales & Operations Planning* (S&OP).

TRADE-OFFS: YOU CAN'T HAVE IT ALL

It will have become clear by now that many of the decisions to be taken in the area of supply chain are multi-faceted and that the context is one of interdependencies between functions and areas. Most of the decisions will always have pros as well as cons, so the perfect solution satisfying all dimensions and all stakeholders most likely doesn't exist. Probably, in most cases we will need to trade off and find some sort of acceptable balance between the different parameters, options and interests.

Some of those trade-offs can be approached from within one and the same decision area, such as transport or warehousing, but many of them in practice have some cross functional aspects (“if I change something in transportation, it might have an impact on warehousing as well, or on customer service”). In addition, some elements in the equation can be quantified, but others maybe not so much, which implies that not all of the arguments in favour or against can be added up in a very straightforward mathematical way.

Furthermore, in most occasions information to support the decision will not be 100% complete, so assumptions will have to be made to fill in the gaps. Then mix in the people dimension and a bit of time pressure because the boss is waiting and it is obvious

that good decision making requires a holistic view, as well as persistence, a well-structured approach and a fair dose of pragmatism.

This is the real juggling act of trade-offs, to which people working in the supply chain have to develop a good degree of sensitivity for: if changing one thing in the supply chain, where could other impacts be expected? In fact, this is one of the skills from the daily decathlon as mentioned in the previous chapter. In addition, one will have to develop a pragmatic approach of how to deal with these trade-offs in practice.

Let's first take a quick look at a widely used view on the elements at play in supply chain trade-offs, which is in a way similar to the famous '*iron triangle*' of project management: cost versus time versus quality. If in a project designed under reasonable assumptions I would need to take certain measures to speed up the final delivery of the project, for example because the customer has changed their mind and wants the results sooner than agreed, I might well have to jeopardize the previously estimated budget, or the actual quality of the deliverables in order to realize the faster deadline. Similarly, in the supply chain we could translate this to a trade-off between the dimensions of *fast*, *good* and *cheap*. Most supply chain textbooks speak in some way or another about the classical trade-off between promised service to customers, operational costs and the required inventories.

Figure 5.1 Classical trade-offs in supply chain: better-faster-cheaper

[! Insert Figure 5.1 here !]

Coherent with the increasing attention for supply chain finance aspects dealt with in Chapter Two, the associated impact on working capital or even total employed capital is taken into consideration more and more, bringing us in fact very close to the

KPI of Return On Investment as discussed earlier on in the book. Good and fast would have an impact on revenue, cost obviously on the expenses, the overall supported by the working capital. Getting very familiar with these elements of the trade-offs when thinking about choices to be made will be very helpful to you in developing the required sensitivity for the pros and cons at stake.

Secondly, a pragmatic approach of thinking about trade-offs in the context of supply chain decision making is to take a holistic view at the choice at hand and simply follow the steps below, thus creating a business case for a specific decision:

- list the pros and cons that could occur as a consequence;
- quantify as many of the identified pros and cons
- in case assumptions need to be made, specify as much as possible the reasoning behind those. If it makes sense, develop different scenarios;
- make qualitative descriptions of those parts that cannot reasonably be quantified within the given timeframe or based on the available data;
- make sure that implementation aspects to go from the as-is situation to the to-be situation are addressed as well;
- on the basis of the entire picture, try to formulate a convincing argumentation supporting the decision and that can be defended towards others in the company.

In this step, the chosen corporate strategy should guide you in making the final decision and formulating the argumentation: decisions should be coherent with the overall strategy.

In Part Two and Three plenty of examples of trade-offs will become visible and the topic of business cases will come back explicitly in Chapter Ten.

CROSS-FUNCTIONAL ALIGNMENT: S&OP AND IBP

In line with the phenomenon of trade-offs, combining the business and the technical as well as the leadership dimensions while making decisions for the supply chain requires strong alignment between different functional areas of the company. Think back to the reflections you did using figures 3.9 and 3.13, respectively looking at interdependencies between the different functional departments in relation to the definition of supply chain strategy and the infrastructure, and the interdependencies in relation to the sub-processes of the overall O2C, P2P and D2S processes. Now put these 2 views together to get a clearer overall view on the complexities involved in the decision making and the challenges of actually aligning between the functional departments.

In fact, the process of Sales & Operations Planning (S&OP) has been developed over time to give a response to precisely those challenges. Some people also speak about Integrated Business Planning (IBP), taking the initial S&OP philosophy to next level of sophistication. On the internet other maturity models for S&OP can be found, the one developed by consultancy company Gartner being a well-known example. According to Tom Wallace, one of the leading people behind the important initial development of S&OP, *“Sales & Operation Planning (S&OP) is a set of decision-making processes to balance demand and supply, to integrate financial planning and operational planning, and to provide a forum for establishing and linking high level strategic plans with day-to-day operations”* (Wallace, nd).

Nowadays, S&OP has made it into the top-level agenda of most leading firms around the planet, even though many companies still struggle to get it right. On the one

hand this might be surprising since the process steps are really not that complicated (see Figure below). On the other hand, S&OP also reflects the combination of the business, the technical and the leadership dimensions of supply chain, so maybe we shouldn't be that surprised of the difficulties with its implementation after all.

Figure 5.3 S&OP Process: sequential monthly steps

[! Insert Figure 5.3 here !]

Source: after Stahl (2009) and Dougherty & Gray (2006)

[!Start box!]

Exercise 5.1 Explore S&OP / IBP

EXPLORE

Using the means you have at your disposal, such as the Internet, libraries, databases, magazines and so on, explore the topics of Sales and Operations Planning / Integrated Business Planning. What can you pick up from these publications?

[!End box!]

In Part Two, when playing The Fresh Connection, you will have the challenge to develop your own S&OP process and experience its complexities.

SUMMARY

The topics of complexity, trade-off's and Sales & Operations Planning bring us to the end of the journey of exploring the fundamentals of supply chain management, and thus also to the end of Part One. As a recap, in Figure 5.4 you can see an overview of the concepts that have been discussed so far. All of these will come back in some form or shape and connected to The Fresh Connection in Parts Two and/or Three.

Figure 5.4 The three dimensions of supply chain management

[! Insert Figure 5.4 here !]

Again, lots of topics, not that difficult individually, but all at play at the same time. I said it before on a number of occasions already: *simple but definitely not easy*. And that's precisely the fun part of it. After finishing the journey of exploring the fundamentals in Part One, we will now move on to Part Two, in which we start a second journey, the journey of mastering the fundamentals.

PART TWO

MASTERING THE FUNDAMENTALS

After exploring the fundamentals in Part One, in Part Two we will focus on practically applying these fundamental concepts with the aim of truly mastering the fundamentals. Here, The Fresh Connection business simulation will be the main vehicle that will serve for the application of the individual concepts that were introduced in Part One. The basic setup of the simulation used in this second section presents a relatively stable environment in which to make a wide variety of basic supply chain related decisions, to make the supply chain run smoothly and the company profitable. By running the simulation, there will be a clear and visible link between cause and effect (decisions & results). In this way, the student will get the first-hand experience of *analyzing real company data* from different functional areas in order to *make good decisions*. Exercises in this section will thus be structured in two steps: *analyse* and *decide*. Furthermore, each chapter will end with a final *reflection*, in order to close the learning cycle.

Also in Part Two, the three dimensions of supply chain (technical, business, leadership) will each be dealt with in separate chapters.

CHAPTER SIX: GETTING STARTED WITH THE FRESH CONNECTION: GAME ON!

In Part One of the book the focus has been on presenting from a helicopter view the main important frameworks, theories and concepts in connection to each of the three dimensions of supply chain: the business dimension, the technical dimension and the leadership dimension. In Part Two we will shift attention to practical application of the concepts from Part One using The Fresh Connection business simulation as an interactive case study, allowing you to get a first-hand experience of the complexities involved. In this chapter we kick off Part Two with getting to know the simulation, the business situation it contains, as well as a thorough step-by-step analysis of the starting point and an action plan for round 1 of gameplay.

THE FRESH CONNECTION BUSINESS SIMULATION GAME (TFC)

The Fresh Connection (TFC) business simulation game is developed by Dutch company Inchange. The company already had an important track record using a variety of board games in their training and consultancy activities, when finally in 2008 The Fresh Connection was launched, bringing “serious gaming” to another level.

At the heart of The Fresh Connection is a *lossmaking producer of fresh fruit juices*, located in the Northwest of Europe (let’s say the Netherlands), that needs to be turned profitable again by making strategic and tactical decisions over the course of a number of rounds of gameplay, each round representing 6 months of the life of the company. The attractiveness of such business simulation games is that students can play in a fun, competitive, risk-free, yet realistic environment in which a direct relationship between cause and consequence (decisions and results) can be experienced.

What makes The Fresh Connection stand out in comparison to other business simulation games is that it has a clear focus on the value chain and the flow of materials from upstream suppliers to downstream customers. Furthermore, by splitting the decisions to be made into the clear functional areas of Sales, Purchasing, Production and Supply Chain, and with a different team member responsible for each area, the experience gets very close to real corporate life, in which a functional split of responsibilities is the norm, rather than the exception.

Beyond the pure functional decision making, this leads to the need for finding effective and efficient mechanisms to ensure *cross-functional alignment*. Then add a little bit of time pressure into the pressure cooker and we have a combination of all the required ingredients for a wonderful learning experience.

The Fresh Connection business simulation game allows for customized configuration, based on its modular setup, each module with a different thematic emphasis. In addition, typically a game setup would start with a slightly lower level of complexity in the beginning of the game (round 1), followed by increasing complexity as the gameplay advances in subsequent rounds. In the context of educational programmes, the decision about which configuration to use, would normally be taken by the lecturer in charge of the course, taking into consideration the specific content and learning objectives of the course. The key points to keep in mind at this stage are:

- The Fresh Connection is a juice company that is currently making a loss;
- Gameplay is in teams, each team member taking charge of a different functional role;

- Gameplay will be in rounds of decision making, each round representing 6 months of the life of the company;
- Game setup, timings and so on will normally be defined and communicated by the course lecturer.

In the remainder of this chapter we will get started with the game by:

- Exploring the simulation;
- Analyzing the starting point in which you find the company;
- Starting to think about an action plan for round 1 of gameplay.

Please note that Part Two, and to a lesser extent Part Three, is based on a game configuration that corresponds to a largely to what most schools and universities are using in practice. This goes for the configuration of complexity in the game, as well as the number of entities and their respective names you will find. So, it might be that the specific configuration you will be playing in your own course is a bit different from what you will find in the book. If this is indeed the case, then don't worry, because the topics, exercises and reflections are equally valid and applicable for any configuration of the game.

INTRODUCING: TEAM SUPERJUICE!

Team SuperJuice is formed by a team of students and they are going through the same experience as yourself. Here you can see the team in full action preparing their first round of gameplay.

Figure 6.1 Team SuperJuice

INSERT TEAM PICTURE (MAYBE FROM THE WINNERS OF THE GLOBAL CHALLENGE 2018???) FOR EXAMPLE A PHOTO IN FRONT OF FLIPCHARTS IN WHICH THEY ARE ACTUALLY CREATING A TFC-MAPPING (APPROVAL PENDING)

Throughout Part Two you will find bits and pieces of the work done by Team SuperJuice that can serve you as an inspiration for your own work.

INTRODUCING: BOB MCLAREN!

Figure 6.2 Introducing the company's owner

[! Insert Figure 6.2 here !]

Bob McLaren has facilitated a few videos for your information. Please go and watch the videos, which you can find on the web portal connected to the book. These videos will give you a brief overview of The Fresh Connection and its current state of affairs.

After watching the videos, please continue reading below description.

THE FRESH CONNECTION: THE COMPANY, THE MISSION, THE EXPERIENCE

Company and customers. The Fresh Connection is a producer of fruit juices, which it sells to a limited set of retail customers. The Fresh Connection supplies its customers directly. If sufficient product of the agreed specifications is in stock, then the delivery is made on the next day after the customer places an order.

Products. The Fresh Connection provides a modest range of flavours, such as Orange or Orange-Mango in different pack sizes, such as 1-litre cartons and 0,3 litre PET bottles. The finished goods have, from the moment of production, a shelf life of 20

weeks. The customers claim a significant part of these 20 weeks, usually between 60 and 80%. This leaves The Fresh Connection with a total shelf life between 20 and 40% of these 20 weeks. In case the shelf life expires, the product will unfortunately have to be destroyed.

Product storage and distribution. The Fresh Connection products are stored on pallets in the finished goods warehouse, also called the outbound warehouse. They stay there until a delivery is made, or until their shelf life has expired. The Fresh Connection does not have its own fleet to deliver to its customer's distribution centers and instead outsources the transportation to an extremely reliable partner.

The production process. The Fresh Connection manufactures all the products it sells itself. The fruit juices are mixed in a mixer and immediately after, they are bottled using a bottling line. Mixer and bottling line are part of The Fresh Connection's equipment. The different pack sizes are bottled on the same line.

The components. A finished product consists of two main components: the packaging and concentrated fruit juice (pulp). A bill of materials that can be found within the system lists what quantity of which component is used in a finished product. The formula - the fruit-pulp mix and additives that give the fruit juices their unique flavour – has been one of the most closely-guarded Fresh Connection secrets for over a century.

The suppliers. The components are purchased from suppliers. The packaging material is bought from local and regional suppliers. Pulp is acquired either from fruit traders or producers from across the globe. Each supplier has its own characteristics regarding for example size, basic component price, lead time and reliability.

Component storage. The components that are delivered to The Fresh Connection cannot always be immediately used in production, that is why the company has a raw materials or inbound warehouse to store them. Packaging material is delivered on pallets and stored in this raw materials warehouse. The warehouse also holds fruit pulp, if it is delivered in drums or IBCs (Intermediate Bulk Containers; small tanks that hold 1,000 liters of pulp and are the floor-size of a pallet). The fruit pulp that arrives in tank trucks is pumped into a tank yard. The pulp also has a restricted shelf life, although much longer than the shelf life of the produced fruit juices (once water is added the shelf life reduces drastically). Once expired the pulp will be destroyed.

Teams and roles. Together with your teammates, you will be in charge of The Fresh Connection. If you make the right decisions, you will save the company from going under. Things have been going badly at The Fresh Connection for some time now – it's running at a loss, customers are complaining bitterly about poor service levels and in the meantime the warehouses are bursting at the seams with stock. In short, something's got to be done. Will you be the one to save The Fresh Connection?

Each team member has a specific role: Vice-president (VP) Purchasing, VP Operations, VP Sales or VP Supply Chain Management. All team members have their own responsibilities in terms of the role they assume, allowing them to also make their own decisions. However, as a great philosopher once said: 'Together is not alone'. Cooperation is the key to saving The Fresh Connection from going under.

The *VP Purchasing* is responsible for purchasing the components. They negotiate the terms of supply and the price with suppliers, and can terminate existing contracts and conclude new ones. The VP Purchasing plays a crucial role in the game.

By choosing suppliers who offer favourable terms, low prices and a high level of reliability, the total purchasing costs are kept under control, stocks stay low and reliability of delivery for components to production is high.

The *VP Operations* is in charge of the production facilities and the warehouses. They orchestrate the work shifts and ensure that the staff are trained. They also decide on the space and manpower deployed in the warehouses. The VP Operations can make or break the game for the entire team. By ensuring that the production system remains flexible, production costs are low and reliability high, the total production costs are controlled while product availability is high.

Product sales are overseen by the *VP Sales*. They negotiate The Fresh Connection's terms of delivery with the customers. Things such as the service level, promotional pressures and the sales volume rebate are all negotiable. The VP Sales plays an extremely important role in the game and his bargaining can result in a high sales price - as long as The Fresh Connection can keep its promises. And sales are, of course, the launch pad for profits!

The *VP Supply Chain Management* is the glue that holds the other roles together. By devising a supply chain strategy and undertaking intelligent inventory planning, the VP Supply Chain Management plays a decisive role in the team. They can ensure that unreliable suppliers or production facilities are covered by strategically deployed safety stock, ensuring that the company keeps its promises to the customer.

Each team member can make decisions individually, but as a team you need a good strategy to achieve the best results. It is not advisable, for example, for the VP Sales to agree to high service levels with the customer, while the VP Supply Chain

Management is cutting back on stock! That's why it's essential you always discuss your decisions with each other.

Gameplay. The Fresh Connection takes a number of rounds to experience. Every round depicts a half a year of The Fresh Connection. A round starts with analyzing the initial situation of the round, followed by decision making. As soon as you have finished a round, the round will be calculated and you will jump a half a year in time. After that, results can be interpreted and analyzed, and complemented with additional reflections about specific supply chain concepts. Then the cycle starts again until all rounds of gameplay have been finalized. In a typical game setup, the complexity will gradually increase throughout the game, meaning that when the rounds in the game advance, more decisions to be taken will be added.

Central indicator for team performance: ROI. The objective is for you and your team to achieve the best possible return on investments (ROI). In other words, the sole aim is not simply to make as much money as possible – managing your investments in a proper way also counts. After each round, your team's ROI can be compared to the scores of the other teams. Next to the team score there is also an individual score. These individual scores do not count towards the team score, but it's always nice to be the best in your field! After each round you can check your performance and compare with the other teams.

Trade-offs. You will make many decisions during The Fresh Connection. A trade-off is incorporated into every decision, so a decision will never only have positive effects, but negative ones too. The trick is to assess these consequences and to balance

them against each other. Should you not make any decisions during a given round, the decisions made in the previous round will then be reused.

Strategy and tactics. The Fresh Connection is a tactical and strategic game. You will be assessed in terms of the longterm effects of your decisions, as expressed by your team's ROI. This means that you must gear your business towards long-term goals (as if your decisions will be in effect over many years). Given that we will measure the results in terms of their long-term effects, you will never suffer the negative consequences resulting from poor decisions in previous rounds in the current round. The advantage of this is that you can organize the business in a new way every round, without having to take the decisions and results from previous rounds into account. But of course by analyzing your results from the previous rounds closely you can start making improvements.

INTERMEZZO: BACK TO THEORY FOR A MOMENT

In Chapter One: Supply chain: General introduction, a number of concepts were touched upon. Let's go back to some of those. First of all, we spoke about *definitions* and the importance to clarify them whenever working with others in order to avoid confusion. In TFC's system you will find a lot of specific terminology. Some of it might be very clear or straightforward, other wordings might be less familiar to you. In those cases, don't guess nor make assumptions about what things could possibly mean. Like in real life, go out and ask for clarification. In this case, you can do that by clicking on the ⓘ - symbol, which can be found next to many of the words on the TFC-screens.

Secondly, the question was raised of how big our supply chain is, how many stages backwards or upstream in the supply chain do we want to look and manage

actively, and how many stages downstream? In the Fresh Connection, since the company is in such big trouble, we start with looking only at direct suppliers and direct customers. As soon as we have fixed the most urgent issues there and get the company into more stable waters, we might start widening our scope, but for now we leave it at one stage upstream (direct suppliers) and one stage downstream (customers).

In Chapter One we also spoke about the fact that *size sometimes does matter* in supply chains. Also in the case of TFC this might be of impact for example when negotiations are at hand or when collaboration projects could be considered. Not all customers are the same size, nor are all suppliers. Some are more important to TFC than others and to some TFC is more important than to others and this might influence the relationship. You will have detailed information available about all companies involved in TFC's supply chain, so be sure to analyze this aspect as well.

We finished Chapter One by looking at the pieces of the puzzle, the *building blocks of the supply chain*. In that context we spoke about the integral logistic concept consisting of four different elements:

- *Physical infrastructure*. In the case of TFC, the physical network is fairly straightforward, as can be seen in Figure 6.3. Suppliers send materials to TFC, who produces (mixing & bottling) and ships out to customers.
- *Planning and control mechanisms*. In the case of TFC, you as the new management team have the task and responsibility to define the appropriate planning & control mechanisms and the way you want to go about decision making as a team: which information to analyze, which indicators and targets to put in place, how to align in the team, and so on;

- *Information and subsequent systems requirements.* In the case of TFC, you will have the company's ERP system at your disposal, you cannot make any choices about the type of system you want to have. In this case, the ERP system is very open, meaning that all team members have access to all parts of the system: every team member can see all screens and access all reports, including the ones corresponding to other functional areas. However, you can only actively touch and modify the decisions corresponding to your own role. Like most systems, the ERP system contains a wealth of data, some of which you might find relevant, while there might be other data you might find over time you hardly use. Also, like in most systems, there might be information you consider relevant, but it's not available, or not in the desired level of detail. Like these things happen in real life, you will simply have to deal with it;
- *Organizational setup.* In the case of TFC, you will be the local management of a single-factory company, so in that sense there is no real difference between central and local. Each of the team members has a functional responsibility for a specific area (sales, operations, supply chain, purchasing). On top of that, the team will have to decide if they want to define any shared responsibilities between the team members. This last point is pretty much intertwined with the aforementioned topic of planning and control mechanisms.

Figure 6.3 TFC's supply chain (linear)

[! Insert Figure 6.3 here !]

WHAT'S WRONG WITH THE FRESH CONNECTION?

A step-by-step approach to analyze the baseline

As you have seen so far, The Fresh Connection is a company that's in big trouble. With your team you enter as the new board of managers with the objective to turn the financial results around and make the company profitable again. This process of turnaround would obviously start with getting a very clear view on the current situation, so that on the basis of your observations you will be in the position to define corrective actions to improve the situation.

[!Start box!]

Exercise 6.1 Analyze initial situation of The Fresh Connection

In the following pages, a step-by-step approach for the Analysis Phase is presented. Besides getting a first view on what needs to be done to improve things, you will also get to know the screens of the simulation, as well as the information you have at your disposal.

[!End box!]

Please go to the book's web portal and find the login information for the analysis phase. Via the game portal you can then log in to the system. Initially, focus your efforts on analyzing the information corresponding to your own role in the team (sales, purchasing, operations, supply chain). This would be valid for Steps 1-4. Then, in Step 5 you bring your individual observations, conclusions and suggestions together with those of your fellow team mates, so that an integrated approach can be defined. Please note that the information you will find in the reports in the different screens represent the situation of the past 6 months of the company's performance.

The 5 steps as presented in this Chapter will help you to establish a thorough understanding of the initial situation in which The Fresh Connection finds itself. Please

note that steps 2-5 can also be applied in exactly the same way after every single round of gameplay.

Step 1: supply chain infrastructure and flows

In Chapter One we spoke about different types of supply chain mappings and their importance for creating a clear view on a supply chain. Now take a piece of paper, or an empty PowerPoint presentation and make a *network flow map* of the material flows of TFC. Your initial map should look something like the Figure 6.4, as done by Team “SuperJuice”.

Figure 6.4 Template TFC’s supply chain (network)

[! Insert Figure 6.4 here !]

Your map should include the following elements:

- 5 components and 1 supplier for each component;
- 1 inbound warehouse for components, with an external overflow warehouse next door in case the warehouse is full and new materials are still coming in from suppliers;
- 1 mixing line for mixing the ingredients of the juice;
- 1 botting line for putting the juice into the appropriate packaging: a 1 litre carton, or a 0.3 litre plastic bottle (PET);
- 1 outbound warehouse for finished goods, with an external overflow warehouse next door in case the warehouse is full and new goods are still coming in from production;
- 6 final products (3 flavours x 2 packaging types = 6 SKU’s);

- 3 customers.

Step 2: which were the decisions taken by the previous management team?

According to Bob McLaren and his fellow co-owners of the company, the previous management team are the ones who brought the company to the disastrous current situation by making a series of bad decisions. The next step in the analysis is to understand which decisions they have made that caused such negative results for the company. Go to the screen of your role by clicking on the corresponding tab and analyze the information that can be found on the decision making part of the screen:

Figure 6.5 TFC screen: decision making part

[! Insert Figure 6.5 here !]

Bring the most relevant information elements to the map you created in Step 1 and locate them where they belong on the map. Per role, for instance take a look at:

Figure 6.6 Past decisions: examples of items to analyze in the decision screens

[! Insert Figure 6.6 here !]

Please note that in case of Sales and Purchasing, the items mentioned might differ per customer or supplier, respectively, so should be analyzed per each of those.

Your map should now be getting filled with information.

Step 3: what happened as a result of the previous MT's decisions?

Obviously, it is possible that there is a big difference between the decisions made by the previous management team and the results they actually obtained. So in the

next step, we add the real results of their decisions to the analysis. Go to the screen of your role by clicking on the corresponding tab and analyze the information that can be found on the bottom left-hand side of the screen (see figure below).

Figure 6.7 TFC screen: report part

[! Insert Figure 6.7 here !]

Here you will find a number of different reports, providing you with a wealth of information. Take a look at the different reports so that you know which information you actually have available. Bring the most relevant information elements to the map you created in Step 1 and locate them where they belong on the map. Per role, for instance take a look at:

Figure 6.8 Past results: examples of items to analyze in the report screens

[! Insert Figure 6.8 here !]

Please note that in case of Sales and Purchasing, the items mentioned might differ per customer or supplier, respectively, so should be analyzed per each of those.

Step 4: what happened between decisions and results – gap analysis.

Analyze the main differences between the planned performance and the real results. You now have the inputs from Step 2 (previous decisions) and Step 3 (previous results), brought together in the Map that was created in Step 1. This allows you to form yourself an opinion about where the bigger issues might be. What has been happening and why?

At this stage, in order to get an even more complete picture, you might also want to create a *geographical flow map* of TFC's supply chain. Its retail customers are

located in the same country as TFC (in The Netherlands, as you remember from a previous section), information about the location of the suppliers can be found by clicking on the ⓘ - symbol next to the name of a supplier in the purchasing decision screens. You could even try and adjust the thickness of the lines between TFC and its suppliers in function of the amount of product flowing between them.

[!Start box!]

Exercise 6.2 Decide on first action plan to turn the company around

DECIDE

As a last step of the initial work done on getting grip on the situation, it is now time to translate your findings into workable actions.

[!End box!]

Step 5: what should be done now – action plan

Now bring your individual inputs, observations and suggestion together with those of the colleagues of your team. This will give you a complete and comprehensive insight into the overall performance of the company and potential causes for current losses. Go through the map together and get clarity on the observations of each one of you:

- Highlight, for example with a red colour, all items that catch your attention in terms of discrepancy between what should have happened and what happened;
- For each of the identified items, which specific actions can you think of to improve on the current situation? Write those down, per each of the functional areas of sales, operations, supply chain and purchasing.

Please note: make sure that you really focus on *concrete actions*. One of the more common mistakes I see is to mainly mention the desired outcomes, rather than corrective measures. For example, if achieved service levels are perceived to be too low, then avoid to describe the corrective action as “improve service level”, because it only specifies the desired outcome without specifying how to actually achieve it (there are many different steps that can be taken to contribute to the improvement of service levels). See the figure below for a template from Team SuperJuice that you can use.

Figure 6.9 Template: observations from diagnosis & proposed actions

[! Insert Figure 6.9 here !]

TFC GAMEPLAY: WHAT YOU NEED TO KNOW

Your first analysis of the initial situation of the company has been done and you're almost ready to go, but before going to the business dimension of TFC's supply chain, let's first take an additional look at TFC gameplay. Normally, you would be participating in a game in which different teams from the same school or university play together in the same pool of gameplay. The exact configuration of the game, meaning which decisions can be taken in which round, has been decided upon by the course instructor, taking into consideration the exact learning objectives of the course in which the game is used.

There is a wide variety of possibilities for course setups. Sometimes the game is played 100% in class, with active presence of the course lecturer in terms of explaining

concepts and being available to answer teams' questions. Sometime the game is played 100% outside class hours, with lecturers being available at given times to give feedback and/or clarify doubts. Also, more and more blended formats can be found. Again, the decision about how to set up a course using TFC is a choice by the course lecturer depending on available time and course objectives and would normally be communicated to you prior to the start of the course.

Whichever the format chosen, the sequence of activities is normally quite similar, pretty much following the learning cycle of Kolb as discussed previously in Chapter One:

1. Profound analysis by the team of the current situation;
2. Decision making and implementation of decisions in the simulation;
3. Closing of the round by the instructor in order to calculate results;
4. Reflection on the results, typically complemented by some exercises in order to 'conceptualize' the reflections;
5. Back to step 1, profound analysis, now for the next round.

Please note, that there are certain parallels between the steps above and the steps normally performed according to frameworks of continuous improvement, such as CAPD (check-act-plan-do). The main, but important, difference lies in step 4, in which explicit reflection takes place with the aim of analysing relationships between causes and effects, as well as on the students' own actions. This step invites to take a step back from the immersion in the gameplay and look at what has actually happened, from a distance so to speak. If well done, this should boost learning based on a much deeper understanding of the factors at play.

Depending on the exact size of the student group in a class, it is common for lecturers to request you to prepare your thoughts on the reflections and conceptualizations and send those in for feedback. Remember, it is on those reflections and the translation of those into new decision making where the real learning takes place.

A few words on decision making in the game. In the roles of Operations and Supply Chain, there are a number of different tabs each representing a different part of the functional scope for which decisions need to be made:

- *Operations*, has separate tabs for:
 - Inbound warehouse (goods reception and component storage);
 - Mixing of ingredients;
 - Bottling of juice;
 - Outbound warehouse (order preparation and shipment).
- *Supply Chain*, has separate tabs for:
 - Component (ie raw material safety stock levels and lot sizes);
 - Production (frozen period in production planning & scheduling);
 - Product (finished goods safety stock levels and production batches).

Basically, on each of those tabs one or more parameters need to be defined, potentially changed and then saved by clicking on the “save” button. Decisions (parameter changes) that haven’t been explicitly saved will not have been implemented, so please make sure to check carefully if indeed your decisions have been saved. Please note that in the following pages and Chapters a number of screens from the game will be shown, however in a slightly ‘stylized’ way. These screens are shown to illustrate relevant

concepts, but they have been stylized in order to cater for the possibility of design changes which might take place on the real screens in the game.

In the roles of Purchasing and Sales, the decision making largely consists out of negotiations with suppliers and customers, respectively. Negotiation takes place individually with each supplier and with each customer. In order to start a negotiation, the corresponding Vice President only has to click the “yes” button in the agreement screen of a particular customer or supplier in order to access the negotiation screen. In the negotiation screen, the negotiable contract parameters can be seen, as well as the so-called *contract index*. The contract index is an indication of the price to be paid, either by your customer to you, or by you to your supplier.

If the index goes up, the resulting price is higher, if it goes down, the price is lower. If the change of a certain contract parameter is considered, it can be changed in the corresponding field in the negotiation screen and then, by clicking on the ‘calculate’ button, the new contract index will be shown, so that the difference in price becomes clear. If the new price is acceptable, by clicking the ‘deal’ button it becomes implemented (see Figure 6.8).

Figure 6.10 Negotiation window (example from sales role)

[! Insert Figure 6.10 here !]

Please note that the resulting contract index in purchasing will be applied to the ‘basic price’ of components and the resulting contract index in sales will be applied to the standard ‘sales price (retailing)’. Both these basic prices can be found in the

“information” tab. For example, if your contract indices with customers are lower than those with your suppliers, this doesn’t automatically imply incurring losses, because both indices will be applied to different figures.

Also, be aware that in the case of all four of the roles, all decisions can be undone, changed, redone, etc. as many times as you want during the gameplay of one round. Those parameters which are set at the moment of closing a round for calculation are the ones that will effectively go into the calculation of the results of the round.

Please note that the TFC calendar is based on *working days*, ie 5 days per week. This is also valid for lead times from suppliers in case these are longer than 1 week, they are then expressed in the number of working days of lead time (a 30-day lead time would mean 6 weeks).

SUMMARY

In this first chapter of the journey of mastering the fundamentals you have gotten to know The Fresh Connection and the problems the company is in. With your team you have done a step-by-step analysis and you have your ideas prepared for making changes in the first round of gameplay.

In the next four chapters, the journey will continue and we will go back to the business, the technical and the leadership dimensions of supply chain management, as well as the integral view on global complexity and apply them to the case of The Fresh Connection. For each of the topics, you and your team first analyze the current situation and the possible alternatives for improvement, and then decide on what needs to be implemented. All exercises will explicitly follow this sequence of analyze and decide. Each Chapter will end with a final reflection about the combined topics of the Chapter.

[!Start box!]

Exercise 6.3 Reflect on the way of working as a team during gameplay

REFLECT

As a team you have now done your first analysis of the situation and you have defined your ideas on the way forward in terms of decisions to be made as soon as the gameplay starts. Similar to Steps 1-5 followed in this Chapter, the analysis and decision making around most of the topics in chapters seven through ten will be recurring and to be repeated every round of gameplay, taking the results of the previous round into consideration while preparing decisions for the next round. Therefore, it is also important to already reflect upfront how you will organize yourselves as a team during the gameplay, when normally some more time pressure is there as well. Take some time to do that now.

[!End box!]

Please note that that your course lecturer will typically guide you during those rounds of gameplay and assist in defining the focus for each round of gameplay. The exercises within each of the Chapters will be of help. Like in real life, the company continues and decisions will have to be updated and made constantly, adjusting to previous results. The exceptions to this are the definition of corporate and supply chain strategies, which you will normally only do at the strategic level every once in a while, and the initial design of the overall S&OP decision making process, which you would do once and then implement and gradually improve over time.

CHAPTER 7: MASTERING THE BUSINESS DIMENSION OF SUPPLY CHAIN

Now that the starting point of TFC's situation has become clearer from the initial overview created in Chapter Six, it is time to analyze more in detail some aspects related to the 'business' dimension of TFC's supply chain and master the fundamentals related to it. The topics in Figure 7.1 were introduced in Chapter Two of Part One, and in the following sections we will put our focus on three of them: competitive strategy, customers & value propositions and supply chain and finance. To the complementary topics of competitive advantages, business models and the external environment we will come back in Part Three.

Figure 7.1 Topics from the business dimension of supply chain

[! Insert Figure 7.1 here !]

Together these topics form part of the main inputs to defining the adequate supply chain setup, as we know by now from the integral concept (Chapter One, Figure 1.1.).

COMPETITIVE STRATEGY

In terms of the competitive strategy of The Fresh Connection, we can be fairly short at this stage. You can assume that the basic fruit juices that TFC offers are of sufficient quality that it can compete with other manufacturers in the industry and that it fits with the expectations of different market segments. Referring back to the strategies

of Porter from Chapter Two, for the sake of argument, we will leave out the niche strategy for the moment, which implies that we will focus on the choice to be made towards the retailers between a *cost leadership* strategy (low cost), or a *differentiation* strategy, based in this case on superior service and quality, as expressed in terms of flexibility of ordering, reliability of delivery and freshness of the product. In terms of the framework of Tracey & Wiersema, the most accurate way of describing would probably be of choosing between the *operational excellence* strategy on the one hand, with clear focus on low cost, and the *customer intimacy* strategy on the other, with a clear focus on offering a no-stress, superior freshness and highly flexible full-service to the customer.

As can be deduced from the above, this means that competition is not so much based on the ‘core product’, but much more on the product/service surround, as discussed in Part One, Chapter Two. In case of offering better or more service, your retail customers are willing to pay you more money per litre of juice and in case of offering less service, they will pay you less.

[! Start box !]

Exercise 7.1 Analyze and decide on competitive strategy

ANALYZE

Since you cannot do a real market analysis at this stage, analyze if there are any preferences in the team for any of the given strategies of ‘cost leadership’ / ‘operational excellence’ (low cost) or ‘differentiation’ / ‘customer intimacy’ (full service and quality). If so, analyze what the reasons behind those preferences are.

DECIDE

As a team, decide on the competitive strategy you want to pursue: ‘cost leadership’ / ‘operational excellence’ (low cost) or ‘differentiation’ / ‘customer intimacy’ (full service and quality).

[! End box !]

Please note that with either one of these two basic strategies you will be able to achieve good results in the simulation in terms of Return On Investment, ROI, as long as the strategy is implemented thoroughly and backed up by a well aligned and coherent supply chain strategy. As noted also by DeSmet (2018): ‘different strategies lead to different ways of reaching that same goal. The operational excellence leaders will work at lower margins but compensate with higher efficiency on the capital employed. The product leaders require more capital to lure customers to more high-end products, but they manage to compensate for this by higher margins. [...] Different strategies lead to different levels of complexity, and each of them can be equally successful’.

CUSTOMERS AND VALUE PROPOSITIONS

The Fresh Connection has three different customers. As the VP of Sales will probably already know by now, these three customers are not equal. They are different in terms of size (number of stores and therefore sales volume in litres of juice), locations and market share. But also, are they different in terms of their own competitive strategies. Some might be following a cost leadership strategy, or a differentiation strategy, or even a niche strategy towards their customers, in this case the consumers of

the juice. By clicking on the ⓘ - symbol next to the name of the customers in the sales screens, you can find more information about each of your customers, the retailers.

Another factor to keep in mind is that because of their own different competitive strategies, they will most likely react in different ways to the proposals you might present to them during sales negotiations. Like in real life, each of them is probably sensitive to different elements of the service level agreements. For example, one of your customers might be willing to pay you 4% more per litre of juice in the case of promising them an increase of 2% in service level, whereas another one of your customers might only be willing to pay you 1% more for the same increase, simply because they are less interested in it, as it probably fits less well to their own competitive strategy.

[! Start box !]

Exercise 7.2 Analyze customer preferences and decide on value propositions

ANALYZE

With each customer you negotiate the same contract parameters as part of the Service Level Agreement, but the value of the various parameters can obviously be very different for each of the customers.

- *By clicking on the ⓘ - symbol next to the names of the customers in their respective agreement overviews, open the profile of each of the three customers and compare the descriptions.*
- *Based on the information you find in their profiles, to which contract parameters would you expect each of them to be more sensitive (see Figure 7.2 for an example*

overview of the contract parameters)? Which contract conditions would be more critical to the pursuit of the commercial strategies of each of the retail customers and why?

DECIDE

What do you propose to do with these insights?

[! End box !]

Figure 7.2 TFC screen: sales contract parameters (example of one customer)

[! Insert Figure 7.2 here !]

SUPPLY CHAIN AND FINANCE

As you will for sure have seen, there is a tab called “Finance” in TFC’s ERP system, where you can find a financial statement (see Figure 7.3).

Figure 7.3 TFC screen: financial statements

[! Insert Figure 7.3 here !]

In terms of the finance statements, let’s focus here on four concepts that were highlighted in Chapter Two.

- *Earn & spend (income statement)*. The part on the middle left hand side of the statement contains the elements of the income statement. Starting with the revenues, it then shows all the expenses. It allows you to analyze in detail of how profit & loss is built up. The column with the comparison between the two

most recent rounds enables a clear view on decisions taken and the financial results obtained;

- *Own and owe (balance)*. In the financial overview of The Fresh Connection the focus in the ‘own & owe’ part is on the assets-side of the balance and doesn’t emphasize on the liabilities. This is because Bob McLaren and the other owners of TFC want you to dedicate your time and efforts on the execution of the business while they take care of the financing aspects themselves. Shown are fixed assets and machines (from Property, Plant & Equipment), inventories and the resulting investment due to payment terms;
- *Working capital*. Because of the way the finance statement in TFC is structured, and because of the fact that in terms of the balance the focus is on the assets, rather than on the liabilities, there is a large overlap between the balance and the elements of working capital. As stated under the previous bullet point, inventories and the resulting investment due to payment terms can be found in the finance statement under the heading of ‘Investments’.
- *Return On Investment (ROI)*. On the upper line of the finance statement you can find the ROI. A truly powerful performance indicator, it combines the result of the income statement with the result of the investments to give an overall view on company performance. This indicator can also be objectively compared between different teams, since all are playing with exactly the same market circumstances.

[! Start box !]

Exercise 7.3 Analyze the finance statement and ROI and decide how to use this information

ANALYZE

Analyze the finance statement in detail, so that you become very familiar with what it contains. Most lines in the finance statement are directly connected to decisions in the different roles in the game. Go through the statement line by line and try to establish a link between the items mentioned and possible decisions in the game that might be connected to it.

Which are the elements in the finance statement that have most impact on the achieved ROI? If necessary, go back to some of the financial indicators dealt with in Chapter Two, such as the ones related to COGS, inventories, PPE, and so on. What does this tell you in terms of priorities in decision making? You can also use data visualization software to get a grip on the current financials (see Figure below for an example).

DECIDE

How do you propose to use this information towards the next round(s) of gameplay?

[! End box !]

Figure 7.4 Analysis of P&L figures using data visualization software

[! Insert Figure 7.4 here !]

Please note that it is very recommendable to start each round of gameplay by going back to the finance statement and check out the differences between the two last rounds played. With your colleagues, you should be able to explain each of the differences line by line, since they are all connected to decisions taken by the team in the round before. For example, if I would be looking at the overview after finishing Round 2 of gameplay,

and I would go to the line where it states *Pallet locations raw materials warehouse* and I see under Round 2 an amount of 80,000, and under Round 1 an amount of 100,000, and in the column Difference an amount of -20,000, I would need to be able to explain why the amount of money spent on the pallet locations in the raw materials warehouse has been reduced by 20,000. Which decision was taken in Round 2 gameplay that would have caused this reduction? Since decisions about pallet locations fall under the exclusive responsibility of TFC's operations manager, they would be in the best position to answer the question.

In this example, since we know that 1 pallet location has a cost of 200 per annum, or 100 per round, and the reduction of money spent has been 20,000, the conclusion needs to be that we reduced the number of pallet locations in the warehouse by 200. The operations manager should then be able to confirm that. You should follow the same logic for every line in the finance overview.

Please note that in the basic version of TFC gameplay, the cost of capital is set at 15% per annum, i.e. 7,5% per round. This is relevant for calculating the interest costs associated to the stocks ('interest on stock value').

SUMMARY

This brings us to the end of the application of the business dimension of supply chain to The Fresh Connection, in which the topics shown below in grey have been dealt with in more detail. Some of these will also come back again in Part Three, as will the topics shown below in white.

Figure 7.5 Topics from the business dimension of supply chain applied to TFC so far

[! Insert Figure 7.5 here !]

[!Start box!]

Exercise 7.4 Reflect on topics from Chapter Seven

REFLECT

To properly close the Chapter and follow the principles of the learning cycle of experiential learning, please go back to each of the topics from the Figure above and reflect on what you have learned. Specifically, think about your learnings regarding:

- *the different theoretical concepts and their practical application in real-life situations. To what extent are the concepts clear and have you experienced the trade-off's involved? What would you do differently next time?*
- *the analysis and decision making process. How did you go about the analysis so far? How has the decision making been organized in the team and to what extent was it difficult to reach agreements?*
- *your team's behaviour. To what extent was everyone actively involved? If not, why not? What was done to deal with it in the best possible way?*

Obviously, the story doesn't end here, we will take it right into the next part, which is about the application of the technical dimension to TFC. But mind you, all business aspects remain relevant here as well.

[!End box!]

The journey of mastering the fundamentals of supply chain will now continue in Chapter Eight with the application of the technical dimension of supply chain to The Fresh Connection.

CHAPTER EIGHT: MASTERING THE TECHNICAL DIMENSION OF SUPPLY CHAIN

In this chapter we will go back to many of the topics exposed in Chapter Three in which the fundamentals of the technical dimension of supply chain were explored. Now we connect the concepts of this dimension to TFC gameplay, so that you can start seeing the many challenges of their application in real life.

Figure 8.1 Topics from the technical dimension of supply chain

[! Insert Figure 8.1 here !]

Referring once more to the overall concept as shown before, we will deal here with Supply Chain strategy, aspects of the physical infrastructure, planning & control and information systems.

SUPPLY CHAIN STRATEGIES

Efficient or responsive supply chains

In Part One we addressed different typologies of supply chain strategies and the underlying issues of choosing for a particular typology in a particular situation. The aspects of predictability and volatility were highlighted as two very important inputs to the choice of supply chain strategy, “efficient” and “responsive” being the widely used extremes of the spectrum. We also said that for the sake of argument, we would stick during gameplay to applying either one of the extremes of the spectrum, so that they become really clear to the reader in all their implications and serve in a way as the identified boundaries within which all other typologies can also be positioned.

In the previous chapter, you were asked to decide on a corporate strategy: low cost or differentiation (from Porter's framework), or operational excellence versus customer intimacy from Tracey & Wiersema's framework. In both cases, the latter mainly applying in this case to quality and service aspects of the juice business (freshness and flexibility). The chosen corporate strategy will obviously be the input to the different functional areas and lead to defined functional policies: overall strategy will determine for example the commercial focus, leading to more or less predictability and volatility, leading to a better suited supply chain typology. So as a next step, take your chosen corporate strategy as a starting point for determining the details of your supply chain strategy.

[! Start box !]

Exercise 8.1 Analyze supply chain typology and decide strategy into action

ANALYZE

Based on your chosen corporate strategy (cost leadership or differentiation), what would be the corresponding supply chain typology: efficient (low cost) or responsive?

DECIDE

On the basis of your answer to the previous question, use a template like the one from Figure 8.2 to determine the direction of specific actions per functional area.

[! End box !]

Please note that Figure 8.2 below contains a number of decisions from a fairly standard configuration of the game. It can serve as a good starting point for defining

what the elements of a chosen supply chain typology are. In the example in the figure below, Team SuperJuice has chosen to pursue an Efficiency / Low Cost supply chain strategy. Now it has started to indicate per each of the functional decisions from the table in which direction they should go. For example, according to the team, in the case of a Low Cost supply chain strategy they think that promised Service Levels to the customers should be on the lower end, indicated in the table with an arrow pointing down. Similarly, they think that the agreed order deadlines should be on the lower end. And so on.

Figure 8.2 Template: corporate strategy into supply chain action

[! Insert Figure 8.2 here !]

Upon finishing the entire table, the team will have created a more specific plan for implementing the chosen strategy, thus giving a much clearer context for each of the VP's to work within for their individual decision making (strategy into action). In a way, with this activity you will have set the scene already for some of the aspects that will be dealt with in more detail in the coming sections.

Two more comments about this table, that can be extrapolated into any real life supply chain:

- The table will be created by the team to the best of their current knowledge. Like in real life, there might be some trial and error required before a solid final version is there. Maybe some of the arrows will change and will be pointing in a different direction later on, or maybe be eliminated altogether because of insights that will be obtained during gameplay. This is perfectly fine and happens in the best companies. All new projects have an element of *ongoing*

discovery and this is nothing to worry about. Just make sure to keep the strategic map updated while you go along.

- In addition, the created table obviously doesn't indicate how low 'on the lower end' is. It shows an arrow, not a number. These numbers might also even vary between customers, suppliers and products, so will be part of the finetuning during actual implementation. Also in real life, this finetuning will be part of any implementation and will take some time before becoming really clear. Another example of trial and error. Probably, by the end of gameplay you will be in a much better position to state to which range of values a downward arrow actually refers, because the experience of decision making in the various rounds and the corresponding results will have demonstrated that to you.

In the next section we will do a more detailed analysis of the different elements of the supply chain. But first, let's make a quick sidestep into the topic of data and reporting.

INTERMEZZO: AVERAGES KILL!

Although strictly speaking more connected to the topic of information and systems, which will follow towards the end of this chapter, it is important to already mention one specific dimension related to it. Since in the coming sections we will be doing a lot of analyses using data from TFC's reports, it is important to have a good understanding about what these data actually represent. Particularly important is to make a clear distinction between numbers representing a total and numbers representing an average, and in both cases if these totals represent for example a weekly or a 6-month (1 round)

total or average. The definition of each item in the reports can be found by clicking on the ⓘ-symbol next to it, also specifying if it's a total or an average.

In the case of averages it's important to question what the behaviour around the average has been. This is also what Quality Improvement philosophies like 6-Sigma focus on. And since like in real life the exact underlying data is not always visible to everyone, we need to make some assumptions here. But first, let's go to a very basic notion of averages, easy to understand but with serious implications. In the following 6 Figures, the average demand per month over the total 1-year period is the same: 100 units per month. This is easily calculated: total demand in 1 year, divided by the number of months gives the average demand per month.

Figure 8.3 Average demand of 100 units per month

[! Insert Figure 8.3 here !]

However, as can be easily understood, the real situation is totally different in each of the cases, for example leading to very different decisions regarding purchasing, production and inventories or even forecasting of future trends. Thus, be careful with averages, they might kill your future performance if interpreted incorrectly! Averages are an interesting and useful piece of information, but do not show the complete picture, only part of it. For example, an average doesn't reflect major or minor fluctuations, nor does it detect upward or downward trends, nor does it warn you for what are known as 'outliers' (exceptional one-time occasions).

Relating this to The Fresh Connection, you can assume that most averages as you will see them in the reports will have an underlying pattern as shown in Figure 8.3. Most of you will recognize it as the 'normal distribution', 'bell-shape' or Gauss curve,

from basic statistics theory. Without going into the statistical specifics, for now just keep with the message that most averages in the reports in TFC would show a similar underlying curve, roughly speaking meaning on a high level that approximately half of the values have been below the average, half of them above.

So, for example, even if the 6-month average attained (i.e. achieved) shelf life value as expressed in the customer Sales reports looks OK to you in comparison to the value as agreed with the customer, be aware that a number of times this average wasn't made and you achieved actually a lot lower shelf life, i.e. not meeting customer agreements, and that in some cases you actually achieved a higher than average shelf life. In this particular example, you can contrast the attained shelf life with the amount of obsolete product as can be found product Sales report to check the potential impact. You should make your interpretations accordingly.

After this short intermezzo, let's now look in detail to the elements of the technical dimension of the supply chain.

PHYSICAL INFRASTRUCTURE

In order to position the details of the different aspects of the physical infrastructure, it's important to highlight once again the importance of the global, holistic view. In the next sections we will address step by step a number of concepts, all important in their own way, but none of them really independent from the others. We will deal with them here separately and sequentially, but with the understanding that they aren't separate, and should be dealt with rather iteratively than purely sequentially, as part of a larger global exercise.

Products: physical characteristics of components

The Fresh Connection deals in the starting situation with 5 different components, which have very different characteristics. Out of the many possible product characteristics, perishability is not really an issue, shelf life of the various fresh components is 2 rounds (ie 1 year) for the fruit pulp, even longer for the packaging materials. Also, the materials are not considered to be dangerous goods requiring special transportation or storage.

However, some components are solid, others are liquid, some are large, others small. Some are cheap, others more expensive, some are used in high quantities, others not. These characteristics do have an impact on how they can be managed in a smart way. Recall for example the concept of value-density from Chapter Three and the implications for how to use that in component segmentation and differentiating management priorities (see for example Figure 3.4).

[! Start box !]

Exercise 8.2 Analyze component characteristics and decide on how to manage components

ANALYZE

Create an overview of the 5 components that The Fresh Connection is using in order to manufacture their current product portfolio. You can use the template below from team SuperJuice as a guideline. Part of the table is related to physical characteristics of the components, part to their usage in terms of production or sales volume. The corresponding information to populate the table can be partially found in the 'Information' tab in the simulation, and partially in the 'Component' report to be

accessed via the purchasing VP's screen. Please note: the numbers you find are specific to your game's configuration and to your team's current performance.

As you can probably appreciate from the overview you have created, TFC's components are indeed very different in terms of size, value, quantities used and money spent. Now think of how can you use these insights into managing them in a more efficient and effective way and setting smart priorities. Think about storage space utilization, transportation modes, trade units, lot sizes in purchasing, available capacity at suppliers, etc. What are your conclusions? Write down your observations and conclusions per component by adding a column to the table you created.

DECIDE

What do you propose to do based on these findings?

[! End box !]

Figure 8.4 Template: component characteristics

[! Insert Figure 8.4 here !]

Products: physical characteristics of finished goods

The product portfolio of The Fresh Connection consists in the starting situation of 6 products (6 Stock Keeping Units, SKU's): 3 different flavours, sold in 2 different packaging types. All obviously contain liquid, but none are considered to be dangerous goods. Fragility doesn't seem to be an important issue, nor is the complexity of the bill of materials (the latter can be found in the 'Information' tab). However, there are 2 characteristics that deserve special attention in this case, perishability and physical volumes:

- *Perishability (shelf life)*. As indicated before, the components that TFC is using have a long shelf life, however as soon as water is added to the fruit pulp, the shelf life of the newly produced product changes. Shelf life is now only 20 weeks. This is what we call the *technical shelf life*, expressing that after this period the product is technically no longer usable, in the case of fruit juice meaning that you can no longer drink it. There is also another concept, called the *commercial shelf life*, which expresses the time that the product still has a commercial value. Sometimes products are technically still fine, but since new editions of the product have appeared on the market, their value has drastically reduced. As is normally the case for many retailing products, the commercial shelf life is determined by a negotiation with the retail customer.

TFC's VP of Sales negotiates with each customer a shelf life for the products, meaning that the remaining shelf life of any carton or bottle shipped to the customer can never be less than that particular agreed shelf life. As you can see, this is different from how drinkable the juice still is. The more shelf life promised to the customer, the more they are willing to pay, since they will have more time and therefore more opportunity to sell the product in their stores.

It is fairly obvious why this is relevant for the 'technical' dimension of supply chain: the more shelf life I have to give to my customer, the less time I have between mixing and bottling the ingredients and doing the distribution. In other words, if my policy is to offer long shelf life to my customer, my supply chain setup should be relatively faster to make that feasible. Thus, it has consequences for my inventory policies, my production batch policies, my production capacity

and machine choices, and so on. More about this later in the section about Planning & control.

- *Physical volumes.* The second relevant aspect regarding physical characteristics of finished goods is their physical volume. Although the differences are not as large as in the case of the components, also the finished have different physical sizes, for example expressed in the number of 1-litre cartons or 0,3-litre PET-bottles that fit on a pallet. In addition, it might make sense to also already take a look at volumes in litres of juice sold and produced, for example per round, in order to put that into the perspective of number of pallets per SKU. These inputs are important when put into the context of defining for example the trade units, the lot sizes in production (production intervals) and the safety stock levels, which in their turn have an impact on for example warehousing capacity and production capacity. More about this also later in the section about Planning & control.

As can be seen from the abovementioned aspects, product characteristics do have an important impact on the physical aspects of the supply chain, as well as on some of the planning parameters.

Push/pull: Customer Order Decoupling Point

Recalling the diagram of the Customer Order Decoupling Points (CODP's, figure 3.5), and recognizing that The Fresh Connection's supply chain is not 100% identical to the one in the diagram, TFC's setup could be characterized as CODP2, Make to central stock (MTS). Since this choice cannot really be challenged in the basic gameplay, we

will just take it as a given and come back to the topic in Part Three: Imagining beyond the fundamentals.

Facilities: warehousing and production

The main facilities in the supply chain of The Fresh Connection are the factory and the two warehouses, for components and finished goods, respectively. For storage of the liquid components there is also the tank yard, which is used in case these components are supplied in tank trucks. We can also add the other ‘nodes’ or ‘hubs’ in the network, as represented by the suppliers and the customers. The latter ones or more correctly, the central warehouses of the latter ones, are located relatively close to the manufacturing location of TFC, in order to facilitate fast delivery. Supplier locations are given in the supplier profile as well as in the overview of the purchasing agreements, and can be challenged as soon as the decision to change suppliers can be changed.

The strategic decision of the location of TFC’s own factory and warehouses, as well as of their overflow warehouses (additional storage with a third party next door in case the own warehouses would be completely full at any given moment) will not be challenged in the standard setup of gameplay, but we will come back to that point also in Part Three. What you can challenge, though, is the size of the warehouses in terms of physical space, as well as their capacity in terms of human resources, and the machine capacity for mixing and bottling. Let’s explore those a bit more in order to know well what the situation is.

[! Start box !]

Exercise 8.3 Analyze production and warehouse capacity utilization and decide on actions

ANALYZE

As a starting point for later on deciding on changing warehousing and/or production capacity, thoroughly analyze the existing capacity situation:

- *Go to the Operations reports of “warehousing” and “mixing and bottling”. Try and get a good understanding of what the different parameters and graphics are telling you. Click on the corresponding ⓘ - symbol if any of the terminology is not clear.*
- *What is your interpretation of the situation? Has there been any underutilization of capacity or maybe any overcapacity and if so, how much has it been? What could have been the reason(s) for this? Think about the patterns and volumes of the ingoing flows, the patterns and volumes of the outgoing flows, as well as the available capacity itself. Which could be the causes for those patterns?*
- *What have been the consequences in case of underutilized capacity? What have been the consequences in case of overcapacity? What would need to be done to optimize the situation and become more efficient and/or effective?*

DECIDE

What do you propose to do based on your conclusions?

[! End box !]

The exercise above has given you a clear image of the status of capacity, but this is only part of the picture. Not only is it important to understand the current situation well, but also to have a very clear understanding of how capacity can be changed, i.e.

increased or decreased and which the implications of such changes might be. Let's take a look and analyze.

[! Start box !]

Exercise 8.4 Analyze options to change production and warehouse capacity and decide on actions

ANALYZE

Warehousing capacity for inbound as well as outbound consists basically out of 2 different elements: space and people. Go to the screens of Operations and find out the following information:

- *What is the cost per year for 1 person (Full Time Equivalent – FTE) working in the warehouse? How much percent increase in available capacity would 1 additional person give you? Please note that 1 round of gameplay represents 6 months, i.e. 0.5 year. Most numbers in the reports represent 1-round totals or averages.*
- *What is the cost per year for 1 pallet location in TFC's own warehouses?*
- *What is the cost per day for 1 pallet location in the overflow warehouse next door?*

Capacity in the mixing stage of production consists basically out the mixing machine and its associated costs. By clicking on the ⓘ-symbol next to the machine name the machine fact sheet will appear. Check it out. If the configuration you're playing includes the option of changing machines, then check out the other possible machines you could select and compare the cost and capacity aspects from the other machines' fact sheets as well. What are the strong points and weak points of each of the machines in terms of:

- *Capacity / speed*
- *Flexibility / changeover or cleaning time / minimum batch size*
- *Operating costs*
- *Investment*

In your opinion, in which cases would either one of the available machines become an attractive alternative?

Bottling capacity consists out of machine capacity, including a fixed number of operators depending on the type of machine you are working with, plus a decision on the number of shifts you operate. Once more, the machine fact sheet will show you the information. Check it out and analyze the following, per each of the available machines:

- *How many people are required to run the machine? Therefore, what is the labour cost associated to 1 additional shift of operation? How much extra capacity would that additional shift give?*
- *Total capacity*
- *Operational fixed costs*
- *Flexibility in terms of changeover times per formula (recipe) or packaging type*
- *Tolerance for different quality grades of bottles and cartons*
- *Efficiency in terms of start-up productivity losses*
- *Investments*

In your opinion, in which cases would either one of the available machines become an attractive alternative?

Bottling capacity can also be influenced by doing improvement projects, such as preventive maintenance, 'solve breakdowns' trainings, increase speed and SMED action. For each of those, check out the associated costs as well as the expected benefits.

In your opinion, in which cases would either one of the optional improvement projects become an attractive alternative?

Go to the Finance statement and check out the cost components associated to the abovementioned topics to see how much they (would) represent on the total costs of operations. Now you would be in the position to make a fairly complete cost-benefit analysis for different scenarios. What are your conclusions on the basis of this?

DECIDE

What do you propose to do based on your conclusions?

[! End box !]

Transportation

In the case of The Fresh Connection, like in real life, most transportation modes are to a large extent geographically determined. For TFC's specific situation, in the case of customers, road transportation is the main mode, because of physical proximity. For suppliers it basically also depends on their location: delivering by truck from China to the North-West of Europe is obviously a theoretical option, but in reality a very unpractical and unrealistic one. There may, however, be some exceptions of suppliers for whom more than one transport alternative exists. In those cases it can be noticed in the overview of the agreement in the Purchasing screens. Next to the transport mode there will then be the option to 'edit', and after clicking, the available options appear. A

new mode can be selected and saved. The supplier lead time will change according to the newly chosen transport mode.

Figure 8.5 TFC screen: changing the transport mode for shipments from a supplier

[! Insert Figure 8.5 here !]

In the supplier profile that appears by clicking on the ⓘ-symbol next to the name of the supplier, the costs associated to the currently chosen mode of transportation can be found. If another mode is selected *and saved*, and the profile opened again, the new transport costs appear, so that they can be compared with the previous costs (see Figure 8.6). The transport mode can be changed back any time before closing the round of gameplay.

Figure 8.6 TFC screen: supplier profile, including transport costs associated to chosen mode

[! Insert Figure 8.6 here !]

Outsourcing and collaboration

Part of the decisions about the physical infrastructure has to do with “make or buy”. Also, TFC has made such decisions, although in a fairly straightforward way. TFC doesn’t own any fruit plantations, nor does it have any packaging manufacturing capabilities. During standard gameplay, this degree of vertical integration will also not be challenged. However, this doesn’t imply that there are no further choices to be made with respect to the setup with suppliers.

Just as we have seen earlier on when discussing the characteristics of components and that different characteristics may lead to different priorities in sourcing, transportation and warehousing, this also might have an impact on how we actually want to deal with the suppliers of those components. Some components may be more critical for our business than other components, so our relationships with their respective suppliers might then also be critical to our business.

[! Start box !]

Exercise 8.5 Analyze components and suppliers priorities and decide on actions

ANALYZE

Recalling the framework of Kraljic from Chapter Three (Figure 3.6), analyze the different components TFC is using, looking at how much money you spend on each of them, as well as how important they are on the total product mix you are selling.

Then look at the various suppliers which you can choose from for each of the components and try to evaluate the complexity of the supplier market for each component. How many alternative suppliers are there, what are their characteristics, are there large differences between them, and so on.

Taking the previous inputs, how would you position the different components in the framework? Which ones are the more strategic ones?

What does the above tell you about the way you might want to deal with the different suppliers, ranging from arms-length purchasing to very close cooperation and joint development?

DECIDE

What do you propose to do based on these conclusions?

[! End box !]

In order to make the picture complete, we need to bring in another dimension we briefly touched upon before: size sometimes does matter. Obviously, you as the management team can have your opinion about with which suppliers it makes sense to try and establish strategic relationships, but that alone doesn't mean that those suppliers also see the point to that. They run their own business and the fact that they are very important and strategic to you doesn't automatically mean that they think you are very important and strategic to them.

So, in addition to the supplier segmentation as done previously, we need to take a closer look at the suppliers we're particularly interested in.

[! Start box !]

Exercise 8.6 Analyze supplier characteristics and decide on actions

ANALYZE

For those suppliers you would consider to be strategic to you and with whom you would be interested to establish more than just an arms-length relationship, open their supplier profile, by clicking on the ⓘ-symbol next to their name or next to the word "info" when looking in the supplier market. Read the profile and try to determine how important you could be to them. Which pieces of information tell you something about that?

You can do the same for the other suppliers in the market for the same component. What is the picture there?

What does the above tell you about the likeliness of being able to establish very close cooperation and joint development with the potential strategic suppliers?

DECIDE

What do you propose to do based on these conclusions?

[! End box !]

Network design

We will not challenge the current structure of TFC's network at this stage and will come back to that in Part Three. The only part we will look at from that respect now is the one representing the supplier base.

[! Start box !]

Exercise 8.7 Analyze geographical flow network and decide on actions

ANALYZE

If you haven't done so already in Step 4 of the mapping exercise in Chapter Six, this might be a good moment to draw a geographical network map of TFC's supply chain, focusing on the location of TFC itself, as well as of its suppliers. You can also consider to use the thickness of the lines connecting TFC with its suppliers as expression of the volume and/or frequencies of the flows between them, potentially also adding the lead times along the lines.

Which conclusions can you draw from this map?

DECIDE

What do you propose to do based on your conclusions?

[! End box !]

After having looked in this chapter at a number of very relevant aspects related to the physical infrastructure, we will leave this topic for the moment. We will return to it in Part Three but will now focus on the next area of attention in our overall supply chain concept: planning & control.

PLANNING & CONTROL

Before diving into the details of planning and control, it's important to once again highlight the importance of the global, holistic view. In the next sections we will address step by step a number of different concepts, all important in their own way, but none of them really independent from the others. We will deal with them here separately and sequentially, but with the understanding that they aren't separate, and should be dealt with rather iteratively than purely sequentially. This will all be falling into place at the end of the chapter when addressing the overall S&OP / IBP process.

Uncertainty and variability

As soon as the physical infrastructure has been defined, we can start looking at the decisions to be made within the given supply chain network, i.e. our overall framework for planning and control. As you remember from an exercise in Chapter Three, we looked first at sources of uncertainty, because understanding the degree and the sources of it better, would allow us to better determine how want to deal with

forecasting, inventories and production. In Chapter Three we looked at it in a fairly generic way, now it's time to apply the same concept to the specific case of The Fresh Connection.

[! Start box !]

Exercise 8.8 Analyze uncertainty and variability and decide on how to use the information

ANALYZE

Use the available reports per each of the four functional areas, as well as the different decisions that can be taken in each of those areas. Start at the market side of TFC's supply chain and work your way upstream towards the supply side of the chain. You could use a template like Figure 8.7 from team SuperJuice.

Step by step, analyse the degree of uncertainty you find in reports and graphics. Even though the concepts of variability and uncertainty are not identical, as exposed in Chapter Three, in this case you might also include variability in your analysis.

Try to determine which are the causes. Some of the causes of uncertainty or variability can be external, such as 'autonomous' customer behaviour, but some causes can also be induced because of decisions taken by your own TFC management team, such as the decision to participate in more or less promotions with your customers.

Try to determine for each of the causes, what would be the best way of dealing with the uncertainty or variability. Please note: uncertainty or variability are not always necessarily bad. In some cases, they can actually be the simple consequences of strategic

decisions taken by the company itself. In those cases, reduction or elimination of uncertainty and variability might not necessarily be the best solution.

DECIDE

Although you probably don't have the complete picture yet, translate the outcomes of this first step in the analysis into possible decisions about actions to take and carry these to the coming steps before making your final choices.

[! End box !]

Figure 8.7 Template: analysis of uncertainty and possible actions

[! Insert Figure 8.7 here !]

Now that we have a clearer picture on the degrees of uncertainty and variability we must deal with, then let's see the implications of this on one of our major supply chain processes, the *demand to supply (D2S)* process and particularly on the 5 keys to this major process we discussed in Chapter Three (see Figure 3.8): forecasting market demand, capacity planning, production planning & scheduling, production and quality and inventory management.

Key 1 to D2S: forecasting market demand

Forecasting is a critical activity, since it gives a starting point to upstream decisions about production, warehousing and transportation. Its impact is different in the case of more uncertainty compared to the situation of less uncertainty, more variability compared to less variability. Better forecasting doesn't impact variability, but might reduce uncertainty, depending on the causes of the variability.

Another important role of forecasting is with respect to the sales function in the company informing their colleagues in the operations areas about potential changes in expected sales volumes. Whenever for example decisions on promotions and/or product portfolio come into the picture, forecasting gains in relevance, because the operational functions of purchasing, operations and supply chain might need to make changes accordingly (in production capacity, storage capacity, safety stock levels, and so on). For example, safety stock settings in TFC are expressed in weeks of demand, based on the expected demand per week coming from the forecast. Let's work our way step by step through the forecasting cycle.

Step 1 in forecasting is actually looking into the past in terms of achieved sales, but also in terms of delivery performance. Let's first look at past sales. In the case of most basic configurations of The Fresh Connection there is a certain 'baseline' sales volume, call it the market size. This volume is pretty much the same every round of gameplay, meaning that the *total amount of juice in litres* in one round is stable. Within this total 6-month amount in litres a lot of day-by-day and week-by-week variability may exist, so total 6-month demand may be stable, but is not flat.

Now we should also look at past delivery performance, in other words, how did we deliver on the promises done? This should lead to conclusions about room for improving on the promises, or the need to make them less aggressive.

[! Start box !]

Exercise 8.9 Analyze sales performance and decide on how to use this information

ANALYZE

Taking the contract conditions as negotiated with each of the customers as a starting point, define which Key Performance Indicators (KPI's) would express well your performance on each of the agreed conditions.

In the different Sales reports, analyse your current performance based on the defined KPI's.

Which gaps between promise and delivery do you see? How big are they? What have been the consequences of these gaps?

The gaps between promise and delivery can normally be closed either by improving delivery performance or by reducing the promises, or by a combination of both. Which options would you see most feasible?

Also, analyse in detail the financial performance by product and customer in terms of contribution rate, margins, etc.

DECIDE

Which conclusions do you draw from these analyses? Although you probably don't have the complete picture yet, translate the outcomes of this first step in the analysis into possible decisions about actions to take and carry these to the coming steps before making your final choices.

[! End box !]

Step 2 would be to take into consideration any information already available about external future industry, market or demand trends as well as company decisions already taken in the past but still to be implemented, for example about introduction of

new products, new channels and/or new geographies. We will leave this topic for the moment and come back to it in Part Three.

Step 3 would then be to develop potential future scenarios, based on the previous historical analysis complemented by available information about the future. Scenarios may include changes in the product portfolio, for example eliminating a product because of bad margin performance, or because of continuous operational problems with the particular SKU. Or a consideration to participate in more promotions with one or more of the retail customers, trying to boost juice sales that way.

Both decisions will have an impact on the total amount of juice sales in litres (positive or negative), and in the case of more or less promotions, also the degree of variability may be affected: even though the net effect of promotions on sales is positive, more promotions do create higher peaks in sales, followed by longer slow periods (see Figure 8.8).

Figure 8.8 Effect of sales promotions

[! Insert Figure 8.8 here !]

[! Start box !]

Exercise 8.10 Analyze sales scenarios and decide on their attractiveness

ANALYZE

Putting the input from the previous steps together, plus the options you have in terms of promotions and product portfolio, now develop scenarios towards the future demand, in order to close gaps between promise and delivery. Assess customer response in terms of

contract index to the changes you contemplate. How much increase or reduction in revenue do these changes imply?

If possible in the specific configuration of the game you play, include the possibility to do more or less promotions, to have more or less promotional pressure and to change the product portfolio. What are the (quantified) financial impacts you would expect from these decisions?

DECIDE

What are your conclusions on the different options you have looked at? Decide on which scenario you like best.

[! End box !]

Step 4 finally would be to decide on the chosen scenario and create a final forecast, which can then be shared with the colleagues in the company management team. Forecasting is done via the forecasting tab, as shown below. In this screen, the VP Sales can indicate per each of the products in the portfolio, in steps of plus or minus 5% the expected increase or decrease in sales in the next round.

Figure 8.9 TFC screen: forecasting window

[! Insert Figure 8.9 here !]

The updated forecast can now also be consulted by the fellow TFC management team members in the same screen where the VP Sales has made the adjustments. In

addition, the VP supply chain can use this updated forecast information in a little analytical decision support tool, call the production interval tool with which optimization of production intervals can be analysed (more about this tool under *Key 3 to D2S: Production planning and scheduling*).

[! Start box !]

Exercise 8.11 Analyze findings from the previous steps and decide on sales forecast

ANALYZE

Go back to your findings from the previous steps and check if your final conclusions are solid enough to move forward.

DECIDE

Based on the insights from the previous 3 steps, now decide on your final forecast for each SKU.

[! End box !]

There are two widely used performance indicators for measuring the ‘forecast error’ or ‘forecast accuracy’: MAPE and BIAS. There are both aiming at expressing the reliability of the forecast, although in slightly different ways:

- **MAPE:** the Mean Absolute Percentage Error is a measure of the forecast unreliability. It is determined by specifying the absolute forecast error (real demand minus forecasted demand) *on a weekly basis*. The sum of the forecast errors for all of the weeks is then divided by the sum of the demand of each week. A MAPE of 0% is the ideal, in which case the demand has been equal to

the forecast. But if the MAPE is high then the difference between forecast and reality has been large and forecast apparently unreliable. Since the forecast in TFC is done on a 6-month total, the forecasted demand per week is simply the average demand per week based on the forecasted total. MAPE will then be higher in case there is more variability in the demand per week (ie higher difference between average forecasted demand and peaks/valleys in demand).

- **BIAS:** the bias is calculated by evaluating the forecast after the previous round against the real demand in the current round, ie *based on 6-month totals*. The bias is the relative difference between these components. In other words, it is the 6-month total forecast minus 6-month total real demand divided by demand. Using this definition, a positive bias means that the forecast was higher than demand, a negative bias means that the forecast was lower than demand. Either positive or negative biases are likely to lead to issues. A positive bias drives increased inventory. Clearly this is due to the fact that the predicted requirement is higher than actual sales. As a result your inventory cost will increase and potential for obsolescent products increases. A negative bias on the other hand, can lead to low inventory covers, which may result in poor service delivery.

After finishing and calculation of the round, MAPE and/or BIAS forecast performance can be checked in either the Sales reports, or via the option to create custom reports by clicking “Analysis” in the list of reports. A number of parameters can be set, thus specifying the desired report (see Figure 8.10). For each of the 4 roles a different set of parameters can be included in the reports.

Figure 8.10 TFC screen: custom report generator (“Analysis”)

[! Insert Figure 8.10 here !]

Before closing this section on forecasting, please note the following very important comment: *a forecast is a piece of information, it is never a self-fulfilling prophecy*. In other words, a higher forecast is not a starting point which will automatically lead to higher sales. The process is actually precisely the other way around: the VP Sales contemplates a series of decisions and potential external market effects as a consequence of which sales volumes might be affected. The forecast is then used to inform the other team members of those expected changes.

Key 2 to D2S: capacity planning

Taking the most recent version of the forecast into consideration, both in terms of volumes as well as in terms of volatility, the VP of Operations can now prepare the necessary changes regarding inbound storage capacity, mixing and bottling capacity and outbound storage capacity. Since there is only one manufacturing facility, in this case there is no choice to be made in terms of allocating demand to different production sites.

Referring to the initial assessment of the current situation of available capacity as well as the costs and benefits associated to making changes in the available capacity, as done earlier on in this same chapter in the section on facilities, now the analysis can be extended by looking towards future projected sales.

[! Start box !]

Exercise 8.12 Analyze sales forecast and decide on capacity changes

ANALYZE

Taking as a starting point the current status of capacity (shortage or overcapacity of production and storage capacity in inbound as well as outbound), take a close look at the sales forecast by SKU.

If there are no changes in the forecasted sales, then the focus can be on optimization of utilization of the existing available capacity. In function of the defined corporate and supply chain strategy, which actions would you propose to optimize capacity utilization, either by increasing flexibility, or increasing efficiency?

In case of a changed forecast:

- *How much percent is sales per SKU forecasted to go up or down?*
- *How many litres of juice does that imply?*
- *What is the expected impact on variability of demand (increased or decreased)?*
- *What are the implications versus the existing available capacity for:*
 - *Inbound warehousing: space and people?*
 - *Mixing and bottling: machine utilization and number of shifts, improvement projects?*
 - *Outbound warehousing: space and people?*

DECIDE

Out of the different possibilities to change capacity in storage and production, as analyzed before, which actions would you propose in this case to adjust available capacity to make it match the forecasted sales volumes and variability in a cost efficient way? Which arguments in favour of your choice can you bring to the table in case Bob McLaren would ask you about it?

[! End box !]

Key 3 to D2S: production planning & scheduling

In Chapter Three the concepts of production batch sizes and frozen period were mentioned as part of the wider topic of production planning and scheduling. In terms of frozen period, we leave the implementation question here to be aligned with the chosen strategy: efficient or responsive. Think of what makes sense and try to optimize the exact length of the frozen period within the chosen strategy.

In terms of detailed production planning and scheduling, in case of having multiple machines for either mixing or bottling, a decision needs to be made about which SKU's will be allocated to which machines. In this way, for example each machine could have a different operational focus (efficiency or flexibility), thus differentiating between large volume production and smaller batches. Obviously, this is only useful if total machine capacity and total investments are justified by the total volume of demand.

[! Start box !]

Exercise 8.13 Analyze changes in machinery and decide on actions

ANALYZE

Recall the earlier analysis on the current capacity situation, the forecasted changes in volume and variability and your suggested actions to deal with these. In case you would have opted for a second machine, either in mixing and/or in bottling, which products would you allocate to which machine and why?

What would be the expected new capacity utilization of the chosen machines? What conclusions do you draw from this?

DECIDE

Which adjustments, if any, would you propose to do in the next round?

[! End box !]

Moving on another important decision within the context of production planning and scheduling, the size of the production intervals, let's first analyse their current status and the resulting impact.

[! Start box !]

Exercise 8.14 Analyze changes in production intervals and decide on actions

ANALYZE

Go to the screen in Supply Chain which specifies the current production intervals. What has been your reasoning behind the current parameter settings? Has any differentiation been done between the intervals of the different SKU's? Why or why not?

Go to the Supply Chain reports on finished goods ("Product"). How is the situation with respect to inventory levels and service levels (in order lines)?

Now go to the report on Mixing and Bottling in Operations. How have the parameter settings for the production intervals impacted on the machine capacity in the bottling line?

Referring back to the pros and cons as mentioned in Chapter Three regarding production batch sizes, and taking into consideration the chosen supply chain strategy, to what extent have the decisions so far given the expected results?

DECIDE

Which adjustments, if any, would you propose to do in the next round?

[! End box !]

Just as production and storage capacity might be impacted by changes in demand variability and/or demand volumes, the same might be valid for production intervals. Depending on the exact configuration in the game, you might now have the option to use the so-called ‘Production Interval Tool’, which can be accessed through the following symbol:

Figure 8.11 TFC screen: opening the production interval tool

[! Insert Figure 8.11 here !]

When opening the production interval tool, the VP Supply Chain can model different scenarios, by changing the production interval settings and calculating the impacts on both production costs and overall bottling capacity. The tool works in a fairly linear way, for example not taking into consideration the degree of variability in the demand, nor machine breakdowns or time spent on preventive maintenance, but may anyway provide very useful insights into the comparison of different scenarios that the VP of Supply Chain may have in mind. Figure 8.12 shows what the production interval tool looks like and which steps can be taken to use it.

Please note that the production interval tool is a ‘decision support tool’, topic we will touch upon a bit more towards the end of this chapter. In other words, the tool is a simulator to help understand the sensitivities of changing certain parameters. Such an analysis can help preparing a decision to be made, in this case about which production intervals to choose. As such, the tool doesn’t make any decision, nor does it implement the decision. That still needs to be done by the VP in question in the corresponding decision screens.

Figure 8.12 TFC screen: using the production interval tool

[! Insert Figure 8.12 here !]

Please note that the first numerical column in the production interval tool shows the forecasted sales volume per product. This information comes directly from the forecasting screen as adjusted by the VP Sales. This means that if the VP Sales has not (yet) updated the forecast, the VP Supply Chain might be analyzing with the wrong information.

[! Start box !]

Exercise 8.15 Analyze changes by using the production interval tool and decide on actions

ANALYZE

Taking the current production interval settings and current capacity and cost situation into consideration, as well as the chosen supply chain strategy, use the production interval tool to analyze different scenarios. Make sure you work with the most recent forecasts before making a final decision.

What is your conclusion on the basis of these analyses?

DECIDE

What would you propose to do next? Which compelling arguments would you bring to the table if Bob McLaren would be asking you to defend your choices?

[! End box !]

Key 4 to D2S: production and quality

This brings us then to the next key in the Demand to Supply (D2S) process: production and quality. Some of the executional parts of production have very clear operational day to day aspects, which are less visible in most basic setups of the gameplay (strikes, absenteeism, weather, traffic, and some others to which we will come back in Part Three). However, there are some other aspects of the executional part of production which have a clear relationship to tactical decisions made in purchasing, operations, or supply chain.

As mentioned in Chapter Three, one of the main indicators to express ‘hiccups’ in production is the “production plan adherence”.

[! Start box !]

Exercise 8.16 Analyze production plan adherence and decide on actions

ANALYZE

Go to the Mixing and Bottling report in Operations and check the current level of production plan adherence. 100% of adherence means it has been possible to perfectly produce according to the established production plan.

In the case the production plan adherence has been below 100%, what could have been the exact causes for it in your particular case? Similar to the discussion about production capacity, you would need to look at the variability and uncertainty of the patterns of the flow going out of production, the variability and uncertainty in the patterns of the flow going into production, the inventories performance in between, as well as the available production capacity as well as real capacity utilization in relation to demand volume and variability. All of these aspects might have had an impact on production plan adherence and since each of them correspond to different functional areas, different reports would need to be consulted in order to get a clear overall picture. Start at the downstream end and work your way upstream, identifying relevant indicators in every step of the supply chain, functional area per functional area. You can use the template as shown below, from team “SuperJuice”, who as you can see experienced a production plan adherence of 72%.

Which consequences has your achieved production plan adherence ultimately had on delivery performance to your customers? And on internal performance in terms of efficiency and effectiveness? Which of these aspects can be quantified and how large has been the impact? These figures should give you a clear view on the ‘urgency’ of getting it fixed.

DECIDE

Which actions would you propose to increase production plan adherence? Try to quantify the costs of these actions and evaluate how they offset the negative implications of poor adherence so far. What is your conclusion and how do you propose to move forward?

[! End box !]

Figure 8.13 Template: template for analysing production plan adherence

[! Insert Figure 8.13 here !]

Key 5 to D2S: inventory management (warehouse replenishment)

In Chapter Seven we already looked in more detail at the financial impact of inventories, looking at inventories from the point of view of interest to be paid, but above all as an asset appearing on the Balance Sheet and thus having an impact on the central indicator of ROI. You can take your observations from there as a starting point for what follows now. Recalling the main key concepts from Chapter Three (see for example Figure 3.11 with the sawtooth diagram of inventory management), let's first look at the logic of inventory management and how it is integrated in TFC.

For *finished goods inventory*, an (R,S) policy is followed, in which the review period R is set at the length of the production interval. So if the production interval of a given product is 5 days, it means that the review for this product takes place every 5 days. The order-up-to level S (expressed in days) is defined as the safety stock for that product, plus the production interval, plus the specified frozen period. This quantity in days is then multiplied by the forecasted demand per day in order to express S in

quantity of product. This quantity S is then compared to the economic inventory in order to define the exact needed production batch. One more thing to keep in mind is the minimum batch size of the machine used. If this minimum batch size is larger than the production batch needed from an inventory point of view, then the machine's minimum batch size will be leading.

For *component inventory*, an (R,s,S) policy is followed, in which the review period R is set at 1 week, ie inventory for components is checked once per week in order to know if a replenishment order is required or not. The re-order point s is defined as the safety stock level (covering uncertainty), plus the lead time from the supplier (the bridge stock). The order-up-to level S is defined as the re-order point s , plus the component lot size as specified by the supply chain manager. Similar to the logic with finished goods, this quantity S is then compared to the economic inventory in order to define the exact quantity to be ordered. One more thing to keep in mind in this case is the trade unit as negotiated with the supplier by the purchasing manager. If this trade unit is larger than the component lot size as desired from an inventory point of view, then the negotiated trade unit will be leading.

Please note that the chosen inventory policies in TFC, so (R,S) for finished goods and (R,s,S) for components cannot be challenged in the game.

Let's try and break down the abovementioned inventory policies to tangible decision making in the game. The VP Supply Chain decides on the component lot size, as well as on the component safety stock, both parameters included in the (R,s,S) policy. The amount of bridge stock per component is calculated automatically by the simulation

tool, on the basis of the lead times of the chosen suppliers (as decided upon by the purchasing manager).

[! Start box !]

Exercise 8.17 Analyze component stocks and decide on actions

ANALYZE

An analysis of potential sources of uncertainty in supply was already done previously in the section on Planning & Control in Chapter Three. Go back to that overview and then check out the “stock development” graphics of components in the corresponding report in Supply Chain, as well as the KPI for “component availability %” for each component.

On a performance level, to what extent have the defined levels of safety stock been justified by the identified uncertainty and the achieved component availability?

From a cost point of view, what have been the associated costs to the chosen levels of component inventory? From a global point of view, do the costs seem justified by the achieved performance?

DECIDE

What do you propose to do next in order to further optimize?

[! End box !]

Now let's take a look at the finished goods inventory. Here the VP Supply Chain decides on the chosen production intervals for each of the SKU's, the length of the frozen period, as well as the safety stock levels to cover demand uncertainty as well as

potential uncertainty caused by production performance. Both of these parameters are part of (R,S) policy.

[! Start box !]

Exercise 8.18 Analyze finished goods stocks and decide on actions

ANALYZE

An analysis of potential sources of uncertainty in demand and production was already done previously in the section on Planning & Control in Chapter Three. Go back to that overview and then check out the “stock development” graphics of finished goods (‘product’), as well as the KPI’s for each SKU for “Service level (order lines)” and “Obsoletes (%)”.

On a performance level, to what extent have the defined levels of safety stock been justified by the identified uncertainty and the achieved service levels and levels of obsoletes?

From a cost point of view, what have been the associated costs to the chosen levels of product inventory? From a global point of view, do the costs seem justified by the achieved performance?

DECIDE

What do you propose to do next in order to further optimize?

[! End box !]

O2C and P2P processes: payment terms

As a last reflection, more oriented towards the financial flows as dealt with in the *order to cash (O2C)* and *purchase to pay (P2P)* processes, let's look at the financial impact of variability and uncertainty. Particularly to those aspects that refer to the Accounts Payable and Accounts Receivable that you can normally find in the Balance Sheet of the company. Since in the case of TFC you do not have a separate Balance Sheet, the combined result of the Payables and Receivables can be found together under the heading 'Payment Terms' in the Investment part of the Finance Statement. You can use the two templates below the following exercises.

[! Start box !]

Exercise 8.19 Analyze payment terms and decide on actions

ANALYZE

P2P: in the profile of each supplier, check when the payment terms starts counting, for example at the moment of ordering, or at the moment of delivery. If relevant for the starting moment of payment terms, check the lead time of the corresponding supplier as well as which uncertainties might have an impact on the actual delivery of the components taking place.

O2C: since delivery is next day in case of having ordered product available in stock, the real payment term is fairly straightforward.

The two partial views analyzed above should give you a clearer understanding on the need to finance the time gap between spending and receiving (ie the cash to cash cycle as introduced in Chapter Two). For which customers and suppliers, respectively is the impact on financing need bigger? Take into consideration that in the total "cash

conversion cycle” also the time components and finished goods spend in inventory and production will need to be contemplated. This part is visualized in the customer payment term template below.

In the Finance statement, under “investment”, now check the total investment due to payment terms, which is the result of payment terms agreements with suppliers and with customers. Also, check the amount of “interest” paid in the last 6 months (‘interest’ as found separately in the Finance statement refers only to the financing of payment terms, the interest paid in relation to the amount of inventory of components or finished goods is mentioned under the heading of “stock costs”). Now you have a starting point for setting priorities on managing the payment terms.

From an investment or financial cost (interest) point of view and in relation to improving overall ROI, to what extent are any changes in payment terms justified, either towards (some specific) customers and/or towards (some specific) suppliers?

Check the impact of changes in the payment terms to those (specific) customers and/or suppliers. How sensitive in the price setting, as expressed by the contract index, are they to changes in the payment terms? To what extent does that offset gains in interest paid or total investment, thus affecting overall ROI?

DECIDE

What do you propose to do and why?

[! End box !]

Figure 8.14 Template: analyzing supplier payment terms

[! Insert Figure 8.14 here !]

Figure 8.15 Template: analyzing sales payment terms

[! Insert Figure 8.15 here !]

INFORMATION & SYSTEMS

As a last topic in this chapter about the technical dimension of supply chain we go back to information and systems, the logic being that as soon as the physical infrastructure is determined and the processes for planning & control to manage the flows going up and down in the infrastructure have been designed, as a last step we can then define the information needs to feed into the processes and the IT systems to provide this information.

ERP System, reporting and data availability

In a way you can say that The Fresh Connection's ERP-system are the screens you're looking at in the simulation game. It contains information about the relevant functional areas and the decisions taking place in each. But also, does it contain a number of predefined reports, which in real-life also exist and would be prepared by systems experts using datamining or business warehousing tools. As touched upon briefly earlier on in this chapter in the section on forecasting, TFC's system also contains a custom report generator allowing for visualizing specific performance indicators, for example in a multi-round view (figure 8.11).

Like in any real-life situation with almost any kind of software, TFC's system contains a wealth of information, possibly making you feel overwhelmed at the beginning, trying to get a good grip on what is available in all of these reports and in which format. It's fairly simple and straightforward and there are really not many

excuses: *welcome to your first day at the new job!* The sooner you know what's there and what's not, the better.

At the same time, despite the overwhelming quantity of data available, you might also come to the conclusion that at the same time there are still some things missing, or that the format isn't the one you would prefer, or that the level of detail isn't what you want. Again, this is a perfectly normal situation which you will encounter in any company using any kind of system. Make sure to spend enough time to find data and know what you have or have not and understand what its limitations may be and how it can be best used in your analysis and decision making.

It will take some time before you know all of the ins and outs, possibilities and limitations of the system and any potential workarounds that might be necessary to get the maximum out of the available data. How much time and with how much success simply depends on those involved, how much expertise, competencies and/or support they might have, plus the amount of effort they actually put into it. Partially this might be pure coincidence in case team composition has been randomly defined, partially this is a choice: it's simply up to you to decide how much time to dedicate to which things.

Decision support systems, analytical and visualization tools

Within TFC to a large extent you are responsible for creating your own decision support system(s). These could be Excel based, or if you have the clearance/permission, you could potentially tap into existing licenses of planning software or decision support systems via your school or university or company. There is one exception to this situation, which is the "production interval tool" that was mentioned already previously under the section of production planning and scheduling (Figure 8.12). As you

remember, this tool allows you to model different scenarios and compare results on cost and capacity criteria as the basis for your decision making. It is important to highlight here that any decision support tool, for however advanced it may be, never releases the user from their final responsibility of implementing a decision. Even if the suggestion from a planning system is implemented, in an automated way or not, then still there has been a person deciding that that was fine and acceptable.

With technology advancing at a faster and faster pace, we see more and more tools appear for reasonable prices that allow users to create data visualizations for analytical purposes in relatively easy ways. Tools such as Tableau, IBM Watson Analytics or Microsoft Power BI, among others, provide interesting capabilities in this sense (Baker, 2018). At schools and universities, teachers are also putting these or similar tools at the disposal of students in order to get acquainted and learn how to use them in a productive way. If you have access to any of these tools, TFC could be a very good integral case to try them out and use them to your advantage during gameplay.

Figure 8.16 KPI dashboard created using data visualization software

[! Insert Figure 8.16 here !]

SUMMARY

With this, we have come the end of the application of the technical dimension of supply chain management to The Fresh Connection, following the sequence of Part One, Chapter Three. We have looked at subjects related to the physical infrastructure, planning & control, information & systems, as well as some organizational aspects. The topics shown below in grey have been dealt with in detail. Some of these, plus the ones in white, will also come back again in Part Three.

Figure 8.17 Topics from the technical dimension of supply chain applied to TFC so far

[! Insert Figure 8.17 here !]

[!Start box!]

Exercise 8.20 Reflect on topics from Chapter Eight

REFLECT

To properly close the Chapter and follow the principles of the learning cycle of experiential learning, please go back to each of the topics from the Figure above and reflect on what you have learned. Specifically, think about your learnings regarding:

- the different theoretical concepts and their practical application in real-life situations. To what extent are the concepts clear and have you experienced the trade-off's involved? What would you do differently next time?
- the analysis and decision making process. How has the decision making been organized? To what extent was the sequence of decisions clear? To what extent has the process been efficient and was no time lost in discussions which were not strictly necessary?
- your team's behaviour. To what extent was everyone actively involved? If not, why not? What was done to deal with it in the best possible way?

[!End box!]

After these final reflections related to Chapter Eight, the journey of mastering the fundamentals continues in the next chapter as we are now going to take a look at the application of the leadership dimension to TFC.

CHAPTER NINE: MASTERING THE LEADERSHIP DIMENSION OF SUPPLY CHAIN

In this chapter we will return to the leadership dimension of supply chain management and apply it to the management of The Fresh Connection. The chapter builds on the concepts exposed previously in Part One – Chapter Four, with a focus on performance management and target setting, stakeholder management and team roles and dynamics.

Figure 9.1 Topics from the leadership dimension of supply chain applied to TFC

[! Insert Figure 9.1 here !]

PERFORMANCE MEASUREMENT & TARGET SETTING

Indicators and targets are a powerful instrument to influence people's behaviour and make them move in the desired direction. That's also why we cover the topic under the umbrella of the 'leadership dimension'. In order to understand where current company performance stands and to evaluate which corrective actions might be necessary so that instructions to collaborators can be given, clear Key Performance Indicators (KPI's) need to be established. Since many decisions are taken by functional experts, KPI's in companies are typically also determined per functional area. If that really is always the preferable and most desirable way of doing will be touched upon later, but for now let's focus on those functional KPI's.

[! Start box !]

Exercise 9.1 Analyze KPI's per functional area and decide on how to use this information

ANALYZE

Taking the chosen supply chain strategy (low-cost or responsive) as a starting point, think of 3-5 meaningful KPI's for each of the 4 VP's: Sales, Purchasing, Operations and Supply Chain.

Referring back to Chapter Four, to what extent you think each of them is SMART? Pay specific attention to the question as to why they are acceptable and realistic from the point of view of bringing something constructive to the evaluation of the successful implementation of the chosen strategy.

For the chosen KPI's per functional area, check by which functional decisions they are impacted. To what extent do these decisions cover the most important decisions per functional area? Are there any gaps, ie important functional decisions not covered by the KPI's? If necessary, reconsider KPI's.

DECIDE

Decide on a meaningful set of KPI's per role.

[! End box !]

As mentioned briefly before, defining KPI's per functional area is not a guarantee whatsoever for achieving cross-functional collaboration. It is therefore important to take this into consideration when designing the KPI's: they should be done in such a way that cross-functional alignment is secured in the best possible way. Now, to what extent do the functional KPI's as part of the global KPI dashboard as you have

defined it, stimulate collaboration and alignment and make the company as a whole move in the right direction, rather than pushing functional experts each in a different direction?

[! Start box !]

Exercise 9.2 Analyze alignment between functional KPI's and decide on KPI dashboard

ANALYZE

For each of the KPI's currently in the list, one by one, check if pursuing their objectives would be potentially going against one of the other KPI's in the list. This would be particularly important for different KPI's between the functional areas. If necessary, reconsider KPI's.

For each of the defined KPI's currently in your list, think of a target value.

DECIDE

Decide on the global KPI dashboard with 3 KPI's per functional role, including target setting for each of the defined KPI's.

Decide on how to use these KPI's and targets throughout gameplay.

[! End box !]

If well-designed from a global context, the currently chosen KPI's should to a certain extent be reasonably well-aligned, at least not be 'conflictive' between them. However, well-aligned could potentially be taken even a step further. As a complement to the purely functional KPI's, which can be used to 'judge' individual performance, it

might be useful to think about some cross-functional KPI's as well: a small set of KPI's with the clear objective to actively stimulate internal coordination. Possibly, some of the KPI's just defined as functional KPI's already have such characteristics, but not necessarily (preferably not, because functional indicators should ideally be mainly related to decisions within that same functional area).

[! Start box !]

Exercise 9.3 Analyze on cross-functional KPI's and decide on their usage

ANALYZE

Try to define 4-5 truly cross-functional KPI's, meaning that they are each directly influenced by decisions from 2 or more functional areas. You can use the matrices from figures 3.9 and 3.13 as a starting point, and add you own experience with the game so far into the equation. Set a target for each of them and make sure the KPI's are SMART.

DECIDE

Define and decide how these cross-functional KPI's can be productively used by the management team when aligning throughout gameplay.

[! End box !]

One last reflection before moving on to the topic of trust and coordination. You have now been giving some thought to meaningful KPI's within the context of your chosen (supply chain) strategy. In the game, there is an option to check the 'rankings' (button on the top right-hand corner. Apart from the possibility to see team rankings based on

ROI, per round or overall, it also allows to visualize the individual rankings per round, based on the following KPI's:

- *Sales* – revenue (the more revenue the better);
- *Operations* – cost of operations (the lower the better);
- *Supply chain* – inventories (the lower the better);
- *Purchasing* – cost of purchasing (the lower the better).

Firstly, it can be stated that these KPI's are very widely used throughout businesses, in many occasions connected to financial incentives (bonus systems). In other words, people are being rewarded for pushing in the direction of the targets associated to these KPI's.

Secondly, keeping in mind that these are very widely used KPI's, to what extent do you think that they go well with the supply chain strategy of low-cost and with the one of responsiveness? Do they make sense in both cases? In any of the cases?

Thirdly, after the different rounds of gameplay, check to what extent the individual leaders based on the rankings per role are also part of the best performing teams in terms of ROI. What does this tell you?

STAKEHOLDER MANAGEMENT: FUNCTIONAL SILOS

Beyond purely measuring individual performance of the different roles, another reflection is useful at this stage. Each team member has assumed a different functional role in the game and by now you have some experience of how that works out during gameplay. The following reflections deal with the functional silos as introduced in Chapter Three.

[! Start box !]

Exercise 9.4 Analyze functional specialization and decide on actions

ANALYZE

To what extent has the functional specialization of having one person dedicated to each role had a positive impact in terms of causing a role-specific learning curve, enabling a better view and better individual judgment from a functional point of view within the silo?

To what extent has the functional specialization emphasized the functional silos in the team in a negative way, for example by creating tension if a person from one role tried to tell a person in another role which decisions to make? Or by creating more misunderstanding because of specific functional expertise that team members from another role were lacking?

DECIDE

Decide on how best to exploit the benefits of functional specialization while limiting the potential negative impact of silos in the team to a minimum.

[! End box !]

TRUST AND COORDINATION: INTERNAL COLLABORATION AND TEAM PERFORMANCE

Measuring performance is a necessary first step for knowing where you are and for having a basis for deciding what needs to be done next. However, KPI's are not going to

do all of the work. As soon as people start working together in achieving results, the people dimension of teams comes into play. Independent of each team member's functional role and responsibilities, we can speak then of team roles of individual team members.

The term 'team roles' refers to how do individual people behave when being put together in a team. For example, some people will be more likely to take the lead and push the team forward, others will perform as the 'glue' binding the individual team members together, whereas yet again others will be searching relevant information and feed that into the team. People's individual personalities and characters have a big impact on this aspect and the particular mix of a set of team members might be more or less balanced. Although there is plenty of academic debate about the topics, not necessarily with everyone always agreeing, the general idea is that the more balanced a team is in terms of team roles, the more likely it is that its performance will be better.

Obviously, there is then also another dimension related to personalities and characters, which together generate a more or less stable or explosive mix within a team. The concept of 'team dynamics' contemplates this by evaluating for example how good the atmosphere in the team is and with the extent to which progress is made in the work at hand. In the following steps we are going to use two short and simple questionnaires as developed by Management Worlds, Inc. (reproduced with kind permission).

[! Start box !]

Exercise 9.5 Analyze task-orientation of the team

ANALYZE

Using the template below, assess your team's performance from the point of view of the 'TASK' at hand. Preferably, each team member should do this individually.

[! End box !]

Figure 9.2 Template: analyzing the “TASK” dimension of leadership

[! Insert Figure 9.2 here !]

[! Start box !]

Exercise 9.6 Analyze team- and relationship-orientation of the team

ANALYZE

Using the template below, assess your team's performance from the point of view of the 'TEAM dimension (RELATIONSHIPS)' in the team. Preferably, each team member should do this individually.

[! End box !]

Figure 9.3 Template: analyzing the “TEAM” dimension of leadership

[! Insert Figure 9.3 here !]

As an interesting extension of the reflection, individual team members might be challenged to complete the questionnaires more than one time, each time reflecting a different moment (round) during the gameplay. In this way, the development over time can also be expressed and interpreted.

[! Start box !]

Exercise 9.7 Analyze combined task, team- and relationship-orientations of the team and decide on actions to improve team performance

ANALYZE

Using the template below, now express the outcomes from the 2 questionnaires in one combined graphic, showing the individual assessments of the different team members.

If the previous questionnaires have been filled out multiple times by each team member to express development over time, this can also be incorporated into the graphic.

DECIDE

What are the conclusions you and the team can derive from this? Based on your observations as a team, what do you propose to do next?

[! End box !]

Figure 9.4 Template: analyzing the “TASK” and “TEAM” dimensions of leadership

[! Insert Figure 9.4 here !]

TRUST AND COORDINATION: EXTERNAL COLLABORATION AND TRANSPARENCY

In Chapter Four we briefly touched upon the topic of trust and coordination as part of the leadership dimension, aimed at establishing special relationships with suppliers and/or customers with the objective of collaborating beyond pure buying and selling. Vendor Managed Inventory was mentioned as an example. In some configurations of the gameplay, The Fresh Connection’s management team can also consider proposing

such improvement projects to either customers or suppliers. In those cases, two possibilities exist:

- *Development projects with suppliers:* for each supplier you can specify whether you wish to implement a supplier development program. For each period that it is applied, a supplier development program has a certain project cost associated to it (information about how much can be found in the system). This type of program improves the performance of suppliers and facilitates the certification of their production processes. The delivery reliability and the quality of the materials delivered by suppliers also improve, and their emission index decreases.
- *VMI with suppliers and/or with customers:* can be employed for each supplier and/or customer. In the case of implementing VMI, control of the stocks of the respective components is passed on to the supplier in question and the supplier ensures that sufficient stock is present (please note, in case of VMI with TFC's customers, TFC is the supplier, in the case of VMI with suppliers, TFC is the customer). Control limits for stock levels must now be specified by the customer, where the upper and lower limits indicate the scope available to the supplier for steering stock levels. The safety stock levels and lot sizes set by the VP Supply Chain Management are overruled by these upper and lower limits. Also VMI has a recurring project cost associated to it. Please note, in the gameplay VMI cannot be employed for alternative suppliers (dual sources).

[! Start box !]

Exercise 9.8 Analyze VMI and decide on actions

ANALYZE

Go back to the criteria as explored in Chapter Four when discussing VMI, or in Chapter Three when discussing supplier segmentation, as well as your observations in the exercise about outsourcing and collaboration earlier in this same chapter. For which suppliers would you consider either VMI and/or supplier development projects? Why?

In the same line, for which customers would you consider proposing VMI? Why?

What are the conclusions you and the team can derive from this?

DECIDE

Which decisions in terms of proposing development projects and/or implementing VMI do you take on the basis of the above? Please take into consideration that TFC is a medium-sized company with limited resources, so only a maximum of 3 such projects in total can be proposed. Also due to TFC's own size, and depending on the size of the customers and/or suppliers in question, your proposals might be declined by them. Should that be the case, you will be notified about that at the beginning of the next round after proposing the collaboration. In such cases no project costs will be incurred.

[! End box !]

STAKEHOLDER MANAGEMENT (DIRECT STAKEHOLDERS)

In the specific setting of The Fresh Connection, most of the internal stakeholders directly involved in what's going on in managing the flow of goods actually form part of the team participating in the simulation game. We will come back to the indirectly involved stakeholders in Part Three. However, there is one other very important

stakeholder we will have to address and to whom we haven't paid much attention since the beginning of this chapter: Bob McLaren is back and he wants some answers!

Figure 9.5 Bob McLaren is back!

[! Insert Figure 9.5 here !]

Good reporting is an important and relevant skill to support effective stakeholder management. The way you inform others, what exactly you tell them and how you tell them, will create a starting point for the following steps in the process. It requires a healthy dose of empathy in order to understand what information your audience would be interested in, as well as a bit of creativity to make your report attractive to see as well as easy to understand. Be aware that the people who are going to look at your reporting are probably short on time, so they need to be able to quickly grasp your message. Also, be aware that you might not be there with them when they see it, so you might not have an opportunity to explain anything until they explicitly ask you to.

[! Start box !]

Exercise 9.9 Analyze what happened so far and create a reporting for the company's owner

ANALYZE

Using the template below as developed by team SuperJuice, go back to the experiences of the rounds played so far and create a management report for Bob McLaren.

DECIDE

Decide on which elements to focus and create the report. Make sure the report is accurate, to the point and self-explanatory.

[! End box !]

Figure 9.6 Template: reporting for Bob McLaren

[! Insert Figure 9.6 here !]

SUMMARY

With this, we have come to the end of the discussion of the leadership dimension of supply chain management, applied to The Fresh Connection. We have dealt with performance measurement as a leadership instrument to influence behaviour, with internal stakeholders as evident via the functional silos, with internal collaboration and team performance and with external collaboration and transparency. We finished the Chapter by looking at specific reporting for the owner of the company.

The topics shown below in grey have been dealt with in more detail. Some of these, as well as the ones in white will also come back again in Part Three.

Figure 9.7 Topics from the leadership dimension of supply chain as applied so far to TFC

[! Insert Figure 9.7 here !]

[!Start box!]

Exercise 9.10 Reflect on topics from Chapter Nine

REFLECT

To properly close the Chapter and follow the principles of the learning cycle of experiential learning, please go back to each of the topics from the Figure above and reflect on what you have learned. Specifically, think about your learnings regarding:

- the different theoretical concepts and their practical application in real-life situations. To what extent are the concepts clear and have you experienced the complexities involved? What would you do differently next time?
- the analysis and decision making process. How has the decision making been organized? To what extent was the sequence of decisions clear? To what extent has the process been efficient and was no time lost in discussions which were not strictly necessary?
- your team's behaviour. To what extent did you share the same view when analyzing team behaviour? Why was that, do you think? What would you do differently now that you are aware of this?

[!End box!]

In the next chapter we will end our journey of mastering the fundamentals of supply chain, by going back for a moment to the topic of overall complexity due to the combination of the business, technical and leadership dimensions and their many elements, and the corresponding need for alignment.

CHAPTER TEN: SIMPLE, BUT NOT EASY (3): COMPLEXITY AND ALIGNMENT

In the previous chapters the main concepts from the business, technical and leadership dimensions of supply chain have been applied to The Fresh Connection. Let's go to some reflections around the overall picture that has emerged from gameplay during the journey of mastering the fundamentals.

SUPPLY CHAIN STRATEGIES REVISITED

Go back for a moment to the exercise and template of figure 8.2 about translating corporate strategy into supply chain action. Reflect on how well your choices have worked out. To what extent have you been able to define and implement well your chosen supply chain strategy, either low-cost or responsive? To what extent have you actually revised your initial choices throughout the various rounds of gameplay? As said in Chapter Eight, also in real life the continuous adapting and finetuning of strategies is part of its implementation.

Now take the same template from figure 8.2 and try to define the supply chain actions in line with the supply chain strategy that you did not choose. So if, like team SuperJuice you chose the low-cost supply chain strategy, then elaborate the actions related to the responsive supply chain strategy and vice versa. Quite likely, some of the teams in your class have chosen a different strategy than you did, so after completing the table, it is recommendable you discuss your findings with them, so that both visions and experiences can be put together.

COMPLEXITY!

So far throughout Part Two, many different concepts have been dealt with. Some of them require maybe a bit more thinking than others, or a bit more work to get to the bottom of them, but I hope you can agree by now that most of the concepts have proven to be relatively straightforward. This was already remarked at the end of Part One but applying the concepts in a practical way to the gameplay with The Fresh Connection has hopefully confirmed the message.

What you have hopefully also experienced is that even though the concepts are relatively easy to understand, it doesn't make running an entire supply chain easy at all. The sheer quantity of them, the many interdependencies between them, the cross-functional dimension and the fact that sometimes there is room for opinion besides the facts, as well as the fact that many things change all the time, make it anything but easy.

Figure 10.1 Complexity of the combined business, technical and leadership dimensions

[! Insert Figure 10.1 here !]

To get a clearer idea on the many interdependencies that exist between the different decisions per functional role, let's analyze and visualize this in more detail.

[! Start box !]

Exercise 10.1 Analyze interdependencies per functional area

ANALYZE

Using the template from Team SuperJuice below, let the VP of each functional department list the Top-5 most important decisions for their role.

For each of these 5 decisions, try to formulate how this decision might have an impact on another functional department and why.

[! End box !]

Figure 10.2 Template: analyzing interdependencies between departments (inputs)

[! Insert Figure 10.2 here !]

Figure: template for analyzing interdependencies between departments (1)

[! Start box !]

Exercise 10.2 Analyze overall cross-functional interdependencies and decide on actions based on the interdependency mapping

ANALYZE

When finished, try and put all of the inputs together in one overall visual chart, like the example below from Team SuperJuice, showing each of the functional roles and the interdependencies as identified.

DECIDE

Now decide what you are going to do with this newly acquired insight.

[! End box !]

Figure 10.3 Template: analyzing interdependencies between departments
(visualization)

[! Insert Figure 10.3 here !]

MAKING PROS AND CONS EXPLICIT: BUSINESS CASES TO SUPPORT DECISION MAKING

As you will have experienced during gameplay, as well as during the previous discussion on interdependencies, almost all decisions carry some sort of trade-off, the pros and cons which were also touched upon in the earlier chapters. However, we need to try and avoid speculating when contemplating changes. Intuition is of course fine as a starting point, but if possible a more thorough elaboration should be done to support the decision making. In TFC's system, lots of information are available to support the decision making and this is where so-called business cases come into the picture. The general idea behind a business case is to elaborate to the level possible the different pros and cons of a certain change, so that the final responsible(s) can take a well-informed decision.

[! Start box !]

Exercise 10.3 Analyze business cases and decide on actions based on the business cases

ANALYZE

Using the template below from team SuperJuice, and taking a number of important decisions as an example, develop business cases for these cases. Possibly, not everything can be quantified, but nevertheless make sure you create a picture which is as complete as possible. Examples you could think of are the change of a supplier, the execution of improvement projects, changes in contract conditions with customers or suppliers, changes in production or purchase lot sizes, and so on.

Like in real life, it makes sense that the VP in charge of the decision takes the lead in the preparation of the business case, or even prepares it alone. The result of the activity would be a well-prepared proposed decision.

DECIDE

Based on the proposed decision, discuss with the entire management team and make a final decision.

[! End box !]

Figure 10.4 Template: decision support using structured business cases

[! Insert Figure 10.4 here !]

CROSS-FUNCTIONAL ALIGNMENT: S&OP

If the objective is to make our supply chain perform well, taking into consideration the very different viewpoints of the technical, the business and the leadership dimensions, as well as the many interdependencies between the individual functional decisions, then how can we make sure this is going to work in the best possible way? As mentioned on a few earlier occasions, cross-functional alignment via the process of Sales & Operations Planning (S&OP) is one of the main important keys to successful supply chain performance. So, let's try and develop an S&OP process in the following steps.

[! Start box !]

Exercise 10.4 Analyze flow of decisions (decision making process) and decide on actions

ANALYZE

Like Team SuperJuice, use the template below. It contains one column per functional area. The team decided to use sticky notes to facilitate the activity. Below example shows their diagram right after they started working on it.

Make a list of all the decisions per functional area which you have seen so far in the gameplay. You could write the decisions on sticky notes, one decision per sticky note. Out of all of these decisions create one global flowchart. In other words, for each decision think of which other decisions provide an input to the decision. Please note that the flowchart doesn't necessarily have to be going only in one direction: feedback loops are possible (some decisions have an iterative character rather than linear). Also, it could potentially happen that you find decisions which have no clear relationship to other decisions, ie they do not require input from another decision, nor give an input themselves to other decisions.

DECIDE

Now decide how you can implement the findings of the S&OP flowchart into your team's decision making, the objective being to make the overall decision making process more efficient (faster) as well as more effective (better and more well-informed decisions).

[! End box !]

Figure 10.5 Template: template for designing decision making process (S&OP logic)

[! Insert Figure 10.5 here !]

The keys to successful execution of the S&OP process are similar to those of any other business process. However, given the cross-functional nature of S&OP, some of them are being put to the test much more intensively, thus becoming even more critical:

- Good design of the process;
- Clarity on roles and responsibilities in relation to each of the steps in the process;
- Solid preparation by each of the participants for each of the steps in the process. Especially relevant before cross-functional meetings (doing your homework on time, with the correct level of quality, having the information prepared which others need in order to be able to make progress);
- Discipline in the execution of the process;
- Focus on facts, not opinions;
- Make the assumptions behind proposed decisions explicit, this will enrich the discussion;
- Constructive solution-oriented attitude in (cross-functional) meetings: critical but positive;
- Continuous evaluation and improvement of the process itself, trial and error being part of the implementation.

Please note that most of the abovementioned factors are very easy to say, very easy to understand, but practice shows that they are very difficult to achieve. You and your team, like any real-life company, have the challenge to make it work well!

SUMMARY

This brings us to the end of Part Two and to the coverage of the journey of mastering the fundamentals. Throughout gameplay, all of the dimensions dealt with in this Part will be relevant in achieving good results in terms of ROI:

- the business dimension, covering competitive strategy, customers and value propositions and financial aspects;
- the technical dimension, covering supply chain strategies, the physical infrastructure, planning & control, information & systems and organizational aspects;
- the leadership dimension, covering performance management & KPI target setting, functional silos, internal collaboration and team performance, external collaboration and top management reporting.

Like in real companies, it's logical that it will take you and your team time to fully understand the complexities and learn how to deal with those in the best possible way. Go step by step, prepare and analyze well, reflect frequently and explicitly on what you are doing, keep the communication channels open and focus on continuous improvement. *It's simple, but definitely not easy!*

In the next part of the book, we will embark on yet another journey: the one of imagining beyond the fundamentals.

PART THREE

IMAGINING BEYOND THE FUNDAMENTALS

Whereas Part One has served as a general exploration of the many and diverse aspects of supply chain management, Part Two has centred around the direct application of many of those concepts to gameplay in The Fresh Connection, focusing on mastering the aspects of running an established and relatively stable supply chain. In Part Three “*Imagining beyond the fundamentals*”, we will look beyond such a stable environment and challenge the status-quo to clearly see the impacts that changes might have on designing and managing a supply chain. The Fresh Connection will once again be at the heart of analysis, but instead of focusing on gameplay, we will apply the company situation as a case-study, wherever possible using relevant data from the system to support thorough analysis and decision making. As you will notice, a range of different types of exercises and formats will be used.

As you remember, reflections and exercises were so far grouped under the names of *explore* in Part One, and *analyze and decide* in Part Two. Even though still a lot of exploring, analyzing and deciding will be required, reflections and exercises in the third section all fall under the umbrella of *imagine*, because the starting point is one of an uncertain future with many challenges ahead.

Please note that in terms of number of pages in the book Part Three is relatively short, but don’t get fooled by this, because you will find that the cases described require quite a lot of analysis, thinking and elaboration of alternative solutions. While dealing with a number of challenges related to the business, the technological and the leadership

dimensions of supply chain management, in Chapters Twelve, Thirteen and Fourteen respectively, a lot of potential actions, projects and initiatives for The Fresh Connection will be defined. In each of the sections, after defining these potential paths forward for the company we will park them for the moment, and have them all come back in the closing Chapter of the book: Conclusion – simple but not easy (4): complexity and alignment.

CHAPTER ELEVEN: SUPPLY CHAIN IN A VUCA WORLD

In order to have a solid starting point for imagining the impact of a large number of challenges throughout Chapters 12-14, in this chapter we will look at the main characteristics of the world around us and establish a view on the current business model of The Fresh Connection.

A VUCA WORLD

The term VUCA was allegedly coined by the US Army War College when the Cold War in the 20th century came to an end, thus giving expression to the emerging of a new reality. Nowadays, the term has become more widely used, also in business and education. The letters of VUCA stand for:

- *V = volatile*. Expressing an *increasing rate of change* at all levels (political, economic, societal, technological, ecological, legal);
- *U = uncertain*. Expressing an *increasing rate of unpredictability* about what might or might not occur in the future;
- *C = complex*. Expressing an *increasing rate of complexity* due to more forces being at stake at the same time;
- *A = ambiguous*. Expressing, partially as a consequence of the above, an *increasing degree of unclarity* of what's going on, of which are the causes and which are the effects and of what the relationships between causes and effects may actually be.

Being an integral part of companies existing in this VUCA world, the supply chain area will clearly need to take these aspects into consideration as well. The Fresh Connection and its supply chain are no exception: TFC as a company will constantly

make decisions to move on in the VUCA world and its supply chain should be able to follow, or in some cases even able to lead.

Even though TFC's simulation has a number of specific configurations dealing with some of these forward-looking characteristics, in most educational environments these configurations are not used very often, typically because the focus of many courses is simply more on the fundamentals of supply chain management. This doesn't mean, however, that we cannot use The Fresh Connection's situation as a starting point for looking in more detail at a number of relevant trends and developments. We will do this in the coming three chapters of Part Three.

Many of the topics covered in Part One were applied to The Fresh Connection in Part Two. Most of those will come back in some form or shape in Part Three, but also the topics from Part One that were left out of Part Two for practical reasons, will now be dealt with, thus completing the picture as shown in Figure 10.1.

As the title of Part Three suggests, since we're dealing with possible future scenarios, a fair dose of your *imagination* will be required. This would be the same for any board of directors of a real company contemplating potential roadmaps for the future. But please note, imagination is not the same as pure speculation. On the basis of imaginative ideas, very concrete scenarios can be developed and evaluated. Which is precisely what we will do in the coming chapters.

VISUALIZING THE STATUS-QUO: BUSINESS MODEL CANVAS

To be able to evaluate the potential impacts of the trends and developments we will look at, we need to create a clear view on the existing situation, the status-quo. Based on the experience obtained with TFC during Part Two, we will assume that the

ins and outs of TFC's current supply chain are by now well-known. But we haven't really looked at the overall business model of TFC. In order to establish a clear view on this, we go back to the concept of the Business Model Canvas, as introduced in Part One, Chapter Two.

[! Start box !]

Exercise 11.1 Imagine the business model of TFC

IMAGINE

Go to the website www.strategyzer.com to download a copy of the business model canvas (you are allowed to do so, but please look at the exact Creative Commons license conditions for its usage). You might also want to check out some of the other supporting resources for use of the canvas on the website.

Create a canvas for The Fresh Connection. Like Team SuperJuice, use sticky notes when creating the canvas. This way, you will be more flexible making adjustments.

Base yourself on the situation you know from the gameplay.

[! End box !]

Figure 11.1 Template: business model canvas Team SuperJuice

[! Insert Figure 11.1 here !]

Source: Osterwalder (2010), www.strategyzer.com, with Team SuperJuice amendments

Please note that as kind of an experiment, Team SuperJuice has decided to take the liberty to make some amendments to the canvas:

- Firstly, they have added a column called *consumer* on the right hand side, in order to be able to clearly express the distinction between TFC's paying customers and the consumers of TFC's fruit juices. Although the current market of TFC clearly is B2B (business to business), they feel the consumer cannot be left out of the business model since at the end of the day TFC produces consumer products. In order to avoid confusion, for example between value proposition towards customers and towards consumers, the extra column was added.
- Secondly, they have added a column on the left-hand side called *supplier*, to be able to clearly express the distinction between key partners with whom a strategic relationship would be established and 'normal' arms-length suppliers with whom there would be a more standard buying-selling relationship. They feel this would allow them to incorporate for example commodity suppliers from whom TFC might be buying a lot of money's worth of materials (i.e. important for the overall cost structure), but who would not be considered key partners, since commodities can be bought virtually anywhere. Accordingly, the box with cost structure has been extended to also cover the arms-length suppliers.
- If you want, you can try out the amendments of Team SuperJuice and see if they also work for you. If not, just move along with the original canvas.

Please note that when creating the canvas, you shouldn't only look at operational and supply chain aspects but consider all elements of the business. When developing the canvas, keep the following checks in mind:

- Are all elements on the “what?” side of the canvas (segments, value propositions, channels, customer relations) supported by one or more elements on the “how?” side (key activities, key resources, key partners, suppliers). If the answer is no, then there are 2 options: either you might have missed something, or you have discovered a gap in the coherence of the business model;
- Are all elements in the canvas strictly necessary? In other words, if you take a specific element away, does that really weaken the coherence of the business model? If you would find something that is not so necessary, then you might have discovered something which is redundant, i.e. could be removed from the company without harming the strength of the business model.

Both checks can effectively be done in quite a ‘mechanical’ way, by simply going sticky note by sticky note and check for each one at a time.

Although strictly speaking part of the business dimension of supply chain, let’s look for a moment what the ‘strategic secret’ of TFC could be in terms of customers and value propositions on the one hand and competitive advantages on the other hand.

[! Start box !]

Exercise 11.2 Imagine value propositions and competitive advantages of TFC

IMAGINE

Since the simulation doesn't contain explicit information about the competitive landscape TFC is operating in, you might need a bit of your imagination to think of what could be possible answers to the following questions. Your experience in the gameplay should also be helpful in answering at least some of the elements, but you would also need to think a bit beyond:

- *What is it that TFC is promising to its clients that makes them want to choose TFC (customers and value propositions)?*
- *What does TFC need to be particularly good at in order to consistently deliver on those promises day after day (competitive advantages)?*

[! End box !]

SUMMARY

At this stage you should have a good understanding of TFC's overall business model and its critical elements as well as the competitive difference you can imagine it might have with other companies in the market. This would then give you the desired starting point for imagining and evaluating future trends and developments and their potential impacts. It is therefore highly recommended to keep the designed canvas at hand while working on the coming chapters. In the next chapter, the journey of imagining beyond the fundamentals continues and we will look what could happen if elements of the business dimension of supply chain are challenged.

CHAPTER TWELVE: IMAGINING BUSINESS CHALLENGES FOR THE SUPPLY CHAIN

In this chapter we will look at a number of business challenges which companies face and in order to make them more tangible we will apply those challenges to The Fresh Connection, so that ultimately we can analyze the potential impact they might have on the supply chain. We will be touching upon some of the elements of the business dimension seen before and cover the ones which are still open, ie introduced in Part One, but not yet applied in Part Two. The focus will be on challenges related to market pressures and competition, business model changes, the trend of corporate social responsibility, changes in the external environment and risk assessment.

Figure 12.1 Topics from the business dimension of supply chain

[! Insert Figure 12.1 here !]

Prepare for the return of Bob McLaren! Now that you have demonstrated that you master the supply chain fundamentals of The Fresh Connection, he is ready to open discussions with you about a wider variety of more advanced topics. In the remainder of this chapter he will be sending a series of emails to you to get the conversation started. And he'll be waiting for your inputs...

MARKET FORCES: NEW ENTRANTS AND TOUGH COMPETITION

As you have noticed in Part Two, TFC has so far been operating in relatively stable market conditions. Demand variability existed, but total demand was fairly stable and competitors didn't seem to be much of an issue. Of course, this nice situation

couldn't last forever. Competitive pressures are all around, not only because of new entrants from other territories. Also existing incumbents can change their portfolios, they can acquire other companies and become much bigger and powerful in the market. Companies like TFC should continuously be alert to such pressures and have their plans ready.

[! Start box !]

Exercise 12.1 Imagine changes in the competitive landscape

IMAGINE

Imagine you receive below email from Bob McLaren:

[! End box !]

Figure 12.2 Email from Bob McLaren about new competitor

[! Insert Figure 12.2 here !]

First take a look at the Market & Industry Flash Bob McLaren sent along with his email.

Figure 12.3 Market & Industry Flash as attached to email from Bob McLaren

[! Insert Figure 12.3 here !]

Source: own elaboration (information is fictitious but realistic)

Now it's up to you and the team to define what to do and report to Bob McLaren in the next meeting. For your analysis, you can use the template as developed by Team

SuperJuice (see Figure below)

In general terms, which are the impacts you could expect in a situation in which an important new company enters into the market? Think of the impact on:

- the *industry* (e.g. competitive strategies of incumbents and new entrants)
- the *market* (e.g. customer segments, value propositions, customer behaviour)
- the *consumers* (e.g. consumer segments, value propositions, consumer behaviour)
- the *suppliers* (e.g. supply market, supply availability, supplier power)

Now relate your observations on the abovementioned factors to the existing business model you visualized in the previous chapter. Take the canvas as reference point and check each of the areas in terms of potential impacts you foresee

On the basis of your observations and assessment, try and formulate the implications for TFC as a company and its supply chain in particular

For each of the functional areas in TFC's management team (sales, operations, supply chain and purchasing), define proposed actions to deal with and/or prepare for dealing with the identified market pressures

Figure 12.4 Template: analysis increased market pressures

[! Insert Figure 12.4 here !]

Probably, from the analysis a number of actions have been defined. Let's park these for the moment and look at another business challenge.

THE NEED FOR NEW BUSINESS MODELS

During gameplay in Part Two, TFC has been selling a small and stable product portfolio of 6 SKU's. But because of competitive pressures like the ones analysed in the

previous section companies need to constantly innovate in products and services in order to keep customers and consumers happy in markets in which typically there is more and more choice on offer. Like others, The Fresh Connection needs to think about new products, new segments, new channels, ...

[! Start box !]

Exercise 12.2 Imagine new product introductions

IMAGINE

Imagine you receive below email from Bob McLaren:

[! End box !]

Figure 12.5 Email from Bob McLaren about new product introduction

[! Insert Figure 12.5 here !]

Figure 12.6 Template: analysis new products, channels and business models

[! Insert Figure 12.6 here !]

Like in the case of the challenges associated to new market entrants, also from this analysis about new product introductions and new channels a number of actions have been defined. Once again, let's park these for the moment and look at yet another important business challenge.

TRANSFORMING INTO RESPONSIBLE AND GREEN

During gameplay in Part Two, TFC's customers were mainly focused on getting a good service in terms of delivery reliability and shelf life, according to the promises

done and the agreements made. In some industries, carbon footprint and the wider topics of sustainability and Corporate Social Responsibility (CSR) are gaining attention. TFC's business is no exception...

[! Start box !]

Exercise 12.3 Imagine the impact of carbon footprint

IMAGINE

Imagine you receive below email from Bob McLaren

[! End box !]

Figure 12.7 Email from Bob McLaren about carbon footprint

[! Insert Figure 12.7 here !]

Go step by step through all the activities in the supply chain of TFC, starting at distribution to the customers, working your way upstream to suppliers (including the supplier production sites). It might be recommendable to use an empty version of the network diagram you created in Part Two (Figure 6.2) as the starting point for visualization:

- For each step, determine the potential sources for carbon emissions (there can be multiple sources per stage in the supply chain)
- See if you can identify public sources that can be of help in determining the quantities of emissions per stage in the TFC supply chain

- Think about how carbon emissions could be measured in each stage of the TFC supply chain: who would have the information, or in case it's not available, how could it be measured?
- For each of the stages in the supply chain, which kind of actions could you think of to reduce the carbon footprint? Who would be in charge of these actions?
- How can you get into the position of being able to identify the top-most-polluting activities in TFC's supply chain, allowing priority setting?
- Which actions can you think of for each of the TFC management team members, to move this initiative forward?
- You can use template below to summarize your thoughts and report to Bob McLaren.

Figure 12.8 Template: analysis carbon footprint

[! Insert Figure 12.8 here !]

After this first exposure of TFC's management to the topic of sustainability and carbon footprint, it seems Bob McLaren isn't done yet.

[! Start box !]

Exercise 12.4 Imagine the impact of CSR, sustainability and TBL

IMAGINE

Imagine you receive below email from Bob McLaren

[! End box !]

Figure 12.9 Email from Bob McLaren about CSR, sustainability and TBL

[! Insert Figure 12.9 here !]

Step 1: operationalize the triple bottom line (TBL)

- 1.1 Per item of the TBL, define 4 KPI's related to the supply chain:
 - *People*: think for example of TFC's own people, of supplier's staff, of the local community of which TFC is part, of TFC's consumers, of the people in the world at large, and so on
 - *Planet*: think for example of air & noise & waste pollution, energy consumption, use of natural resources, water footprint, and so on
 - *Profit*: think of supply chain related costs, revenues, investments, and so on
- 1.2 Check if they are SMART (see Part One, Chapter Four)
- 1.3 If you are convinced they are, then create a factsheet for each KPI (see template below, following the example of Team SuperJuice. As a start they build on the work done after the previous question from Bob McLaren about carbon footprint)

Figure 12.10 Template: TBL KPI-design

[! Insert Figure 12.10 here !]

- 1.4 Now design an “Integral TBL supply chain dashboard” with these 12 KPIs (see template below)

Figure 12.11 Template: TBL KPI-dashboard design

[! Insert Figure 12.11 here !]

Step 2: definition of actions

- Saying that you want to become more socially responsible as a company is one thing, but those are just words until real actions are taken. Using template below, for each KPI try to identify the *structural implications* for TFC of becoming more “TBL-sensitive”. Which areas of the canvas are related to the KPI in a direct or indirect way? Which are the implications of this? Ultimately, how could existing activities, resources and partnerships be affected? Which new activities, resources and partnerships would need to be considered?
- Which *actions* would you define in order to move forward and achieve the targets proposed for each of the KPI’s.

Figure 12.12 Template: definition of TBL actions

[! Insert Figure 12.12 here !]

Step 3: define a pilot project related to circular economy

- Remember that Bob McLaren also asked you to come up with a proposal for a *pilot-project* related to the concept of the circular economy. As a reference, go back to the figure in Chapter Two showing the “butterfly diagram of circular economy” or check out the original version on the website of the Ellen MacArthur Foundation. Define a project around circular economy that would be relevant for TFC. You can think for example about return and recycling of used bottles and/or cartons, the creation of a pallet return pool, re-use of waste, and so on.
- You can use the canvas as well as the diagram of TFC’s supply chain network to analyze the potential impact your proposed project has on the physical flows but

ultimately also on the overall business model (from a strategic point of view both are important). Describe the new process and the changes it implies using the template below.

Figure 12.13 Template: analysis pilot-project circular economy

[! Insert Figure 12.13 here !]

- In defining your project approach, think about what business process redesign thought leader Michael Hammer wrote when addressing implementation of changes in processes. He stated that “two principles are critical to success [...] The first is ‘think big, start small, move fast’. [...] The second principle is ‘communicate relentlessly’” (Hammer, 2001).
- Create a compelling business case for the project based on TFC data and assumptions. For the business case you can go back to the template from Figure 10.4 which you have used previously. If relevant, make sure to also include any potential one-off project or implementation costs and/or one-off investments.

As you will have seen from the previous exercises, really becoming a more socially responsible company can have a lot of far-reaching implications, extending far into the supply chain. I’m sure that you have defined a large number of potential actions to be carried out by TFC management and staff. Once again, let’s park these for the moment and come back to them at a later stage and go on to yet another challenge.

CHANGES IN THE EXTERNAL ENVIRONMENT: PESTEL

During gameplay in Part Two, you as TFC’s management team have been focusing on turning around the company and return to profitability given the status-quo within the market. Obviously, companies do not live in isolation from whatever is going

on in the world, from how industries, countries, technologies, people are changing over time. Like any company, The Fresh Connection needs to get a view on changes occurring, evaluate what the implications might be and decide what to do...

[! Start box !]

Exercise 12.5 Imagine the impact of the external (macro) environment

IMAGINE

Imagine you receive below email from Bob McLaren

[! End box !]

Figure 12.14 Email from Bob McLaren about PESTEL analysis

[! Insert Figure 12.14 here !]

Step 1: trends & developments

Identify trends & developments which might be relevant to TFC in terms of potential impact. Part of the identification might be starting off with pure brainstorming, then to be complemented by thorough desk research (fact finding) to ultimately support the proposals for Bob McLaren. In case you would run into gaps in the information, either make defensible assumptions, or simply checkmark the identified gaps for further research and/or expert consultancy (“know what you don’t know!”).

Follow the PESTEL framework as briefly touched upon in Part One, Chapter Two. You can use the template below from Team SuperJuice to report on your findings from step 1, as well as the upcoming steps 2 and 3. Use 1 separate page for each of the PESTEL-topics.

- **Political**, such as trade-zones, political regimes, safety and security, political stability, trade embargos or bans. Look at the entire supply chain network of TFC (so origins of flows, but also destinations and zones of transit), and so on;
- **Economic**, such as currency exchange rates, market upswings & downswings (look at markets for supply as well as for demand), rise of emerging economies, and so on;
- **Social**, such as individualization, sensibility for environment, but also demographics (growing/declining populations, ageing population, millennials), the rise of megacities, increasing issues with traffic, sensibility for human aspects (labour relations, unionization, sweatshops in developing countries), and so on;
- **Technological**, such as artificial intelligence, robotics, drones, blockchain, Internet of Things (IoT), 3d-printing, Virtual Reality (VR), Augmented Reality (AR), material sciences (smart materials), renewable energies, nanotechnology, and so on;
- **Ecological**, such as climate change, weather, temperature, wet and dry periods, weather stability, fossil and alternative energy sources, air & noise & waste pollution, plastic soup in the oceans, raw material scarcity (precious metals, minerals, clean water), and so on;
- **Legal**, such as international trade laws and import/export quota and taxes, customs regulations, (food) security legislation, cool and cold chain requirements, emission reduction targets, and so on.

Step 2: analyze potential impacts

For each of the identified relevant trends, you can use the canvas to analyze potential impacts on TFC

Step 3: define actions

Define actions in order to move forward. Try to be as specific as possible, so that the company's management receives a concrete and compelling proposal from you.

Figure 12.15 Template: analysis PESTEL

[! Insert Figure 12.15 here !]

Once more, a number of actions have now been defined, in this case as a consequence of the analysis of the external environment. Again, let's park these for the moment and move on to the next topic.

INTERMEZZO: AN EMERGENCY!

[! Start box !]

Exercise 12.6 Imagine managing an emergency

IMAGINE

Imagine you receive below message from Bob McLaren, at 06:11 in the morning.

[! End box !]

Figure 12.16 Message from Bob McLaren: urgency!

[! Insert Figure 12.16 here !]

So far, you haven't had to worry about operational issues in TFC, but of course not everything will always work out according to plan. Bob McLaren has the customer waiting, so damage control is needed here. Analyze quickly what could have happened in the case of the 17 pallets. At the same time, think of an approach towards the customer. They are very unhappy and you need to get some convincing information back to Bob McLaren so that he can report back to the customer and minimize the damage to the relationship. No time for templates, the clock is ticking...

MANAGING UNCERTAINTIES: RISK ASSESSMENT

Imagine the issue with the customer has been settled and that it's back to normal business again. However, the incident has shown that TFC, like any other company is vulnerable to unforeseen events happening. Maybe it's time for some solid risk management...

[! Start box !]

Exercise 12.7 Imagine managing supply chain risks

IMAGINE

Imagine you receive below email from Bob McLaren

[! End box !]

Figure 12.17 Email from Bob McLaren about risk assessment

[! Insert Figure 12.17 here !]

Go step by step through all of the activities in the supply chain of TFC, starting at distribution to the customers, working your way upstream to suppliers (including the

supplier production sites). It might be recommendable to use an empty version of the network diagram you created in Part Two (Figure 6.2) as the starting point for visualization.

- For each step, determine the potential risks you can think of. You might want to refer to Chapter Two (Figure 2.11) for inspiration. Obviously, the previous exercises of this chapter may also provide useful inputs to the assessment;
- Then classify the identified risks according to probability, impact and detectability, thus coming to a list of risks ranked according to importance. Make sure to document the facts and/or assumptions underlying the risk classification;
- For your top-5 risks, define mechanism to improve detectability, as well as potential mitigations for impact minimization. You can use below template from Team SuperJuice.

Figure 12.18 Template: analysis risk assessment

[! Insert Figure 12.18 here !]

The actions required to move forward with risk management in TFC have now been defined and also these we will park for the moment and come back to them at a later stage.

SUMMARY

In this chapter we have been imagining beyond the fundamentals of managing a stable supply chain. We have addressed potential implications of challenges to the status-quo from the perspective of the business dimension of supply chain: more intense market pressures, new products, channels and business models, the transformation into a

socially responsible company, dealing with an ever more complex external environment, and finally, the wider topic of supply chain risk management. In the next chapter, the journey of imagining beyond the fundamentals will continue as we will look at several challenges to the status-quo from the perspective of the technical dimension of supply chain.

CHAPTER THIRTEEN: IMAGINING TECHNICAL CHALLENGES FOR THE SUPPLY CHAIN

In this chapter we are going to look in more detail at what could happen to the supply chain in case the status quo of the elements of the technical dimension are challenged. Since supply chain solutions by default are of an integral nature, the individual topics of the technical dimension are now not dealt with separately anymore, even though all of them will appear.

Figure 13.1 Topics from the technical dimension of supply chain

[! Insert Figure 13.1 here !]

In the mini-cases in this chapter we will therefore look at the physical infrastructure (facilities, transportation, outsourcing & collaboration), planning & control, information & systems and organizational issues from a holistic point of view. You will maybe find that some of the mini-cases in this chapter are relatively open-ended. This is done on purpose because questions and issues in real life also do not always appear in a nicely and clearly formulated way. In some cases, this is simply because the topic and/or its implications still aren't very clear to begin with. But that doesn't have to mean that they are then less relevant.

Please note: some, although not all, of the challenges dealt with in this chapter correspond to more advanced modules of TFC gameplay which normally are only being used in specific situations. In those cases, the elaboration here in the book is an adaptation of the game functionality and goes a bit beyond the pure gameplay version of the challenges.

Please note: I think that for all the challenges in this chapter it is valid to say that no answers nor solutions are written in stone here. There are always different interpretations and different solutions possible. Probably, you might want to consider evaluating various scenarios before deciding which one convinces you more in terms of outcomes, realism, likelihood, and so on. Just make sure that for whatever solution you finally propose you have clear and compelling arguments in favour that can be explained and defended. If necessary, make reasonable and understandable assumptions. For most of the challenges, it would be recommendable to develop a template based on the one from Team SuperJuice we saw already a few times in Chapter Twelve. In addition, you might want to keep a copy of TFC's business model canvas as well as an empty canvas ready just in case.

Figure 13.2 Template for analysing challenges

[! Insert Figure 13.2 here !]

CHALLENGING THE PUSH/PULL SETUP

In the gameplay so far, we haven't questioned the way the products were produced, nor the decoupling point that was initially chosen by The Fresh Connection. Basically, production has taken place directly from components to finished goods without interruption, on the basis of forecasts and corresponding inventory settings.

[! Start box !]

Exercise 13.1 Imagine challenging the push/pull setup

IMAGINE

Imagine an increasing commercial drive within The Fresh Connection to jump on the trend of customization. For example, think of bottles with names printed on the label, bottles customized for specific events or campaigns, maybe even bottles designed in specific shapes. In addition, you could even think of customized flavours, customized packaging formats, packages combined with gifts or toys, and so on. A reconsideration of the customer order decoupling point, touched upon in Chapter Three, might be called for here.

[! End box !]

Analyze from a business point of view what the impacts of customization can be on the business model. First define a number of alternatives for how customization could be shaped. Then develop a template based on the one from Team SuperJuice in figure 13.1, analyze the potential impact on the various areas of the canvas and reflect on the implications. Although you may touch upon it during already the elaboration of the template, make sure that you explicitly address the required implications for operations and planning & control, potentially even the organizational setup due to a potential change of the decoupling point.

For example, think of:

- Which additional steps in the design/development and/or production process would be needed? Which new competencies would need to be developed and/or subcontracted? How easy or difficult, and how time consuming might that be?
- Which new requirements would there be towards the sources of components, for example the customized labelling?

- Which would be the implications for the machines used and potential new equipment required?
- In the case of new steps in production, effectively a make-or-buy decision would come into play. Which arguments in favour or against outsourcing would there be in this case?
- Due to potential changes in the decoupling point, what would be the implications for forecasting? Consequently, would there be any changes in who would be involved in the forecasting? And in the tools needed? The information needed?
- What would be the implications for the customer interface, for example key account management? How would the operational relationships with customers be affected, in terms of the design processes for customized products, obtaining of reliable forecasts in the case of continuously changing products, and so on?

Overall, which actions would you propose to deal with this new requirement? Keep those actions registered for the moment, and we'll move on to the next issue: challenging capacity.

CHALLENGING CAPACITY

In most configurations of TFC gameplay you don't have to worry about growth nor about capacity constraints. Demand is there and seems to be stable in terms of overall volume in litres of juice. And in terms of production or storage capacity, even though more expensive than regular capacity, whenever one of your warehouses is full, there is the overflow with unlimited capacity next door you can use. Whenever you run out of manufacturing capacity, there is always an unlimited amount of overtime available to

finish production. In two subsequent steps let's look at situations in which demand volume and capacity are challenged.

[! Start box !]

Exercise 13.2 Imagine challenging capacity in case of expansion

IMAGINE

Imagine that Bob McLaren, together with the other owners of the company are pushing for growing aggressively in the next years, putting a target for 10-15% year on year growth for the next 3-5 years, to be reached by having more direct and innovative sales approaches to competitors of your current customers. In other words, growing based on your current geographical scope and current product portfolio.

[! End box !]

Figure 13.3 Challenging capacity (some examples of capacity expansion strategies)

[! Insert Figure 13.3 here !]

Source: adapted from Slack et al (2012) and Heizer & Render (2013)

Reflect on the following:

- Considering short term as well as longer term solutions, which ways of expanding production and storage capacity can you think of (fixed staff, temporary labour, machinery and equipment, third parties, and so on)?
- For each of the options you have identified, list the pros and cons in terms of investments to be done, learning curve of usage, speed of implementation, flexibility to upscale/downscale, temporary versus more permanent solution,

easily reversible or not, risk against wrong forecast and/or wrong sales target setting, how easy/difficult to replace existing capacity, and so on.

- Based on your analysis, to what extent could you grow gradually, or to what extent at some point bigger incremental steps would need to be taken? To what extent would you need to expand capacity in anticipation of expected growth, or could you be fast and flexible enough to ‘grow with the flow’?

Park your observations for a moment.

Still we have only considered the unlimited flexible capacity like in TFC gameplay. In real-life you might at times have such luxury of unlimited capacity, but it is not unlikely that someone in the company, for example the finance director, will tell you that overflow or overtime are fine, but that there is only a fixed maximum amount of money that you can spend on it. In similar fashion, it can also be that collective labour contracts, for example as negotiated with labour unions by the general management and the human resources department, only allow for a certain amount of extra hours per month.

[! Start box !]

Exercise 13.3 Imagine challenging capacity in case of capacity constraints

IMAGINE

Imagine that for budgetary or cost-efficiency reasons, only a +/- 10% margin around the forecasted production volumes can be catered for in terms of flexible production and storage capacity.

[! End box !]

Think about the following:

- As a starting point, you can compare to figures from the gameplay in which you to a larger or lesser extent have used overflow capacity and/or overtime in production. Which implications would a hard-stop maximum on available capacity have had in those cases? Which choices would you have been forced to make? How would you have made those choices, on the basis of which information and which criteria?
- Now enter the growth targets into the equation? What does it look like now? Which issues could you potentially run into? How to coordinate in order to make it work?

Overall, which actions would you propose to deal with this new requirement? Keep those actions registered for the moment, and we'll move on to the next issue, of machine life.

CHALLENGING MACHINE LIFE

In the gameplay of The Fresh Connection you have had to deal with a certain amount of machine breakdowns, against which you could protect yourself with preventive maintenance, training your staff to solve breakdowns quicker. This is a normal fact of production life. For the duration of the gameplay you didn't have to worry about it much more than just that. At the same time, in case you had the possibility of changing one or both machines for other machines (bigger or smaller, faster or slower), you didn't have to pay attention to the investment aspects, specifically on how and where to get the financing for buying the new machine(s), if the remaining market value of the old

machines would be very limited. Let's now introduce the element of machine life and machine investment into the equation.

[! Start box !]

Exercise 13.4 Imagine challenging machine life

IMAGINE

Imagine that the current machines for mixing and bottling were bought some 20 years ago when the company was founded. They are now getting towards the end of their technical lifetime. Independent from the technological developments that might have taken place during those 20 years, and the more technologically advanced machines which surely are available in the market right now, the existing machines will most likely also start having more and more technical hiccups.

[! End box !]

Figure 13.4 Challenging machine life

[! Insert Figure 13.4 here !]

Reflect on the following:

- What would be the impacts you could expect if both your mixing and your bottling will start breaking down more often? Go back to the numbers of the game and work from the basis of the breakdown percentages you have seen there. What if these numbers would double over the next year or two, what would be the consequences? What could be done to mitigate these impacts? How expensive and time consuming would that be? How would overall

production volumes be affected? What would the impact on the cost per litre of juice be?

- If you would decide that it's time to replace one or both current machines for mixing and bottling, what would be the possible scenarios and how would they compare? Consider for example simply replacing one machine for a new one. But you can also think of getting a strategic partner for mixing and/or bottling, or even start buying the mixing and/or bottling services from an arms-length commodity supplier. Use the template from Team SuperJuice as a basis for analysing the different alternatives, also looking explicitly at the business model implications using the canvas. What are the pros and cons of each of the alternative scenarios, in terms of strategic value, commercial aspects, required competency development, customer value, speed and flexibility, and so on.

Overall, which actions would you propose to deal with this new requirement? Keep those actions registered for the moment, and we'll move on to the next challenge.

CHALLENGING THE NETWORK DESIGN

The supply chain network from The Fresh Connection that you have seen so far has been stable and unchanged during gameplay: sourcing was done globally, whereas storage, production and distribution were local affairs. Let's see what could happen if that situation changes.

[! Start box !]

Exercise 13.5 Imagine challenging the network setup

IMAGINE

Imagine that TFC as part of the growth strategy is now also considering geographical expansion, for example into Belgium, France and Germany. For the moment, consider a scenario of so-called organic growth, meaning by growing the own organization, not by mergers or acquisitions.

[! End box !]

Figure 13.5 Challenging the network design

[! Insert Figure 13.5 here !]

Elaborate two distinct scenarios:

- Delivery from finished goods inventory in TFC's home country directly to retail customers' storage facilities in the destination countries;
- Delivery from finished goods inventory in TFC's home country to TFC local storage facilities in the destination countries. Delivery to the retail customers from TFC's local warehouses.

Taking the situation and the numbers you know from TFC gameplay as a starting point, using the template from Figure 13.2 and making defendable assumptions where necessary, for each of the two scenarios evaluate the potential implications for:

- The products and product portfolio (incl. labelling, packaging types, etc.);
- Demand (volume and variability);
- Shelf life;
- Production and production capacity (incl. options to upscale);
- Inventory policies (central/local safety stocks)
- Transportation (incl. outsourcing/subcontracting, risks);

- Final distribution (incl. outsourcing/subcontracting, risks);
- Potential return policies;
- And so on.

How do the two scenarios compare? Which one of the two would you propose? Or which one would you propose first and which one later on?

Which actions would you propose? Keep those actions registered for the moment, and we'll move on to the next challenge, related to changes in segments and channels.

Please note that obviously in distribution network redesign many detailed calculations can be made, comparing the many different possible scenarios. However, the key is to do this in an efficient way, ie start with high-level comparisons which can be done relatively quickly and only calculate in detail the (few) most promising scenarios. In this way, the majority of time is saved for the detailed calculations of the really interesting scenarios, rather than calculating all possibilities in detail.

CHALLENGING SEGMENTS AND CHANNELS

During gameplay you have basically been working with a fixed set of customers, in a way representing different types of segments, a situation which wasn't challenged. Now let's see what could happen if that situation changes.

[! Start box !]

Exercise 13.6 Imagine challenging segments and channels (mini-case 1)

IMAGINE

Mini-case 1: *imagine that the marketing department of The Fresh Connection Group has an interest in entering the HoReCa segment (HOTels, REstaurants, CAfés). Specifically, they aim at smaller and larger restaurant and cafés. For the smaller sized operators, the assumption is that probably glass bottles would need to be introduced as a new packaging type. For the larger operators, they are looking at the option of introducing refillable dispensers like the ones many food retail chains are already using.*

[! End box !]

Figure 13.6 Challenging segments and channels (mini-case 1)

[! Insert Figure 13.6 here !]

Taking the situation and the numbers you know from TFC gameplay as a starting point, and making defensible assumptions where necessary, for each of the two new segments evaluate the potential implications for:

- The products and product portfolio (incl. labelling, packaging types, etc.);
- The supporting equipment and potential maintenance;
- Demand (volume and variability);
- Shelf life;
- Production and production capacity (incl. options to upscale);
- Inventory policies (central/local safety stocks);
- Transportation (incl. outsourcing/subcontracting, risks);
- Final distribution (incl. outsourcing/subcontracting, risks);
- Potential return policies;

[! Start box !]

Exercise 13.7 Imagine challenging segments and channels (mini-case 2)

IMAGINE

Mini-case 2: *imagine that you are contacted by a new player in the market, focusing on the emerging O2O market (Online to Offline). In some countries this segment is growing very rapidly due to new online shops appearing, offering a wide variety of products, which the consumer can buy and later pick up for example at a local convenience store in the area where they live.*

[! End box !]

Figure 13.7 Challenging segments and channels (mini-case 2)

[! Insert Figure 13.7 here !]

One of the disrupting elements of this new O2O market is that the retailer acts as a broker, without any physical locations of their own, but using local pickup points such as aforementioned convenience stores, for whom this is a new source of revenue.

Going back to the template including the business model canvas and taking the situation and the numbers you know from TFC gameplay as a starting point, and making defensible assumptions where necessary (for example about the potential sales volume associated to this new market), evaluate the implications for:

- The overall business model of TFC;
- The products and product portfolio;
- Demand (volume and variability);

- Shelf life;
- Production and production capacity (incl. options to upscale);
- Inventory policies (central/local safety stocks);
- Final distribution (incl. outsourcing/subcontracting, risks);
- Potential return policies;

Given the complexity and level of uncertainty in this second mini-case, you can focus mainly on raising relevant questions, potentially drafting already some preliminary sketches for supply chain solutions.

Overall, which actions would you propose to deal with these two new requirements?

Keep those actions registered for the moment, and we'll move on to the next challenge, which is related to the customers introducing new dimensions to the business.

CHALLENGING THE CUSTOMER STATUS QUO

In the gameplay in Part Two customers have stayed pretty much the same throughout the various rounds, but obviously customers also have their own path, their own visions for the future, their own strategies.

[! Start box !]

Exercise 13.8 Imagine challenging the customer status quo

IMAGINE

Imagine that you receive a communication from your customer Dominick's that they are about to acquire a national competitor of theirs, which is a convenience store retail chain. The strategic fit that they see is that the retail chain is an expert in convenience

stores, which are in fact very similar to the stores in the gas stations of Dominick's themselves. As far as you are aware, the retailer has approximately the same amount of stores as Dominick's, but then without the gas stations and located within cities (ie little stores with relatively small quantities of inventory of a wide number of different product categories).

[! End box !]

Figure 13.8 Challenging the customer status quo

[! Insert Figure 13.8 here !]

Develop a template based on the one from Team SuperJuice, analyze the potential impact on the canvas and reflect on the implications. Taking the situation and the numbers you know from TFC gameplay as a starting point, and making defensible assumptions where necessary, for each of the two new segments evaluate the potential implications for:

- The products and product portfolio (incl. labelling, packaging types, etc.);
- Demand (volume and variability);
- Shelf life;
- Production and production capacity (incl. options to upscale);
- Inventory policies (central/local safety stocks)
- Transportation (incl. outsourcing/subcontracting, risks);
- Final distribution (incl. outsourcing/subcontracting, risks);
- Potential return policies;

Overall, which actions would you propose to deal with this new requirement? Keep those actions registered for the moment, and we'll move on to the next challenge, related to new requirements due to market developments at existing customers.

CHALLENGING THE VALUE PROPOSITIONS

During gameplay you have basically been working with a fixed set of customers, in a way representing different types of segments, whom you were offering a particular value proposition defined by your own Sales manager on the basis of a number of predefined elements. Let's see what could happen if 'the market' starts requiring new services.

[! Start box !]

Exercise 13.9 Imagine challenging the value propositions

IMAGINE

Imagine that there seems to be a new trend in the market in which some retailers are seemingly moving away from having very large warehouses. In practice, two different solutions seem to emerge. The first one is a scheme of cross-docking, in which retailers expect daily shipments from all suppliers into transport platforms at which the incoming shipments are reshuffled into outgoing shipments to retail outlet, carrying a mix of products from different suppliers. The second emerging solution is one in which retailers expect shipments to go directly from suppliers to their retail outlets. On top of that, imagine that retailers because of their increasing purchasing power, are more and more moving towards agreements which include the introduction of end-of-shelf life returns of unsold product.

[! End box !]

Figure 13.9 Challenging the value propositions

[! Insert Figure 13.9 here !]

Develop a template based on the one from Team SuperJuice, analyze the potential impact on the canvas and reflect on the implications. Taking the situation and the numbers you know from TFC gameplay as a starting point, and making defensible assumptions where necessary, for each of the two new segments evaluate the potential implications for:

- Demand (volume and variability);
- Inventory policies;
- Distribution (incl. shipment sizes, shipment frequencies);
- Warehousing (incl. picking & packing, order management, returns, merchandising)

Overall, which actions would you propose to deal with this new requirement? Keep those actions registered for the moment, we will come back to those in Chapter Fifteen.

SUMMARY

In this chapter we have seen many issues and development in the company that might challenge the ‘technical’ status quo you have seen during gameplay. These challenges, of a wide diversity and varying in complexity and urgency, have probably resulted in a large list of potential actions to consider. In the following chapter the journey of imagining beyond the fundamentals of supply chain will continue as we will move on to

some more potential changes, this time putting pressure on the leadership dimension, once again challenging the status quo we have experienced during gameplay.

CHAPTER FOURTEEN: IMAGINING LEADERSHIP CHALLENGES FOR THE SUPPLY CHAIN

In this chapter we will return to the leadership dimension of supply chain management and focus on some challenges that were left untouched during the gameplay in Part Two.

Figure 14.1 Topics from the leadership dimension of supply chain

[! Insert Figure 14.1 here !]

Specifically, we will deal with the wider topic of stakeholders, leadership in the VUCA world, and external collaboration and transparency.

MANAGING MANY MORE STAKEHOLDERS

So far, in the gameplay you only had to deal with your own teammates as direct stakeholders, and with your suppliers, customers and Bob McLaren as virtual stakeholders. Let's expand the list a bit further by doing a more extended stakeholder analysis. Sometimes we also call this a 'force-field' analysis, since we're mapping out the various forces at play. This is a standard activity in project planning, but given the wide diversity of touching points it can as such also be very useful in the sphere of supply chain.

[! Start box !]

Exercise 14.1 Imagine managing many stakeholders (stakeholder mapping)

IMAGINE

Imagine that as part of a wider analysis of the opportunities and threats for the supply chain, you are asked to carry out a full stakeholder analysis as the basis for defining actions towards each of the main identified stakeholders.

[! End box !]

Step 1: Define a list of stakeholders of The Fresh Connection. For the moment don't limit yourself too much:

- *Internal stakeholders*: for example R&D, legal & regulatory, IT, finance, HR, employees, and so on;
- *External stakeholders*: for example national and local authorities, local community, NGO's, labour unions, shareholders, customers, suppliers, other local companies, and so on.

The identified stakeholders could be put in a table, each one on one row in the table. See Figure 14.2 for an example by SuperJuice of what the template could look like.

Step 2: For each of the identified stakeholders, define the following (each of the points would be one column in the table started in step 1):

- Directly or indirectly involved in the supply chain?
- Impact on which activities and/or which decisions in the supply chain?
- Relative importance to the supply chain (positive or negative)?

Figure 14.2 Template: stakeholder analysis

[! Insert Figure 14.2 here !]

Step 3: Based on step 2, create a ranking of the identified stakeholders in order of importance. For the top priority stakeholders, define suggested ways to manage the relationship:

- Which kind of activities to establish/maintain the relationship?
- With which frequencies to be organized?
- Who should be in charge?

Figure 14.3 Template: stakeholder action plan

[! Insert Figure 14.3 here !]

Keep in mind that in some of the identified cases, the relationship to the supply chain might be indirect and the stakeholders might not necessarily feel connected to it, potentially implying that extra attention and/or sensitivity might be needed.

Like what was done in Chapters Twelve and Thirteen, keep the defined actions registered for the moment, and we'll move on to the next leadership topic, related to internal collaboration.

INTERMEZZO: SUPPLY CHAIN LEADERSHIP IN THE VUCA WORLD

During gameplay you haven't had to worry much about TFC staff, apart from specifying quantities of employees per activity in the supply chain. At this stage I think it might be interesting and useful to reflect for a brief moment on the role of staff in the supply chain in a VUCA world and to reflect upon what that might imply for leadership.

I remember an interview from years ago with Michael Dell, founder and CEO of the PC company of the same name. He was talking about how to deal with a company growing at a rate of approximately 25% per year. Besides the more obvious aspects of

how to keep up with increasing capacity of sourcing, assembly, storage and distribution, he was also specifically addressing the issue of managing a workforce under such circumstances of expanding to new countries, opening new call centres, more support functions, and so on. Basically, his point was that in a company that grows so fast, change is the norm rather than the exception, and you need a workforce who can deal with that, or even better, a workforce that thrives in such an environment. And of course those people exist, but reality is also that many people resist change. You cannot count on everyone getting a kick out of having new colleagues, new bosses and new procedures every so many months.

Following the logic of VUCA and looking at the world around us in general and the supply chains in it, it looks like change will be the norm more and more and that also in supply chain we need to get used to continuous change. The many mini-cases of the last chapters is proof of that - supply chain is everything but stable.

[! Start box !]

Exercise 14.2 Imagine the impact of changes on people in the supply chain

IMAGINE

Imagine that changes in markets, industries, products, technologies, society, climate and so on as identified before in your PESTEL analysis are indeed going to take place in the foreseeable future, what would the impact be on people working in the supply chain area? Think of general support functions (staff), as well as operational people (line), both work floor as well as management.

[! End box !]

- What are the implications of those changes for the profiles of the people needed in the supply chain in the different functions? Think of technical profile as well as personality, behaviour and attitudes.
- What does that mean for recruitment and for training & education in the future?
- What does this all imply for future supply chain leadership? Also think back to the traits of the T-shaped supply chain manager. Which of the skills will be required especially in order to deal with the aforementioned issues?

Let's move on to the last leadership topic of this chapter, related to external collaboration.

MANAGING TRUST AND COORDINATION: EXTERNAL COLLABORATION

[! Start box !]

Exercise 14.3 Imagine managing external collaboration (mini-case 1)

IMAGINE

Mini-case 1: *imagine that your largest customer is in fact a large multinational retailer mainly maintaining arms-length buying-selling relationships with small and medium-sized suppliers like The Fresh Connection. They prefer to pay relatively little attention to these smaller companies, standardizing the ordering processes to the maximum possible, for example through automatically generated emails and limiting further communication to the minimum in order to have more of their resources available for shaping the relationship with their large suppliers, aiming at more large-scale improvements and synergies. So, effectively, for them you seem to be one of the many. Too small to even ask them for reliable forecasts, or propose schemes like Vendor*

Managed Inventoried. In practice, it's proven very difficult to talk to them. But they're big, pay reasonable prices and, not unimportantly, they pay on time. Now imagine that one day your finished goods warehouse manager tells you that orders from this customer now seem to be experiencing a 30% increase across all of the SKU's in litres of juice over the normal volumes he's used to. Obviously he notices, since he and his team are the ones preparing the orders for shipment. In this case, since it's referring to the biggest customer, inventory levels are dropping faster because of the increased demand.

[! End box !]

Since it can all be down to an exceptional week, in weeks 1 and 2 you think nothing special of it, but when in week 3 again the higher demand continues you need to decide if you want to do something and if so, what. Your options are the following:

- a. Do nothing, maybe it's something temporary and demand will go down later;
- b. Increase machine capacity to deal with the increased demand;
- c. Increase inventory levels to deal with the increased demand;
- d. Order more from suppliers to produce more and have more inventory;
- e. Two or more from the above (if so, which ones?);
- f. Other (please specify).

Write down your answer as well as the reasoning behind your decision. Now we go to another example.

[! Start box !]

Exercise 14.4 Imagine managing external collaboration (mini-case 2)

IMAGINE

Mini-case 2: imagine that you are buying your oranges from a very large agricultural company. They're more than 10 times as big as you in terms of revenue and the relationship is distant at best. They have always been reliable suppliers to you, but you don't have a special relationship with them, they always seem to be more busy with their other customers. Now imagine that the word is out that the growing season in the main country where you buy oranges is not looking very promising. Temperatures have not been good and there has been too much rainfall and more severe, too little sunshine early on, it seems the climate is indeed getting crazy. For as big as they are, there is of course little your supplier can do about the weather. Although the situation might still turn around, since harvest is still some time away, almost everyone in the market buys from the same or other suppliers in the same country and it looks like some companies in the market are making moves to prepare.

[! End box !]

Now you need to decide if you want to do something and if so, what. Your options are the following:

- a. Do nothing, maybe it will not be that bad after all;
- b. Pre-buy as much as you can from your supplier, just in case;
- c. Increase inventory levels to cover for more uncertain supply;
- d. Find alternative suppliers (incl. negotiation and getting them homologated to comply with your quality standards);
- e. Two or more from the above (if so, which ones?);
- f. Other (please specify).

Write down your answer as well as the reasoning behind your decision.

Let's go back to mini-case 1. Take the proposed action(s) you wrote down from the options in the list and assume that you would have gone in the chosen direction. Now elaborate each of the following scenarios:

1. After week 6 there is another increase, the average now being approximately 45% higher than initially;
2. After week 5 demand goes back to normal. Apparently, the higher demand was because some competitor of your customer had serious supply issues leading to temporary higher demand to your customer which now seem to have passed;
3. Demand stays at 30% above the previous average. Apparently, they have opened some new stores and/or reduced SKU's from competing stores from their shelves;

For each of the 3 scenarios and based on your proposed actions, try to elaborate the impact on each of your own activities (supply chain, operations, purchasing, sales), but also try to think of potential impacts on your business partners, such as suppliers, transport and distribution companies, external storage, temporary labour agencies, and so on. In addition, try to get a good grip on the timings involved, how much time would it take before your own decisions cascade down to other companies in the chain.

Figure 14.4 Template: scenario analysis increased demand

[! Insert Figure 14.4 here !]

Let's now go back to mini-case 2. Once again, take the proposed action(s) you wrote down from the options in the list and assume you would have acted in the chosen direction. Now elaborate each of the following scenarios, 4 months down the road:

1. Harvest indeed turns out to be bad, approximately only 60% of normal volumes are produced;
2. Harvest is not that bad after all, roughly the same volume as normal;
3. Your supplier communicates that increased speculation in the market has pushed demand and that in combination with the expected lower harvest volumes they will increase the price for orange with approximately 30%;

For each of the 3 scenarios and based on your proposed actions, try to elaborate the impact on each of your own activities (supply chain, operations, purchasing, sales), but also try to think of potential impacts on your existing business partners, such as customers, transport and distribution companies, external storage, temporary labour agencies, and so on. In addition, try to get a good grip on the timings involved, how much time would it take before your own decisions and events cascade down to other companies in the chain.

Figure 14.5 Template: scenario analysis harvest problems

[! Insert Figure 14.5 here !]

The above two mini-cases show you once more the complexities in decision making and in scenario development when dealing with uncertainty. Secondly, they hopefully show you the potential impact of additional uncertainty due to difficult relationships with the customer and/or supplier, staying at the level of pure buying and selling. If the relationship would have been of a different nature, then maybe other solutions would have entered the possibilities.

I think the following two reflections are appropriate here:

1. For each of the 2 mini-cases, from the overview of scenarios and your proposed decisions, how would they have played out? What would have happened? If you would have done the scenario analysis before deciding on the basis of all of the possible choices, would you have chosen differently? What does that tell you?
2. Given the importance that the customer and the supplier in question have for you, and given the complexities and risks associated to potentially changing either of them, what can possibly be done to create some sort of trust with them enabling more coordination and transparency in the relationship than the simple focus on just buying-selling? Which actions can you think of? Who should be involved? Who should take the lead?

One last thought before going to the end of this chapter. Both of the last two mini-cases deal with situations that in practice might very well lead to the bullwhip effect as discussed in Chapter Four (and remember the toilet-paper example from the beginning of Chapter One!). An increased demand from a customer might lead to an overreaction by their supplier, who might be thinking that a new upward trend has begun requiring increased inventories, capacity and so on. This, in turn, might lead to an overreaction by the supplier's supplier. Since the lack of transparency and potentially lack of trust between the different players in the chain leads them to speculate what's going on rather than know what's going on, practice shows that this normally results in covering up with overcapacity and/or overstocking, leading to inefficiencies and potentially bad service.

SUMMARY

This brings us to the end of this chapter about imagining what might happen to the leadership dimension in case the status quo is challenged, thus almost ending the journey of imagining beyond the fundamentals of supply chain. In the next and last chapter of this book we will try and bring everything from the previous 14 chapters together and draw some final conclusions and identify points for further development.

CONCLUSION

CONCLUSION: SIMPLE, BUT NOT EASY (4): COMPLEXITY AND ALIGNMENT

In this closing chapter, we will come back to the various storylines that were opened throughout the book and we will close each of them with some final reflections and an outlook for your future continuous development.

SUPPLY CHAIN STRATEGIES REVISITED ONCE MORE

The first storyline to bring home is about supply chain strategies. You will hopefully remember from back in Chapter Three that we spoke about different typologies of supply chain strategies, to be applied in function of overall corporate strategy, as well as supply and demand characteristics. A number of references were made to textbook authors presenting different frameworks for such typologies. As we said in Chapter Three: for the sake of argument as well as in order to make things manageable, and because they are in fact the cornerstones of the overall typology framework and therefore very important for any supply chain student and practitioner to know about, we worked for the better part of this book on the basis of the two extremes that all of the highlighted approaches have in common: the *cost-driven* and the *responsive* supply chain.

I hope that through the gameplay and the other exercises and reflections in the book you now have a better understanding and what the buttons are that can be touched in the supply chain, and how to touch them in the case of either of the aforementioned supply chain strategies. If that is indeed the case you can then on the basis of your own experience and insights also form your opinion about what those other typologies, most of them some form of ‘hybrids’ between the two extremes, should be like. Independent

of the circumstances in which they would work best, you would now have an opinion about what a supply chain strategy would look like that is relatively low-cost but at the same time a little bit responsive? Or a strategy that is mostly responsive, but on the lower-cost end of responsiveness? What do these hybrids mean in the context of physical infrastructure (warehousing, production, transport), for planning & control, for systems and for organizational models. With the information and experience about each of those aspects you have obtained so far, how complex would it be to implement a truly hybrid strategy? How expensive would it be, how much time would it cost? What are the implications and under which circumstances would such an implementation be justified?

And at the same time, apart from looking at hybrid strategies as such, the question can be raised about if a company can only have one supply chain strategy at a time, either an extreme or a hybrid, or that it might make sense to actually have multiple strategies in place at once. Referring back to the strategy compass from figure 3.3 it would be reasonable to think that multiple supply chain strategies at once are sometimes perfectly justified. After all, different customer segments and different products might have very different characteristics. The key there is to be smart, like in any case of segmentation. Segregate strategies wherever it makes sense and combine wherever possible. Of course, in a context of dynamic markets and industries.

Both the question on hybrids as well as the one on parallel strategies are very extensive puzzles that we will not finish here because it's outside the scope and objectives of this book, but very interesting for you to explore further.

THE FRESH CONNECTION: NOW WHAT?

The second storyline to close is the one about The Fresh Connection. Back in Part Two you found the company in a lossmaking situation and you have had the opportunity with your team to turn the situation around and make the company profitable again. Then, in the previous chapters of Part Three we looked at a large number of challenges for each of which you have been asked to develop a list of potential actions, proposals and initiatives. If you were leading the company, there would be one final exercise to present to the boss: making sense of that long list of proposals and define a feasible action plan for the next 2-3 years. Remember, TFC is a medium-sized company, meaning that time, money and resources are far from unlimited, in other words, choices will have to be made.

[! Start box !]

Exercise 15.1 Imagine defining a strategic plan

IMAGINE

Imagine you would have to come up with a list of strategic priorities for the coming 2-3 years, what would it contain?

[! End box !]

Step 1: go back to all of the actions, proposals, initiatives you listed in Chapters 12-14. Assume that all of the challenges to which they are related are real and relevant somehow at this moment. As a reminder, the following challenges have been dealt with:

- Business dimension
 - New market entrants and tough competition

- The need for new business models
- Transforming into responsible and green
- Changes in the external environment: PESTEL
- Risk assessment
- Technical dimension
 - The push/pull setup
 - Storage and production capacity
 - Machine life
 - Network design
 - Segments and channels
 - Customer status quo
 - Value propositions
- Leadership dimension
 - Stakeholders
 - Internal collaboration
 - External collaboration

Step 2: Using the template from team SuperJuice as shown in figure below, try and define priorities. Take your time for doing it well. Make sure to be able to defend your choices.

Step 3: Define where would you put the priorities. How many actions do you think you could reasonable put on the priority list for the coming 2-3 years? How much of the actual resources would that require. Consider that TFC as a medium-sized company probably doesn't have a dedicated project department, meaning that the projects should

be staffed either by people who have a fulltime tasks in parallel, or that external (expensive) resources would need to found and contracted.

Figure 15.1 template: project heatmap

[! Insert Figure 15.1 here !]

Figure 15.2 Project timelines

[! Insert Figure 15.2 here !]

So, now you should have a clear view on what TFC would be capable of doing and busy working on in the next 2-3 years. Finally, let's meet the boss once more!

BOB MCLAREN'S IS BACK!

As you probably would have expected, Bob McLaren was going to show up once more before the end of this book.

[!Start box!]

Exercise 15.2 Reflect on the journey and report to the company's owner

REFLECT

Bob McLaren seems to be in a mild, forward-looking mood, this time not asking about ROI, projects and the resolution of emergencies. Instead, he's asking for a bit of self-reflection and is interested to know what you've learned from the experience and what you would do to continue learning from now on. Use the template below to list your findings. It might be interesting and enriching to first do this individually, then put your inputs together with those of your team mates and discuss your points of view.

[!End box!]

Figure 15.3 Template for learning points and takeaways

[! Insert Figure 15.3 here !]

Listing your learning points and actions for further learning brings us back to the learning cycle of experiential learning.

CLOSING THE LOOP: THE LEARNING CYCLE OF EXPERIENTIAL LEARNING

The third storyline to be finished in this last chapter is the one about experiential learning and the learning cycle. Recalling a phrase from the preface of the book in which we expressed the hope of the “learner touching all the bases” of experiential learning by going through an experience, reflecting on what happened, conceptualizing the events and incorporating the findings into the next cycle of experience. As the subtitle of the book already indicated, the focus has been on exposing the main *principles* of strategy, supply chain and leadership, *practice* the application of these concepts via gameplay and reflections and imagine more *real-life applications* beyond the pure gameplay. Obviously, even though we’re at the end of the book, the learning doesn’t stop here. I would even argue that this is actually where the learning should really start to take off: you now have the basis and an outlook on where it might go. Now it’s up to you to give that shape and form and define how to continue the learning process.

One interesting reflection you can do for yourself at this stage is to take a close look again at the concept of the T-shaped manager from figure 4.3 and try to evaluate yourself on each of the elements, for example on a scale from 1-5. I’m sure that even though you would only do this for yourself, it would still give you a useful insight in

where you stand during assessment. Based on your self-assessment, try to define some specific actions, things to work on over the course of the coming time (try and set concrete goals as well as deadlines, remember the SMART KPI's!). And of course, it would be interesting to go back to the chart every once in a while, to see in which aspects you have indeed developed and then update your plans.

As said, the learning doesn't stop here, it has merely begun. It's up to you to now define your own continuous supply chain learning path and find what works best for you: self-study using books, linking into web resources such as sites of organizations & expert associations, subscribing to magazines and newsletters, following professionals' groups on social media such as in LinkedIn, finding mentors, reading general business and specific industry newspapers, doing project internships, and so on. There is a wealth of possibilities for you to tap into.

As mentioned when highlighting the supply chain manager's daily decathlon, 'supply chain managers need to be versatile, multi-skilled people, chameleonic in a way. A bit like the decathlon athlete, they need to perform well on a lot of different disciplines, not necessarily the best at each, but good enough to have a good shot at becoming the overall number 1 in the tournament'. I hope that in the spirit of the phrase from Ken Robinson and Lou Aronica at the beginning of this book, we have provided you with the conditions in which you could actively do things, that we have aroused your curiosity and have invited you to ask many questions and have discovered new ideas, feeling the many exciting dimensions of supply chain management. Thus, I hope that it has contributed to you developing (part of) this supply chain manager's rich skill set and getting ready for managing supply chains in the VUCA world.

So, congratulations on your journey along the business, technical and leadership dimensions of supply chain! Passing by the fundamentals, mastering and even imagining beyond them. I hope it's been worth your while, and above all, that it has inspired you to move forward in supply chain. Challenges are numerous, and I'm convinced that lots of brain power will be needed in the future. Many examples of such challenges have been dealt with throughout the book, for sure many more will appear wherever you go. But with a solid way of working and good attitude, you are hopefully well prepared for whatever will follow. Remember, it's not about who has all of the knowledge, it's about who knows how to ask the right questions.

Figure 15.4 Topics from the three dimensions of supply chain management

[! Insert Figure 15.4 here !]

As you have seen in the book, supply chain has a lot of different angles, most of them simple but not easy. It's a wide, diverse and complex area, and that's precisely the fun part of it!

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PART TWO: MASTERING THE FUNDAMENTALS

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ANNEX 1: EXPERIENTIAL LEARNING AND THE FRESH CONNECTION

(EXTENDED VERSION)

THE AGE OF ACCELERATIONS

Developments in the world are going faster and faster and as a consequence the world is becoming less and less predictable. As an analogy for expressing this increasing speed of developments, Brynjolfsson and McAfee (2014) cite from a book by Kurzweil published in the year 2000, in which he alludes to “the second half of the chessboard”, based on a story from 6th Century India about the inventor of the game of chess.

As a reward for his invention the inventor asked from his emperor nothing more than to “*place one single grain of rice on the first square of the board, two on the second, four on the third, and so on*”. The emperor approves, thinking that that’s a reward easy to fulfil, not understanding the final amount of rice on the 64th square of the board would “*dwarf Mount Everest*”.

As continue to argue Brynjolfsson and McAfee, “*Kurzweil’s great insight is that while numbers do get large in the first half of the chessboard, we still come across them in the real world. [...] In the second half of the chessboard, however, [...] we lose all sense of them. We also lose sense of how quickly numbers like these appear as exponential growth continues*”. They go on to argue that the rate of change in our world of today might well be reaching the second half of the chessboard soon, and “*like the emperor, most of us have trouble keeping up*”.

21ST CENTURY SKILLS

So if the rate of change keeps increasing and people have trouble keeping up, then the question arises as to what it is we can do to be better prepared for this uncertainty ahead of us. Both in business and in education more and more people speak now about what has become known as “21st century skills”. One of the thoughts behind this list of critical skills is precisely that the world is changing and that therefore changes are also required in the skillset of people, in order to best deal with this new normal.

The World Economic Forum (WEF) frequently publishes an overview of their view on the 21st century skills, based on frequent surveys among a diversity of companies. The most recent list of Top 10 skills that the WEF have come up with at the time of writing of this book is for the year 2020 (World Economic Forum, 2016):

1. Complex problem solving
2. Critical thinking
3. Creativity
4. People management
5. Coordinating with others
6. Emotional intelligence
7. Judgment and decision making
8. Service orientation
9. Negotiation
10. Cognitive flexibility

Not surprisingly, an important number of the skills are related to complexity and how to deal with it, and another important number of the skills is dealing with human

interaction. Apparently, one of the implicit expectations is that we will need to be working more and more in teams in order to deal with the increasing complexity in the world.

Fortunately, not only from business perspective but also in the world of education a similar view can be found. For example, education expert Sir Ken Robinson in one of his recent books on the future of education (Robinson & Aronica, 2015) suggests “*eight core competencies that schools should facilitate if they are really going to help students succeed in their lives [...] They are:*

CURIOSITY – the ability to ask questions and explore how the world works;

CREATIVITY – the ability to generate new ideas and to apply them in practice;

CRITICISM – the ability to analyse information and ideas and to form reasoned arguments and judgments;

COMMUNICATION – the ability to express thoughts and feelings clearly and confidently in a range of media and forms;

COLLABORATION – the ability to work constructively with others;

COMPASSION – the ability to empathize with others and to act accordingly;

COMPOSURE – the ability to connect with the inner life of feeling and develop a sense of personal harmony and balance;

CITIZENSHIP – the ability to engage constructively with society and to participate in the processes to sustain it”.

In other words, the key to solving problems and making decisions is no longer only in what you know, but in what you are able to do, especially in situations with less certainty. Factual knowledge lasts shorter and shorter, but well-developed skills will enable a person to find the most up to date inputs and answers whenever needed. Or as John E. Kelly III, Sr VP of Research and Cognitive Solutions at IBM states, as cited in Thomas L. Friedman's book "Thank you for being late": *"In the 21st century, knowing all the answers won't distinguish someone's intelligence – rather, the ability to ask all the right questions will be the mark of true genius"* (Friedman, 2016).

In a similar fashion, both Microsoft's CEO Satya Nadella as well as Amazon's CEO Jeff Bezos have said in interviews that they believe in the *"learn-it-all's"* over the *"know-it-all's"* (Bariso, 2017 and 2018). Again, skills over knowledge. So, if in the 21st century skills are becoming more and more important to thrive in an ever faster changing world, then how do we train these skills? If a shift of attention in skills is needed, then what is the most appropriate way of learning?

EXPERIENTIAL LEARNING

On the same webpage of the World Economic Forum as mentioned before, the list of skills for the 21st century is linked to the implications it has for education, advocating for example an increased need to focus on Social and Emotional learning as a required complement to more traditional Cognitive learning (World Economic Forum, 2016). But let's try and make that a bit more specific.

Much has been written about the different ways people learn and different schools of thought exist. What many agree upon, in one way or another, is that practical experience is a fundamental part of learning. Ken Robinson and Lou Aronica (2015)

phrase it this way: *“many students learn best when they are actively doing things and not only studying ideas in the abstract: when their curiosity is aroused, when they are asking questions, discovering new ideas, and feeling for themselves the excitement of these disciplines.”*

Also, I'd like to particularly reference the work of David Kolb (2015), whose book “Experiential learning” is a classic book on the topic. Among other important contributions like for example the concept of individual learning styles, Kolb is well-known for what is called the learning cycle.

Figure 0.1 The learning cycle

[! Insert Figure 0.1 here !]

Source: after McLeod (2017), based on Kolb (2015)

The main idea behind the learning cycle is that *“Knowledge results from the combination of grasping and transforming experience. Grasping experience refers to the process of taking in information, and transforming experience is how individuals interpret and act on that information. The experiential learning theory learning model portrays two dialectically related modes of grasping experience – Concrete Experience (CE) and Abstract Conceptualization (AC) – and two dialectically related modes of transforming experience – Reflective Observation (RO) and Active Experimentation (AE). Learning arises from the resolution of creative tension among these four learning*

modes. This process is portrayed as an idealized learning cycle or spiral where the learner ‘touches all the bases’.”

Even though the concept of the learning cycle and the connection to experiential learning were developed well before the start of the 21st century, their spirit seems to fit very well with the training and development of the aforementioned 21st century skills.

In experiential learning, the focus is on going through a first-hand experience, which allows for reflection on what happened and why, leading to forming a conceptual view on the situation, potentially reinforced by existing theories and/or frameworks. This combination will then be the basis for an improved view on the situation, which can then be applied in the next experience, either in class or other study environment, or directly in a real-world situation.

The link between experiential learning and 21st century skills becomes even stronger if the experiences are based on problems or situations which the student will initially find “unstructured” or “new”, in which they need to build up their own understanding of what’s going on. Some would speak about getting the student “out of their comfort zone”. This leads to what Robinson and Aronica (2015) phrase as:

“Effective learning in any field is often a process of trial and error, of breakthroughs punctuated by failed attempts to find a solution”.

Excellent and well-known methodologies for experiential learning in school settings are the case method, as championed by Harvard Business School, projects and teamwork and business simulation games.

MASTERING THE SUPPLY CHAIN

The objective of this book is to fully facilitate for the “*learner touching all the bases*”.

The Fresh Connection business simulation game will be at the heart of this learning experience. In subsequent steps it serves as a vehicle for grasping experience, as well as transforming experience, by using the simulation of rounds of gameplay complemented by conceptual frameworks, as well as active reflecting by the student, leading into a new round of simulation, creating a steep learning curve based on first-hand experience. In addition, fields of direct application outside the simulation tool will be touched upon, to widen the student’s perspective even further.

Parts Two and Three of the book have a direct relationship to The Fresh Connection gameplay. Part Two: Mastering the fundamentals is built on the game’s “standard configurations” which are mostly used in schools and universities, thus allowing students to combine the book with active gameplay. In Part Three: Beyond the fundamentals, we will build on some advanced configurations, which in practice are more widely used in specific corporate training situations. Here, The Fresh Connection will serve to students as a ‘real-life’ case, filled with realistic data, which forms the basis of creatively thinking about future challenges, beyond the ‘standard’ management of a relatively stable supply chain.

ANNEX 2: ABOUT THE BOOK'S WEB RESOURCES

WHERE TO FIND THE BOOK'S WEB RESOURCES?

to be written once defined

OVERVIEW OF WEBCONTENT

- About Inchainge
- FAQ's about TFC
- Overview of decisions in TFC (level sheets)
- Overview of terminology from the game (InfoCenter document?)
- Description login process for a game (incl. reference to lecturer's role)
- Login credentials for analysis phase (ie 'dummy login')
- Bob McLaren & Strategy Director videos (links to YouTube and/or embedded)
- Exercise templates
- Numerical info about:
 - Baseline sales, extra volumes due to promotions
 - Interest rates
 - ...
- KPI overview (KPI's available in the game)
- Overview of interesting SCM links, groups, magazines, etc.
 - Supply Chain Movement, Supply Chain Management Review, Supply chain 24/7
 - APICS, CSCMP
 - ...
- ...