

# Financial Visibility in Supply Chain Losses

Linking risk data and the financial impact of supply chain losses

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To gain access to confidential information and category/country/BU/region mappings, contact [janna.ridderbeekx@kraftheinz.com](mailto:janna.ridderbeekx@kraftheinz.com) for approval and to sign an NDA from the Kraft Heinz company. Then contact [d.r.m.bos@students.uu.nl](mailto:d.r.m.bos@students.uu.nl) for confidential information and category/country/Bu/region mappings.

## Management Summary

Supply chain risk management is a topic of interest for large companies with globalized complex supply chains. By first looking at a general introduction about FMCG (fast-moving consumer goods) companies, we can already learn about the challenges these companies face within their supply chains. Next, we can link these concepts to the Kraft Heinz company and see through a SWOT and Porter's Five Forces analysis what issues it's facing.

After this introduction, we will go over the risk reporting routines established within the Kraft Heinz company and how these routines help us gain insights into the trends we see of the stock in our warehouses. Many reports are created throughout the company, and we will highlight two reports that give information about the risk evolution of stock and week-over-week movements. We also talk about the D&E central sale, a great way of reducing supply chain losses. Some important parts of risk reporting are to gain insights into why a specific item became a risk and what actions are taken to mitigate this risk. We call these the root causes and the mitigation actions. But stock at risk can become financial hits in the form of supply chain losses. Financials hits are such items that we need to sell with a discount since the item has passed its trade BBE date or destroy when it has passed its BBE date.

The problem at hand is that we don't have an in-depth understanding of the financial impact of the SCL (Supply Chain Losses) actuals. There's a lack of information about the types of SCL and information such as the category of the SCL. We also miss a linkage between the financial impact of the SCL and the risk data. For example, we put provision on items at risk, a charge for the likely loss due to destroying the item. But in our current situation, we don't know how the risk data and thus the provisioned items are linked to the SCL actuals.

Thanks to the risk management framework of Manuj and Mentzer, we learn that for companies such as the Kraft Heinz company, we need to improve our information systems to reach maximal benefits in the supply chain. By creating a centralized database with the SCL actuals data from the international zone of the Kraft Heinz company, we can start gaining insights into the SCL actuals. We also learn about different ways to identify risk and look at some risk identification systems. Eventually, we will go over multiple steps of the risk management framework and end with a part about food losses and defining various types of food losses.

The process of creating this centralized database consists of three steps. We first need to collect the correct data. With all the different BUs and countries, there are many various data sources, so we needed to investigate where to get the data from and ensure that we got the correct SCL actuals data. The second step is the aggregation of data. We build BU-specific templates to quickly transform the local SCL actuals data from the different BUs and countries in an automated way. The final step is the linkage between SCL actuals and risk data. By linking the SCL actuals data with the risk data's root causes and mitigation actions, we gain many insights into why certain items became a supply chain loss and what measures were taken to mitigate this loss.

The resulting database helps us get more information about the SCL actuals by looking at the SCL types, categories, channels, and more. And we can link the SCL actuals data with the risk data to understand the reason for these SCL actuals.

Eventually, we can continue to improve the automation of this process, create visuals for the BUs to help them gain insights into their monthly SCL actuals, and add more countries to the routine to get the whole international zone on board.

The centralized database with SCL actuals is a great way to improve the company's information system and thus helps us reduce supply chain losses.

# Introduction

## FMCG Companies

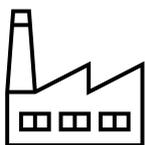
FMCG companies, Fast Moving Customer Goods companies, are known for their large portfolios of products and vast networks of linked supply chains (Bala & Kumar, 2011). A few examples of types of FMCG companies are *Cosmetics and Toiletries* (e.g., L'Oréal), *Beverages* (e.g., Coca-Cola Company), *Tobacco* (e.g., Philip Morris International), and of course *Food* (e.g., Nestlé, the Kraft Heinz Company). Although these companies are seen as examples for companies in other industries for their large and effective supply chains, there are also unique challenges regarding FMCG companies. A notable example is the *bull-whip effect*, the increasing effect of ordering patterns the more you move upstream in the supply chain (Krajewski et al., 2010). A slight shift in the daily demand from customers can lead to large fluctuations in the weekly orders of the suppliers. Another challenge for FMCG companies is *growth*. Most products compete with many alternatives, such as local retailers' private brands (e.g., AH house brand). And some more challenges are *health-conscious buyer behavior* and *inertia* (Sull, 2005). FMCG companies deal with non-durable products. This is a challenge since time is one of the factors to deal with in the supply chain. It's not just the expiration dates we see on the labels of products, but also the date before which retailers want to buy stock (Trade BBE date) that needs to be considered.

Supply chain losses are the cost of resources needed to solve inefficient performances (Lewandowska, 2013). This can be the cost of the product itself which can't be sold anymore, but also the cost of replacing the product, repacking the product, or any other cost involved in this process. Later we will define the meaning of supply chain losses within the Kraft Heinz Company. Below follows an overview of possible supply chain losses at different stages in the supply chain of a general FMCG company (Liddell & Brunekreef, 2018):



### Grower

- Variation in trading prices
- Quality and aesthetic standards
- Contracts based on quality
- Different policies regarding harvesting and selling



### Manufacturer

- Contaminated materials
- Spills and evaporation
- Damaged goods from handling (human errors)
- Machine failure



### Transport

- Improper packaging
- Fluctuations in oil/gas prices
- Decrease of the value of products over time
- External factors (e.g., 2021 Suez Canal obstruction)



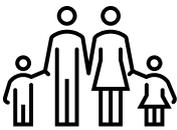
### **Storage**

- Improper refrigeration
- Limited space (e.g., due to write-offs)
- Inefficient inventory accounting
- Inefficient picking



### **Retailer**

- MOQ (minimum order quantity) issues
- End of seasonal promotions
- FIFO (First In – First Out) issues
- Forecast Bias



### **Consumer**

- Limited consumer spending (e.g., 2008 financial crisis)
- Health-conscious buyer behavior
- Foodservice competition
- E-commerce alternatives

Although this is a simple overview of the phases within a supply chain, it might appear that the complexity is structured and easy to understand. But recent developments in the supply chains of FMCG companies have increased the complexity, and thus the potential for supply chain losses. Many factors increase the potential risk of the supply chain, and below three key drivers are stated:

#### *Products and Service Complexity:*

In recent years there has been an increase in demand for product and service variety. This increases complexity (Rush, 2001). Companies realized they couldn't handle this increase alone, and the need for outsourcing has increased.

#### *Outsourcing*

Outsourcing is the collaboration or involvement with other specialized companies to develop and provide parts of the whole (Knight & Harland, 2001). This outsourcing dramatically increases the complexity of the supply chains, and thus the potential for supply chain losses. Outsourcing leads to globalization.

#### *Globalization*

Globalization is the process by which geographical borders are blurring to increase the company's value by introducing more global brands and improving the economies of scale. Globalization is an organic result of the characteristics of FMCG companies, with their large portfolios of brands and networks of supply chains. Another reason for globalization is the introduction of e-commerce, which has helped reach new customers and suppliers (Fee & McIlroy, 1998)

## The Kraft Heinz Company

One well-known FMCG company, and the company at which I did my internship, is the Kraft Heinz Company. The Kraft Heinz company, as the name suggests, is the merger of the Kraft Food Company and Heinz in 2015. It's an American company with headquarters in Chicago and Pittsburgh. The Kraft Heinz Company is one of the food and beverage (F&B) industry leaders worldwide. With an estimated sales revenue of \$26.1B in 2020, it's the 12<sup>th</sup> largest F&B company globally (The Kraft Heinz Company, 2021). Some of its well-known competitors are Nestlé, PepsiCo, and Mars.

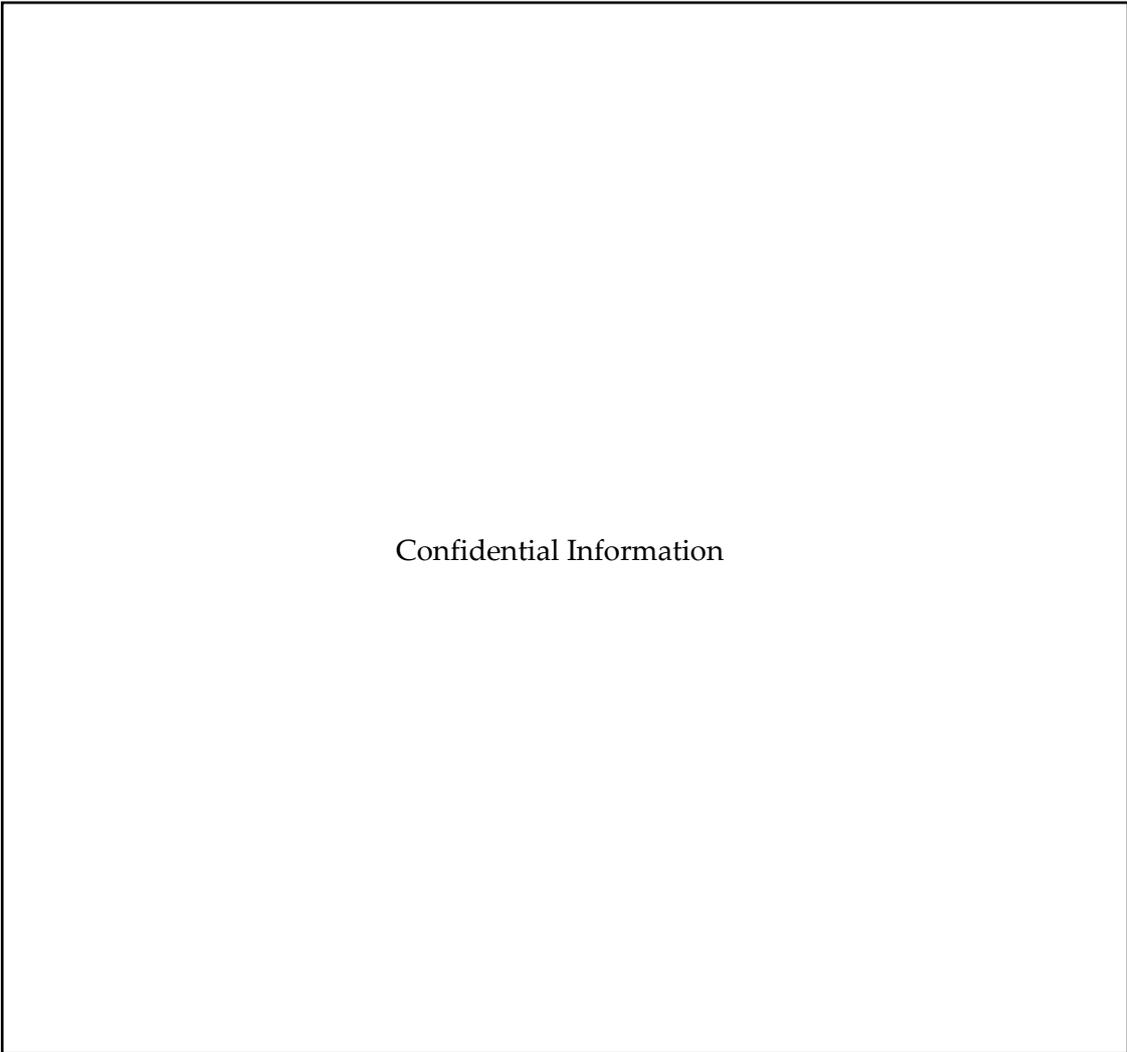
During this report, we will see that the Kraft Heinz Company (KHC) has faced many challenges introduced in the previous section. And this report will show what type of supply chain losses challenges the company has encountered and what actions are taken to deal with these challenges. In this report, after introducing the company, we will look at my work assignments and how the KHC is dealing with the reporting of risk items and supply chain losses, and how these reports lead to insights into anomalies in the supply chain. From my work assignments, we will go into the problem we're trying to tackle with the project I've worked on during my internship. And after this, we will see how this is linked to academic concepts. Finally, we will go over the methods and results before ending with some results and limitations of the project.

Like many other FMCG companies, the KHC has a rich portfolio of globally known brands and more local unknown brands. In *figure 1*, a few of the more well-known brands are stated.



*Figure 1: Selection of brands in the Kraft Heinz Company portfolio*

The collection of brands may seem familiar only for Dutch readers, but the KHC is a truly globalized company with many global brands. We also see this globalized character in the company structure. See *figure 2* for an overview of the company structure. The company's international structure also reveals one of the problems we will encounter later in the project. With the many different BUs and countries come many different data formats and data sources.



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*Figure 2: International Company Structure*

The KHC also distinguishes itself from other F&B companies because of its company values. Besides its perfect score on the *Corporate Equality Index* (The Kraft Heinz Company, 2019), which is a measure of LGBTQ+ inclusion within a company, it's also focused on its strong purpose (a broadly defined and enduring statement that distinguishes the company from others) and its vision (a coherent and powerful statement of what the business should aim to become) (Jobber et al., 2006). Both help in creating uniformity within the global BUs of the company.

**Purpose:**

LET'S MAKE  
LIFE  
**Delicious**  
KraftHeinz

**Vision:**

**To sustainably  
grow by delighting more  
consumers globally.**

## SWOT Analysis

Below one can find a SWOT analysis of the KHC. This gives us a better understanding of the company's position and where there are still growth opportunities. The strengths and weaknesses in the SWOT analysis are inherently linked to the supply chain losses of the KHC.

<b>Strengths</b>	<ul style="list-style-type: none"><li>Skilled employees through training and internal academies</li><li>Strong brand names and diverse portfolio</li><li>Complex and robust supply chain</li><li>Dominant market share in multiple categories</li><li>Global network and geographic diversification</li><li>Employee satisfaction (e.g., <i>Corporate Equality Index</i>)</li><li>Well positioned and established company</li></ul>
<b>Weaknesses</b>	<ul style="list-style-type: none"><li>Inertia</li><li>History of failure in merging firms with different work cultures</li><li>Reputational damage due to advertising controversies</li><li>Product recalls having led to reputational damages</li><li>Use of plastic and other environmentally unfriendly materials</li><li>No direct sales to customers</li><li>Risk of internal cannibalization</li></ul>
<b>Opportunities</b>	<ul style="list-style-type: none"><li>New technology</li><li>Decreasing costs of transport</li><li>Growth of new health-conscious categories</li><li>Acquisitions of smaller brands</li><li>Product innovation</li><li>Marketing innovation due to new forms of media (e.g., creating viral videos)</li><li>Emerging markets (Africa, Asia)</li></ul>
<b>Threats</b>	<ul style="list-style-type: none"><li>Seasonal fluctuations</li><li>Imitation/counterfeit products in low-income countries</li><li>Increasing labor wages in western countries</li><li>The cost of raw materials is rising</li><li>Intense competition from other F&amp;B companies</li><li>Covid-19</li><li>Currency fluctuations due to operations in multiple countries</li></ul>

As stated, the strengths of the KHC, such as their globalized and complex supply chain, increase the risk of potential supply chain losses. When everything is running according to plan, these are significant strengths, but unplanned disruptions become weaknesses. There are still opportunities in new markets, leading to an even more complex supply chain that needs a strong risk management system to reduce losses.

## Porter's Five Forces Analysis

To close this section about the KHC, we will use Porter's Five Forces analysis to examine its position compared to its environment.

<b>Threat of new entrants</b>	MEDIUM	To become a company as large and established as the KHC, many years need to pass, a strong supply chain needs to be developed, and high levels of investment need to be introduced. The economies of scale that the KHC enables is hard to imitate for new entrants. So, the threat of new entrants on this level is low. But looking at specific categories, the threat increases. Smaller companies can enter the market focussed on one specific category. Most countries have no government policies regarding entry into the food industry, and raw materials are becoming easier to access (although more expensive).
<b>Threat of new substitutes</b>	HIGH	There are many substitutes, but consumers value the quality of the KHC products and won't easily switch to other low-quality brands. The threat of food service is increasing but isn't at the same level as retail yet. On the other hand, products such as ketchup, mac & cheese, biscuits, etc., can easily be manufactured at home. Many other large food and beverage companies have similar products with similar quality. Brand loyalty is one of the primary key drivers that keep the consumers coming back for the KHC products.
<b>Bargaining power of suppliers</b>	MEDIUM	For some materials such as packaging, the KHC has an advantage since they can easily switch suppliers who want those large orders from the KHC. This is more difficult for other materials, such as tomato paste, since selecting new suppliers depends on tenders and are large multi-year contracts. This makes it difficult to switch suppliers easily.
<b>Bargaining power of buyers</b>	MEDIUM	the KHC has a vast customer base, widely spread geographically. Besides the smaller transactions in retail locations, there are also deals with large food service establishments. Recently the KHC closed a deal with Disneyland Paris (Disneyland Paris, 2021). One of the problems could be the consumers at retail locations preferring lower prices and more health-conscious products, something they can find at other companies. Hits on the company's reputation can also influence the consumers' buying behavior.
<b>Rivalry of existing competitors</b>	HIGH	the KHC is facing stiff competition from other large F&B companies. Most of these companies are established in the same markets and fight over customers. Besides the larger companies, smaller established companies focusing on one category and therefore reducing price and increasing quality make the rivalry among existing competitors large.

## Context

### Work Assignments

During the seven months of my internship, besides working on the project, there were a lot of work assignments that I needed to fulfill on a weekly or monthly basis. Besides these work assignments helping the company, they also helped me better understand certain supply chain losses and risk concepts. This understanding further helped me develop my project and understand the problems we wanted to solve.

As I was working on the Supply Chain Losses International team, my main task consisted of collecting and reporting risk data from the BUs and countries in the international zone. Every week, the different BUs would provide me with their weekly risk data, and I would update multiple risk data files (more on these files and the meaning of risk data in the next section).

A second task during my internship was preparing files for the countries in region 7 such that they could go over the risk data and see what actions should be taken to mitigate the risk of these items. This also involved chasing those who provided me with the input data and ensuring the files were ready on time before the region 7 countries would go in their weekly meetings.

I've also created several reports on a weekly or monthly basis (more on these reports in the following sections, and examples of how these reports helped raise alarms when unexpected peaks of drops in risk data happened).

### International Supply Chain Losses Risk Data

The main file that needed to be updated was the *International SCL Risk Data* file. As stated earlier, all the BUs and countries would provide me with their risk data every week. Essentially this is an update about the stock in the warehouse and information about this stock. Below I will go over some of the data points in this file.

#### Risk Bucket

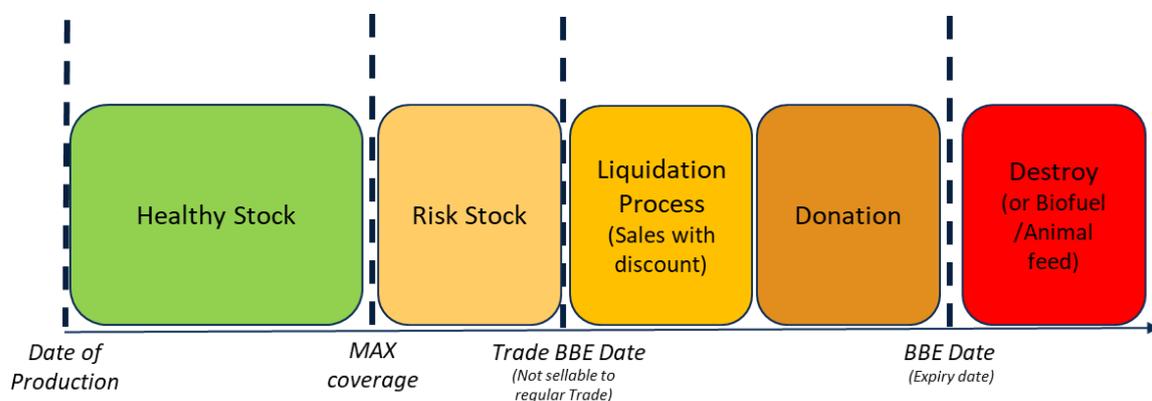


Figure 3: Product Life Cycle

Every item has a trade BBE date (Best Before End). This is the date after which the item is not sellable to regular trade anymore. With regular trade, we refer to selling the item without discounts. When an item is approaching its trade BBE date, we say it is at risk. In *figure 3*, one can see the product life cycle. When an item passes its BBE date (expiry date), it is not consumable anymore. We define a few risk buckets based on the trade BBE date of an item; these can be found in *figure 4*.

<b>Risk Bucket</b>
No Risk Inventory
>120 Days to trade BBE
91-120 Days to trade BBE
61-90 Days to trade BBE
31-60 Days to trade BBE
0-30 Days to Trade BBE
Past trade BBE
Past BBE

*Figure 4: Risk Buckets*

It's important to note that not all items in stock are at risk. Even some items close to their trade BBE date aren't at risk. We define items at risk as those items that, according to their forecast, won't be consumed anymore by sales before passing its trade BBE date. For example, some items in the *no risk inventory* bucket have already been sold but are still waiting to be shipped. So, for all the items in the risk data, we want to know in which risk bucket they fall.

*Material Number:*

Every item sold by the KHC has a material number. This is a unique number to identify what item we are referring to.

*Material Description:*

Every item has a unique material description. This is the item's name, with often the item's size. For example, *Ketchup Heinz BOT Mx 16/14OZ*.

*Channel:*

The channel tells us something about where the item should be sold. The different channels are:

*Retail* (These are the items sold to consumers through retailers such as supermarkets)

*Foodservice* (these are the items sold in larger quantities to foodservice locations)

*Export* (these items will be exported to other countries that do not have their own BUs, for example, country **a** or country **b**, or sold through brokers and distributors.)

*Affiliate* (These items are like export)

*Country:*

The following countries are listed:

**A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T**

*Category*

Every item in the risk data also falls under a specific category. We define two types of categories: the local and the international categories. *Figure 5* shows how the different categories are linked with an example of an item for each international category.

<b>International Category</b>	<b>Local Categories</b>	<b>Example</b>
I		
II		
III		
		Confidential Information
IV		
V		

VI

VII

VIII

IX

Confidential Information

X

XI

*Figure 5: International and Local Categories*

### *Value and Quantity:*

For each item, the value and quantities need to be stated. The value is stated in USD\$. With value, we refer to the COQs value, the *Cost of Goods Sold*. This is the cost of manufacturing and selling the product. The quantity is stated in boxes. For example, if one ketchup package contains six bottles, the quantity is 1, not 6.

### *Mitigation Actions:*

For stock at risk, the BUs also define a mitigation action. This set of 10 standardized actions tells us something about the steps taken to mitigate the risk.

- 1. Sell to customer (in negotiation)**  
Offered to regular retail/foodservice customers but no confirmation yet.
- 2. Sell to customer (sold)**  
Sold to regular retail/foodservice customer (confirmed); waiting to ship out.
- 3. Negotiating Trade BBE**  
Requested regular customers to accept below Trade BBE (derogation).
- 4. Sell to clearance (in negotiation)**  
Offered to clearance customers/brokers (selling with discount), but no confirmation yet.
- 5. Sell to clearance (sold)**  
Sold to clearance customers/brokers (confirmed); waiting to ship out.
- 6. Donation**  
Donation to foodbank/salvation army/ etc.
- 7. Master data issues**  
False risk (can be multiple issues).
- 8. Sell Centrally**  
Offer to other countries through D&E central sale (more on this routine in the following sections).
- 9. Rework to Another SKU**  
Rework to another SKU and offer new SKU to customers.
- 10. Write-off**  
Item cannot be sold/donated

### *Root Cause:*

For each item, we also want to have the root cause. The root cause explains why a specific item became a risk. The root cause is defined by a root cause decision tree with three levels (see *Figure 6*). BUs can use this decision tree to define the correct root cause for items at risk. After the root cause decision tree figure, we will give an overview of the root causes in *figure 7*. There are four main root causes: Commercialization, Demand Management, Supply, and False Risk. In the academic review of this report, we will talk more about risk identification and how the root causes defined by KHC compare to other risk identification systems.

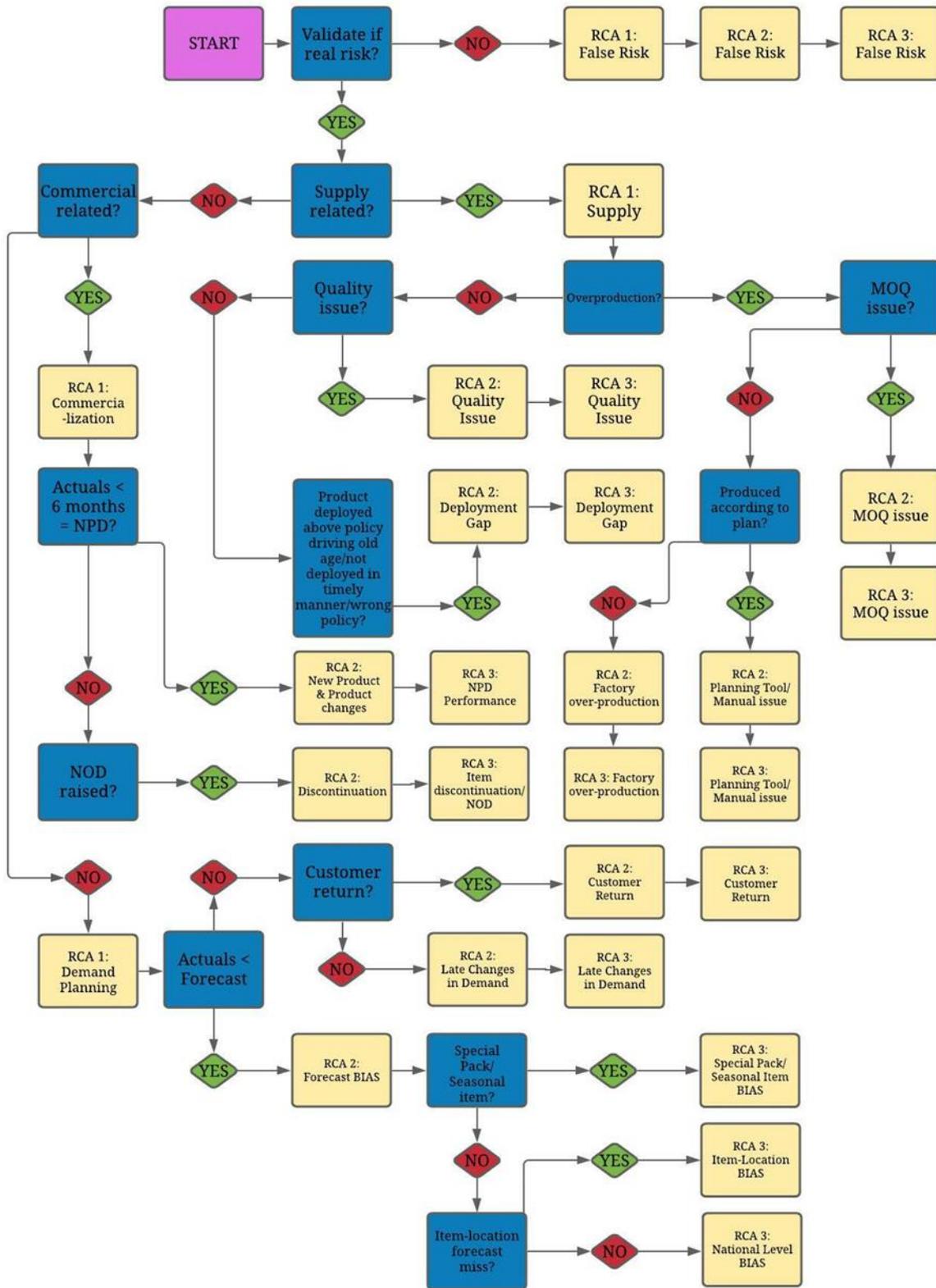


Figure 6: Root Cause Decision Tree

<b>Root Cause 1</b>	<b>Root Cause 2</b>	<b>Root Cause 3</b>
Commercialization	New Products & Product Changes	NPD Performance ( <i>New Product Development</i> )
Commercialization	Discontinuation	Item Discontinuation/NOD ( <i>Notice of Discontinuation</i> )
Demand Management	Forecast BIAS	National Level BIAS
Demand Management	Forecast BIAS	Special Pack/Seasonal Item BIAS
Demand Management	Forecast BIAS	Item-Location BIAS
Demand Management	Late Changes in Demand	Late Changes in Demand
Demand Management	Customer Return	Customer Return
Supply	Supply Excess Production	Planning tool/ Manual issue
Supply	Factory Over-Production	Factory Over-Production
Supply	MOQ issue	MOQ issue
Supply	Deployment Gap	Deployment Gap
Supply	Quality Issue	Quality Issue
False Risk	False Risk	False Risk

*Figure 7: Root Causes*

## Risk Reporting

Now that we've seen all the data in the *International SCL Risk Data* file, we can see what type of reports are created using this file and give some examples of how these reports have helped us spot unexpected trends in the risk data evolution and reduce supply chain losses.

### *Risk Summary*

At the beginning of each month, we are creating a slide we can use to present the risk evolution of the international zone. With this slide, we want to look back on the risk evolution until that point and gain insights into the future development of the risk evolution by looking at the trends in the graphs. The data in the charts are from the beginning of December 2021.

The two graphs in *figure 8* show the risk evolution in k\$, split between two risk buckets. Past TBBE stock, sometimes referred to as aged stock, and 0-90 Days to TBBE stock, sometimes referred to as long-term risk. Both graphs give us a better understanding of the risk value evolution, and we quickly see if the risk value is going down, which is a positive development.

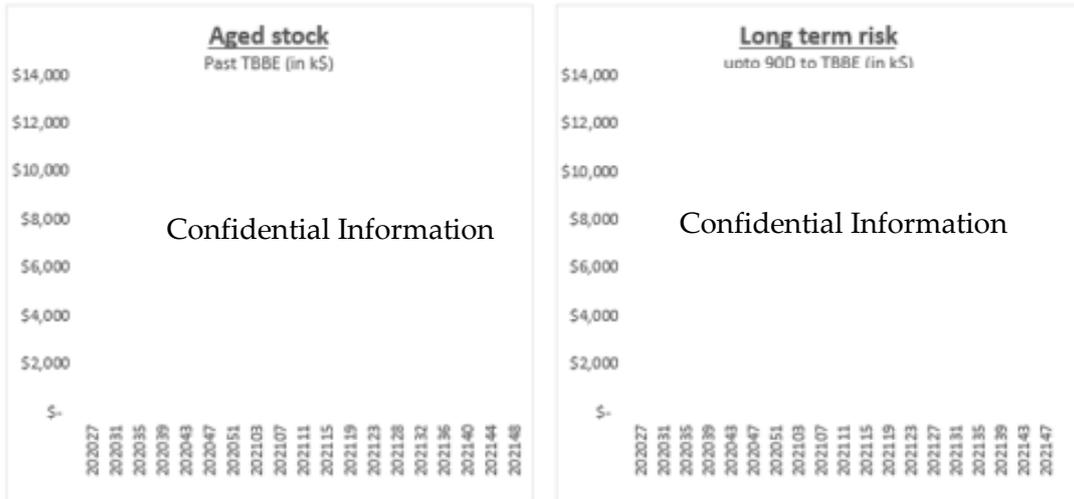


Figure 8: Risk Evolution Graphs

In the table in *figure 9*, we see the week-over-week movements of the different BUs in the international zone. We compare the risk value in k\$ of the current week (both Past TBBE + 0-90 Days to TBBE risk stock) with one week ago, two weeks ago, four weeks ago, eight weeks ago, and 12 weeks ago. For example, when we look at BU 1, we see that compared to the previous week, we have a decrease of \$XXXk in risk value for the risk buckets Past TBBE and 0-90 Days to TBBE.

BU	L1	L2	L4	L8	L12
Confidential Information					
<b>Grand Total</b>					

Figure 9: Week over week movements

In the table in *figure 10* on the left, we see the international categories and the risk value in the current week. So, this is a snapshot of week 48 and not a risk evolution. This gives us a quick understanding of which categories are at risk. We see that the category X has the highest risk. But it's also the category that's sold the most.

In the graph on the right, we see the top 10 regions with the risk value of the current week. And besides that, we also have a column with % Annual COGs. This gives us an indication of the size of the risk value compared to the forecast of the cost of all items manufactured this year. We can see that the country T has the highest risk value, but country N has the highest percentage of annual COGs, which is a more critical measure to track.

Category	Value (k\$)	Region	Value (k\$)	% Annual COGs
Confidential Information		Confidential Information		
<b>Top-10 total</b>		<b>Top-10 total</b>		
<b>Total Intl.</b>		<b>Total Intl.</b>		

Figure 10: Top 10 Categories and Regions

The last table on the risk summary slide gives us an overview of the top 10 SKUs (or top 10 items) with the highest risk value in the current week; see figure 11. For the top 10 items, we've stated the country, the risk bucket, the COQs value, the root cause, and an action/comment. The action tells us something about the steps taken to reduce the risk; this can be in the form of negotiations about the trade BBE with customers or selling the items with a discount. These actions are comparable to the ten mitigation actions discussed before.

	Material Description	Country	Risk Bucket	COQS Value	RCA	Action
1			PAST TBBE	Confidential Information	Masterdata issue	Didnt order a shipper in time but they will still order it (orders expected this month)
2			PAST TBBE		NPD performance	NOD raised; last stock offering with discount to regular customers
3			PAST TBBE		NPD performance	NOD raised; last stock offering with discount to regular customers
4			RISK TO TBBE		Forecast BIAS	Blake more & Brakes current customers. To check production qty
5			PAST TBBE		Forecast BIAS	Trade BBE extension accepted by CostCo
6			PAST TBBE		Forecast BIAS	Export team + Expansion region liquidatng
7			PAST TBBE		NPD Performance	Donation
8			RISK TO TBBE		Forecast BIAS	Sell to customer
9			RISK TO TBBE		Forecast BIAS	Will be cleared if Lidl contract gets confirmed
10			PAST TBBE		Plannig tool/ Manual issue	Delist in ASDA but, should now sell all of current stock through bargain stores in the UK.

Figure 11: Top 10 SKUs

Now that we have seen the graphs and figures created for the risk summary slide, we can look at an example of how these slides warn us when unexpected events happen.

Back in October, country L switched its inventory system to SAP. Due to this switch, issues arose with the Trade BBE dates of the items at risk. Meaning that we saw a massive increase in risk values for country L as if all the items were going to pass their Trade BBE dates soon. Looking at the week-over-week movements from November in Figure 12, we see a massive increase in risk for BU 3 compared to the last four, eight, and 12 weeks before.

We've contacted country L, and they explained the reason and told us they are going to fix the system and fix the TBBE dates. We slowly saw the risk go down in the following weeks, and the trade BBE dates in their SAP system were returned to their original state.

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**Grand Total**

Figure 12: Week over week movements from Week 44

*International Finished Goods Risk in Stock update*

On Mondays, I would collect all the different data from the BUs (including the mitigation action plans) from the previous week, and I would clean and check the data for it to be used by my colleague, who would create the *international risk in stock update*. This international risk in stock update is shared with the international zone every week. Below we will go over the graphs that are created for this update. This is data from Week 1, 2022.

The graph in *figure 13* shows the risk evolution of the four risk buckets (Past TBBE, 0-30 Days to TBBE, 31-60 Days to TBBE, and 61-90 Days to TBBE). In this graph, we can see decreasing or increasing trends in risk value. Currently, we see a decreasing trend in risk value, which is a good sign.

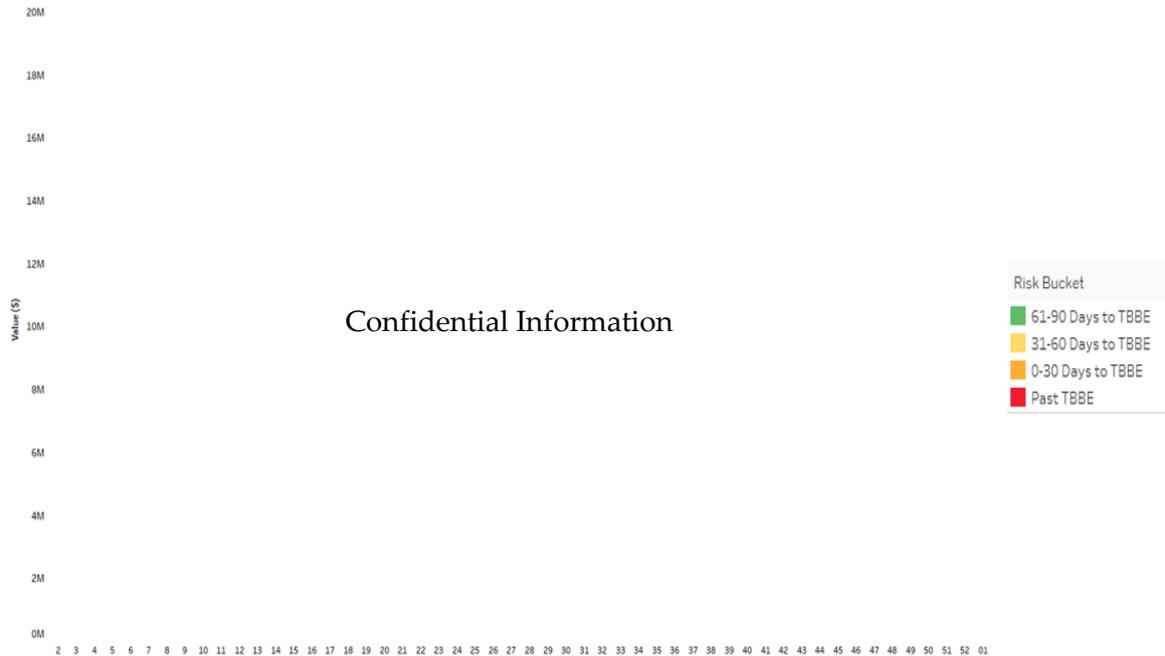
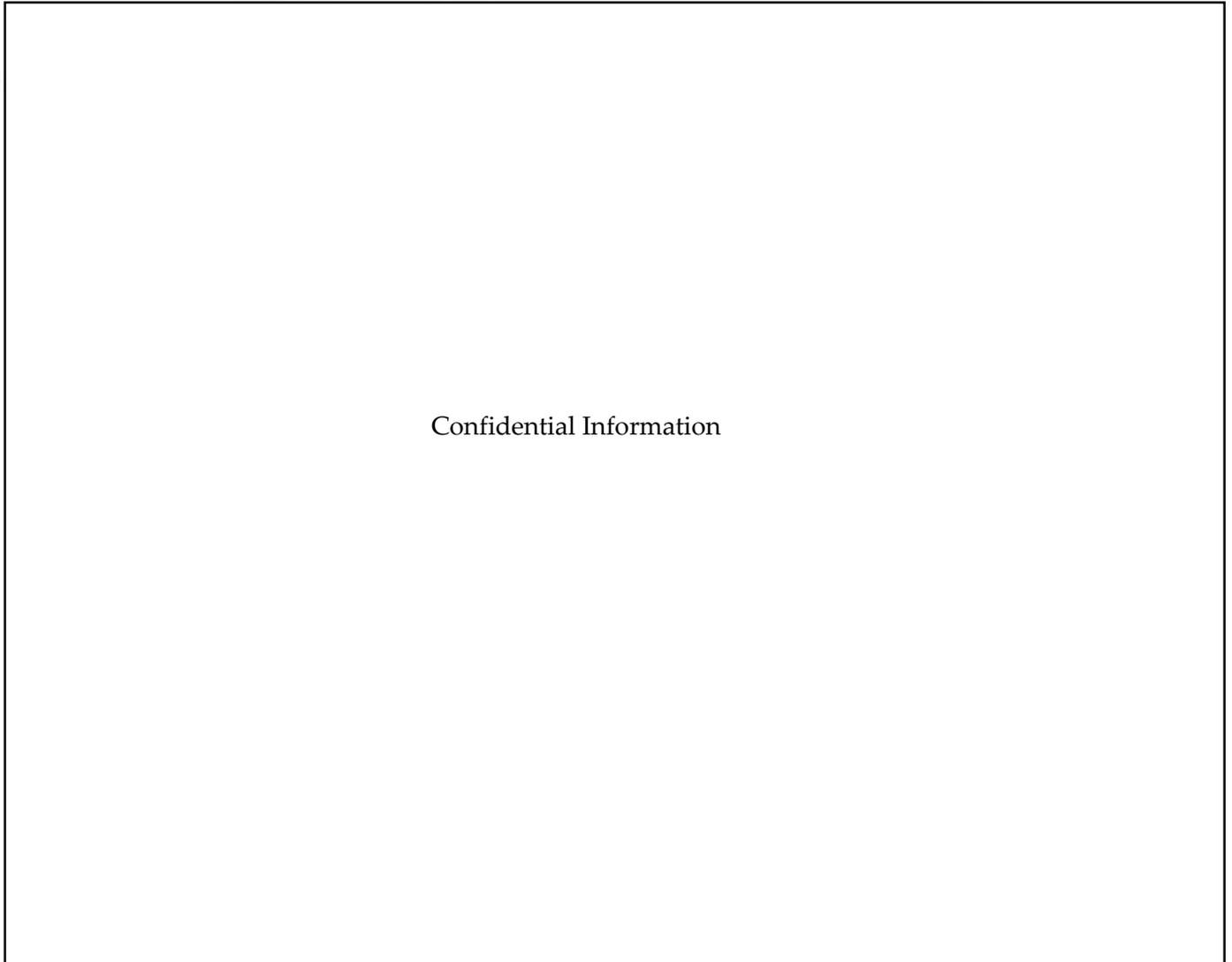


Figure 13: Weekly Past TBBE and 0-90 Days to TBBE Stock Evolution

On the map in *figure 14*, we see all the BUs in the international zone. Indicated in each country, we see the percentage of COQs at risk, meaning how much is at risk compared to the total yearly forecast or the annual operating plan (AOP). For example, for country **S**, we see a percentage of 0.3% at risk because this week, the risk value is \$XXXk, and the COQs AOP for 2021 is \$XXXM. We quickly understand which countries have more items at risk compared to their COQs AOP.



*Figure 14: % of COQs at Risk*

The table in *figure 15* is comparable to the week-over-week movement table in the risk summary slide. But here, we see a clear split between the four risk buckets (Past TBBE, 0-30 Days to TBBE, 31-60 Days to TBBE, and 61-90 Days to TBBE). This table compares the current week's risk value with last week's risk value. Values in green mean the risk value has decreased compared to the previous week, and values in red indicate the risk value has increased compared to last week.

0-90 Days to TBBE						Past TBBE	
0-30 Days to TBBE		31-60 Days to TBBE		61-90 Days to TBBE		Past TBBE	
Value (\$)	WoW Δ (\$)	Value (\$)	WoW Δ (\$)	Value (\$)	WoW Δ (\$)	Value (\$)	WoW Δ (\$)

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Figure 15: Week over Week Overview (0-90 Days to TBBE and Past TBBE)

In the graph in figure 16, we see the BUs and the risk value of each category in this BU. In the legend on the right, we can see what color belongs to which category. Categories **XI**, **X** and **V** are the largest categories in risk value. But we must keep in mind that these are also the most prominent categories being sold.

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Figure 16: International Category per BU

In the graph in figure 17, we see the BUs and, per mitigation action, the risk value. Meaning we've linked most items (we try to keep a maximum of 20% of the risk value blank) with a mitigation action. On the right, one can find the legend of this graph. This gives us a quick insight into different BUs' efforts to reduce risk.



Figure 17: Mitigation Action per BU

The final image shared in the international risk in stock update is the top 10 SKUs; see figure 18. But instead of including both Risk to TBBE and Past TBBE (such as in the risk summary), this table only consists of the top 10 SKUs past TBBE. We can also find the mitigation action for these items. As part of preparing the data to create this table, I need to ensure that the

top 10 items each have a mitigation action. These actions are sometimes stated by the BUs, but sometimes I need to contact colleagues in different BUs to get information about a specific item and its mitigation action.

Material	Material Description	BU	Country	Category	Risk Bucket	Mitigation Action
					Past TBBE	Donation
					Past TBBE	Negotiating Trade BBE
					Past TBBE	Sell to Clearance (in Nego..
					Past TBBE	Sell to Customer (in Nego..
					Past TBBE	Sell to Clearance (in Nego..
					Past TBBE	Sell to Clearance (in Nego..
					Past TBBE	Sell to Clearance (in Nego..
					Past TBBE	Negotiating Trade BBE
					Past TBBE	Negotiating Trade BBE
					Past TBBE	Sell to Customer (in Nego..

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Figure 18: Top 10 SKUs (Past TBBE)

### D&E Central Sale

The D&E central sale is a monthly process in which stock that local customers in region 7 countries don't want to buy is offered through distribution and export to other countries. This is an excellent example of reducing supply chain losses. All region 7 countries (except country S) are part of the D&E central sale.

At the end of each month, I will ask the countries to update their action plans for the current stock at risk, such that we know which items can be offered through this sale. Then in the first week of each month, I will make a list of items that can be offered through the D&E central sale. A few rules apply when making this list:

The stock can't have less than 37 days till the BBE date (expiration date). This is such that there's enough time to sell stock in the other countries without it expiring.

We also exclude some infant food stock since there are stricter laws for this category than other categories.

In figure 19, we see an overview of the value of items offered during the P08 (August) – P01 (January) D&E central sale cycles and how much of this stock has been sold during the central sale process. We see an average of XX% of the offered stock being sold, with low sales in September and high sales in October. Stock that isn't sold through this process can either be offered again in the next cycle (depending on the expiry date) or be put forward for donation.

Year	Month	Offered (k\$)	Sold (k\$)	% stock sold of stock offered
2021	P08			
2021	P09			
2021	P10			
2021	P11			
2021	P12			
2022	P01			
	<b>Average</b>			

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Figure 19: D&E Central Sale, items offered vs. items sold

## Problem

In the previous sections, we've only talked about reporting risk data. So, items in our warehouse that are either approaching their trade BBE date or have passed their trade BBE date. This section will introduce the SCL Actuals, the financial hits of items that weren't sold to regular trade or weren't sold at all.

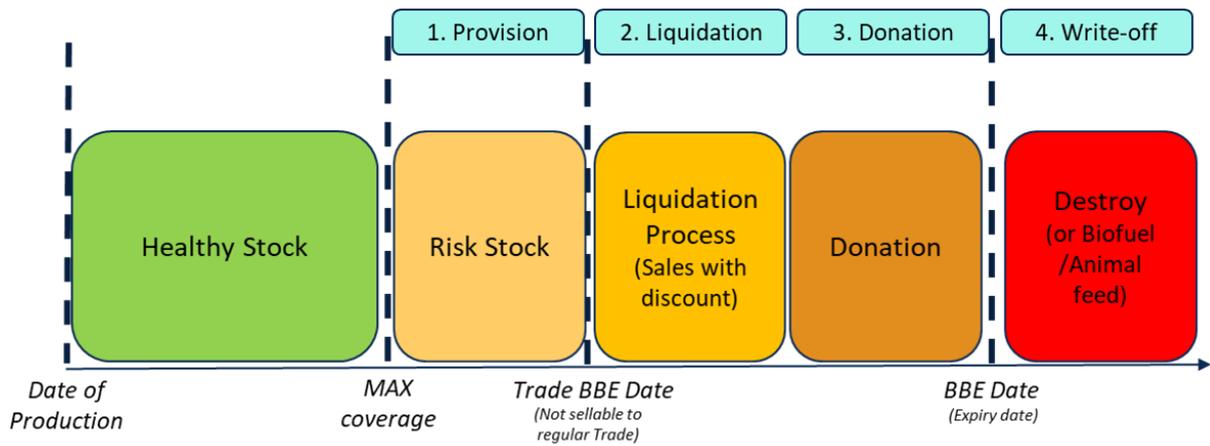


Figure 20: Product Life Cycle and SCL Actuals

To be prepared for a possible hit on the financials, items at risk are in *provision*. This is a charge for the likely loss due to having to destroy the item. Based on the BBE date (or TBBE date in the case of country A), this is a rate that calculates a certain percentage of the total COQs value of the item. Each BU has a different set rate for the provision. In *figure 21*, the rates are given, and below there is an example of how we calculate the provision change.

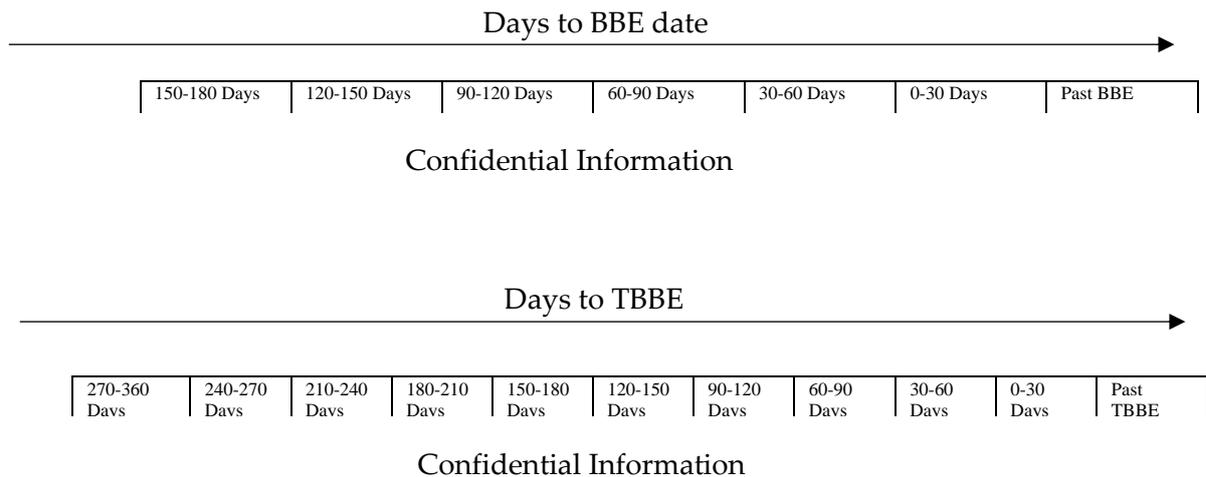


Figure 21: Provision rates

### *Example:*

Item X in country A has a COQs value of \$10,000. Today is 1/1/2022, and the TBBE date is 3/30/2022. So, to calculate the current provision, we look at the days to TBBE, in this case, 88 Days. Then, looking at the provision rates for country A, we see this yields a provision rate of 65%. So, the hit is \$6,500. But we are not interested in the provision snapshot but in the provision change month over month. So, we take this \$6,500 and subtract last month's provision, where the provision rate was 60%; thus, the provision was \$6,000, and we conclude that the provision change for item X is \$500 in the current month.

If the item has passed its trade BBE date, we can't sell it to regular trade anymore and need to start the *liquidation process*. This is the process in which items are sold with a discount. If this process isn't successful, we will *donate* the item. And if all of the previous actions didn't work, we need to destroy the item (or sometimes offer it as biofuel or animal feed). These items are called *write-offs*. See *figure 20* for an overview of these four types of SCL and how they relate to the product life cycle.

### *Problem*

The problems we're tackling with the project are firstly that there is no in-depth understanding of the supply chain losses actuals data. The current situation of SCL actuals reporting is very limited in information. The only information we have is which of the following sub-packages the items fall under:

#### **Planning Commercial**

Supply chain losses due to products being discontinued by customers or removed from promotions by a customer, but production has taken place according to forecast.

#### **Innovation**

These are the NPDs (New Product Development). The supply chain losses include new products, special packs, promotional graphics (including coupons), and limited-time offers.

#### **Discontinuation**

These are the NODs (Note of Discontinuation). The supply chain losses are due to the cost of raw & pack materials and left-over stock.

#### **Planning**

Supply chain losses due to forecast biases and other planning issues on the supply side. This includes overproducing according to the forecast and planning tool issues.

#### **Internal Damage**

Supply chain losses on saleable finished goods which are destroyed due to handling in the warehouses or during transportation.

#### **Inventory Counting Losses**

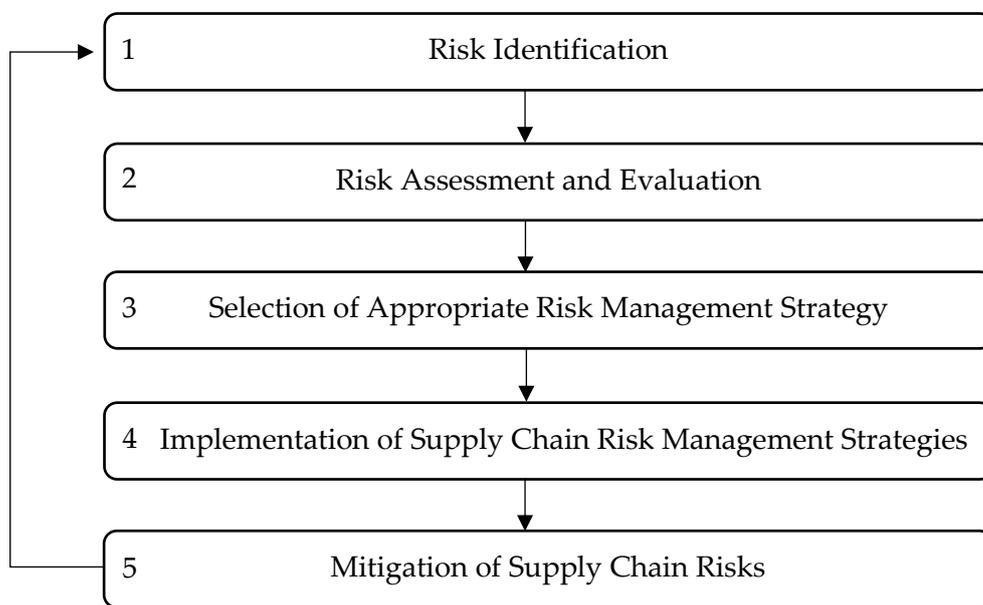
Losses identified through physical counts or other inventory discrepancies.

The second problem we want to solve is that there's no linkage between the risk and the SCL actuals. So how are the financial hits of SCL correlated to the stock in our warehouses? For example, we want to know how many of the items at risk are already provisioned for.

## Academic Review

Before we go into the project's methods and results, we'll first show how this project is linked to academic concepts about risk management and supply chain losses (more specifically, food losses).

In this academic review, we will go over the framework offered by Manuj & Mentzer (2008). See *figure 22* for an overview of the framework. This is a framework for the global supply chain risk management process, and with the help of this, we will go over concepts that can help assess and mitigate risk. We will see how these concepts are related to the project we've worked on to better understand the supply chain losses within the KHC and how this framework might help in risk management within the KHC.



*Figure 22: Global Supply Chain Risk Management*

### *1. Risk Identification*

There's no clear census in literature as to what types of risk are the standard. Kleindorfer & Saad (2005) only identified three different types of risk based on sources and vulnerabilities of risk: Operational chance occurrences, Natural hazards, and Terrorism & political instability. These three types of risk don't give the full scope of possible risk in a supply chain. Tang & Tomlin (2008) identify six types of risk: Supply, Process, Demand, Intellectual Property, Behavioural, Political. These six types of risk are more comprehensive and identify all aspects of the risk in supply chains.

For an even more comprehensive overview of risk factors in the supply chain, one can find the fishbone diagram in *figure 23* (Sun et al., 2015). The fishbone diagram is the most comprehensive overview of possible risk factors in the supply chain. It reveals that deciding the correct form of risk identification can take many different routes and should be determined based on the company's preferences.

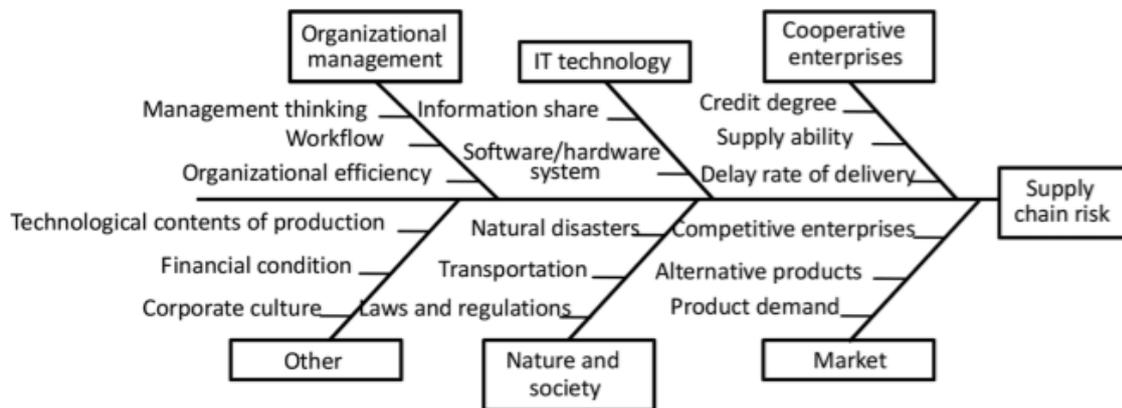


Figure 23: Fishbone diagram of risk factors in the supply chain

Risk can also be divided into quantitative and qualitative risk, where quantitative risk includes losses like stock-outs and unavailable stock. And qualitative risk consists of a lack of accuracy in the supply chain.

Within the KHC, we identify four types of risk, based on the root causes found in *figure 7*: Commercialization (risk due to new product development or product discontinuation), Demand management (risk due to forecast biases, changes in demand, and customer returns), supply (risk due to production issues) and False risk. Although within the demand management root cause we can find the changes in demand, which also implicitly entails political issues, it would be beneficial to create a new root cause based on political issues, such as the types of risk relating to political issues found in other risk identification systems mentioned above. The KHC operates in such countries where political instability plays a role in the supply chain.

## 2. Risk Assessment and Evaluation

Risk assessment is possible in either of the two following ways. First, when objective information is available, probability distributions can be used to derive supply chain risks. If this information is not available, beliefs and judgment can be used. A few techniques for risk assessment within the supply chain are:

**Delphi Method:** This is a method in which multiple experts in the fields of risk, cost, or scheduling forecast the demand for certain items and thus forecast the risk. After which, an analyst will review these forecasts and summarize them (Melnyk et al., 2009). The strength of this method is that group judgments yield better results than individual judgments.

**Monte Carlo Estimation:** This technique helps understand the impact of risk in the form of a forecasting model (Kroese et al., 2014). This mathematical method will help you decide best-case and worst-case scenarios for forecasting with the involvement of random variables.

**Decision Analysis:** This approach is used in assessing supply chain risks. It's used primarily for evaluating sourcing decisions (Berger et al., 2004).

Within the KHC, the *Monte Carlo Estimation* method is used to assess risk on forecasts.

Risk evaluation may take similar forms as tender processes. For example, when a company wants to decide on a new supplier, risk can be evaluated by ranking risk categories such as laws and financial situations, and the best supplier can be chosen.

### *3. Selection of Appropriate Risk Management Strategy*

Within risk management, the main goal is to prevent risk. Risk management strategies aim to reduce the probability of financial losses. Lee (2002) suggests four types of supply chains that aim to help prevent risk:

**Efficient:** Supply chain focussed on cost-efficiency

Achieving this type of supply chain means cost-cutting on non-value-added activities, optimizing utilization of transport and warehouses, and focussing on economies of scale.

**Responsive:** Supply chain focussed on flexibility

Achieving this type of supply chain means using build-to-order and customization processes to adhere to specific requests from customers.

**Risk-hedging:** Supply chain focussed on sharing of resources and risk

Achieving this type of supply chain means multiple and alternative sourcing and increasing shared safety stock with other companies.

**Agile:** Combination of responsive and risk-hedging

Achieving this type of supply chain means combining those actions from responsive and risk-hedging supply chains.

The table in *figure 24* shows the supply uncertainty versus the demand uncertainty, with the corresponding type of supply chain strategy. Also included are examples of items produced by companies with that type of supply chain.

		Demand Uncertainty	
		Low	High
Supply Uncertainty	Low	<b>Efficient Supply Chain</b> Grocery, food, oil	<b>Responsive Supply Chain</b> Fashion, pop music
	High	<b>Risk-hedging Supply Chain</b> Hydro-electric power	<b>Agile Supply Chain</b> Telecom, semiconductor

Figure 24: Uncertainty framework and matched supply chains

With medium supply and demand uncertainties, as stated in Porter's five forces analysis in the introduction of this report, the supply chain that benefits the KHC most fits the efficient supply chain type. To benefit from the efficient supply chain, a company needs to build competitive advantages around the predictable demand and supply patterns. Either by improving the production (think the Toyota Production System) or improving the information coordination, a company with an efficient supply chain can gain competitive advantages.

#### 4. Implementation of Supply Chain Risk Management Strategies

Implementation of supply chain risk management strategies relies on a few key factors (Freedman, 2003).

##### *Communicating the strategy:*

Internal and external stakeholders should be entirely up to date about the new strategy and their roles within the new implementation.

##### *Driving Planning:*

Operating plans should be based on the new strategy rather than financial incentives.

##### *Aligning the Organization:*

The organizational structure should be set against the new strategy. For example, this could mean that a company's structure is compatible with the competitive advantages or aligns with the primary products and market segments.

##### *Reducing Complexity:*

As stated in the introduction of this report, we know that FMCG companies are known for their complex and widespread supply chains. Reducing complexity within a supply chain can mean increasing the flexibility of the supply chain.

One definition of flexibility is “the ability to change or react with little penalty in time, effort, cost or performance” (Upton, 1994, p. 73). Inertia within a supply chain increases complexity because any small changes would influence large parts of the chain. Flexibility mitigates this.

### *5. Mitigation of Supply Chain Risks*

Now with all the previous strategies and implementations, risk will always happen. We can try to reduce them and succeed in this, but we can't prevent them altogether. Mitigating supply chain risks can take many forms, and it's essential to look at possible options for when certain risks occur. For example, backup suppliers, transport, storage, or retailers are all ways of mitigating risk and can help to resolve the issue as much as possible quickly.

Within the KHC, we have ten standardized mitigation actions to mitigate the risk of items (see *page 15* in this report). These range from negotiating the trade BBE date to selling the items with a discount. As part of my internship, the reports we've created helped us mitigate some risk by giving the BUs insights into what items are at risk and providing them with the necessary data to choose the correct mitigation actions. The mitigation actions will help us link the risk data with the financial impact of supply chain losses. By better understanding the actions taken to mitigate risk for the stock in our warehouse, we can get a clearer picture of the supply chain losses actuals.

### *Feedback Loop*

The last part of the model is the feedback loop. With the implementation of new strategies, it's crucial to look back on the performance and see what could have gone better. There needs to be a constant reassessment of the chosen risk management strategies to keep improving the supply chain and decrease the chances of risk in the ever-changing environment of globalized supply chains.

Thanks to the global supply chain risk management framework, we know where there are opportunities for companies, specifically for the KHC, to grow in establishing risk management strategies.

## Food Losses

Since our problem revolves around better understanding the SCL losses within the KHC, I will close this academic review with a fishbone diagram in *figure 25* stating different kinds of losses in the supply chain, specifically, food losses (Bilska et al., 2016). It's interesting to see how other research can help us learn more about possible losses in the supply chain.

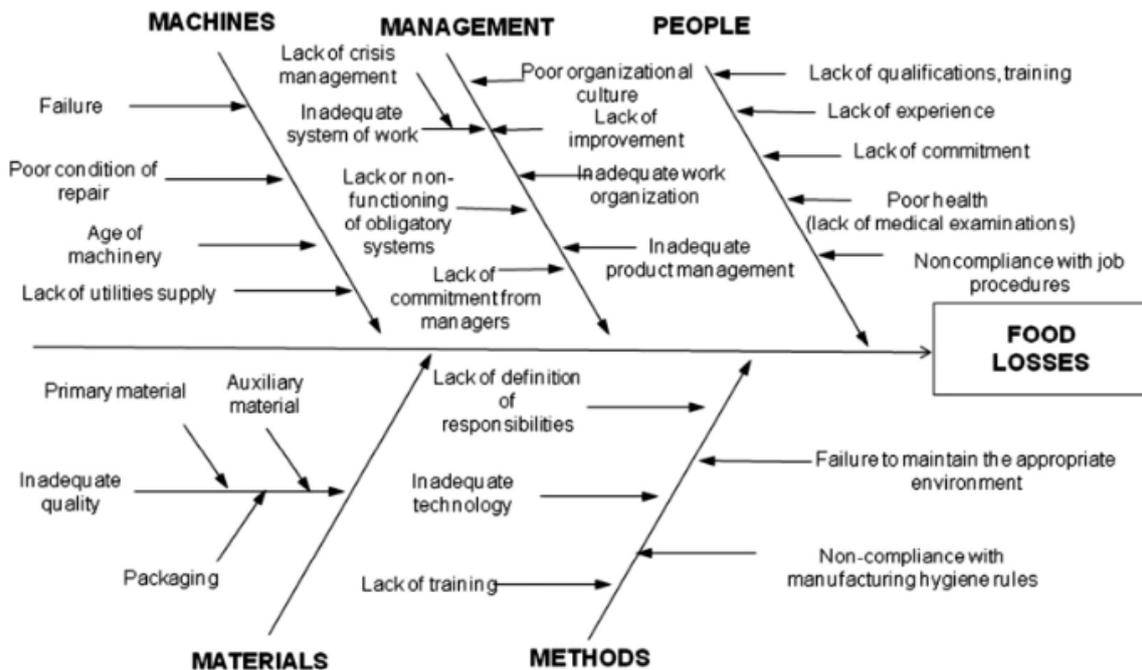


Figure 25: Fishbone diagram of food losses

Since the problem we're facing within our project is the lack of information about the SCL actuals in the KHC, we can get inspired by the many categories of food losses found in the fishbone diagram. One of our goals is to link the SCL actuals and risk data, specifically the root causes and mitigation actions. There are similarities between the root causes we have already defined within the KHC company. For example, the lack of crisis management in the fishbone diagram falls under demand management within our root causes. But there are also root causes we haven't defined yet within the KHC that we can see in the fishbone diagram, such as specific root causes based on losses due to lack of experience or commitment. But these two examples also lead to demand management issues, which again is a root cause we did define. So, the key in determining root causes or types of risk is to decide on the level of detail. One can define many root causes, but the risk reporting will get more complex. Within the KHC, we have a clear set of four main root causes, branching into 13 eventual root causes. These 13 root causes are already defining almost the complete scope of root causes within our supply chain.

The internal damage and inventory counting losses sub-packages from the SCL actuals data are also present in this fishbone diagram under the branches of people and methods. To validate the current root causes within the KHC, we could use some of the categories in the

fishbone diagram to gain a more in-depth understanding of the root cause behind the SCL actuals. But this is limitations territory, which we will save for later in the report.

The main takeaway from this fishbone diagram is that there are widespread reasons why supply chain losses come to be. In our project, we will scratch the surface of information there is to obtain from SCL. The information we will provide will be helpful to the company. As it's already stated, there's a lack of information in the current situation regarding SCL actuals reporting, and we are already aiming to solve this.

## Methods

Now that we've gained some perspective about risk management and our goals are set, we can discuss the process of how we want to increase the understanding of SCL actuals and link this data with the risk data.

The main goal of this project is to create a centralized database with the SCL actuals from all the different BUs and countries in the international zone. This database consists of the monthly financial updates for both the finished goods (FG) and the raws and packs (RPW). Besides the already known information about SCL actuals, the sub-packages, we will also have access to information such as the SCL type (e.g., donations, provision change) and data points found in the *International SCL Risk Data* file (e.g., category, channel).

Creating the centralized database consists of three steps: Data Collecting, Data Aggregation, and Linkage to Risk Data.

### *Data Collecting*

With the many BUs and countries, many different systems are used for SCL actuals reporting. This was the first challenge we needed to overcome. Because of all these different systems, there were also different definitions for similar concepts. For items that are destroyed, some BUs use the term write-offs while others use transactions. Besides these differences in definitions, there were also differences in the inclusions of certain categories. In country **S**, for example, only commercial losses are included in their SCL actuals reporting, whereas, for other countries such as country **A**, there were both commercial and operational losses.

During the first stages of the project, we needed to align our definitions and decide on what data we wanted to collect. Since all the data was available, we could research what was in the local SCL actuals files and decide on the next steps in data collecting.

Eventually, we were able to set up routines with the BUs for them to provide us with our desired data.

### *Data Aggregating*

Although we got access to many files with SCL actuals data from different BUs and countries, all the data came in various formats. Therefore, we needed to transform all the local SCL actuals data into one format to update the centralized database during the data aggregation process. To do this and increase automation, we build multiple BU-specific templates. For country **A**, we only needed to create one template since all the data comes from one file. However, we needed to build multiple templates for country **S** since the SCL actuals data came from various files.

These templates were created in Excel, and all had a similar setup. The input is the local SCL actuals data, and the output is the data in our desired format based on the columns in the centralized database.

Figure 26 shows the columns we want as output data for all the templates created. These columns also represent the columns we find in the centralized database.

Item type	SCL type	Year	Month	Concatenation "Common Denominator"	Material Code	Material Description	
Batch	Country	BU	Channel	Local Category	Int. Category	Mitigation Action	
Comments	RCA 1	RCA 2	RCA 3	Subpackage Local	Subpackage INTL suggestion	Days to BBE	Expiration Date
Total Stock_VAL	Total Stock_QTY	Provision_VAL	Provision_QTY	System/Manual	Manual Provision Note	% Provision	

Figure 26: Output data columns from SCL actuals data templates

We won't go over every column since most are trivial or familiar from the previous sections. But it's interesting to point out a few of the columns and how this data came to be.

The *item type* is either FG or RPW. The *SCL type* is one of the four SCL actuals types we've discussed in the section about the problem statement, namely Provision, Write-off, Donation, or Liquidation.

The *concatenation* is used to link the SCL actuals data to the risk data. Often this is a combination of the material code and the batch number, or the material code and the expiry date since these are unique keys to look up information from the risk data.

The *sub-package intl suggestion* is based on the local sub-package, and the international sub-package is one of the six sub-packages we've stated in the problem statement. So, the sub-package is mostly the only information from the BUs and countries we have about the SCL actuals in their local files (besides the SKU numbers, values, and quantities).

We also have a column for *system/manual*, meaning if the SCL actuals data is manually or systematically added. Systemically added items have their provision calculated based on the fixed provision rates. Sometimes items were added manually for different reasons, such as last-minute issues with the items or problems with the provision calculation.

The *%provision* column is the provision rate at that moment. We use this rate also to calculate the total stock values and quantities.

With the help of master data from the different BUs, we can link the channel and categories and get all the information we desire. As a result of this, we were already establishing the in-depth understanding we were aiming for.

### *Risk Data Linkage*

We already briefly touched on linking the SCL actuals data with the risk data using the unique concatenation of an item. But we want to link SCL actuals data specifically to the root causes and mitigation actions.

Linking the SCL actuals data to the root causes will explain why a specific item became a loss. And connecting the SCL actuals data with the mitigation action, which is specifically insightful for items in provision, updates us on the measures taken to mitigate the risk. If these mitigation actions are successful (e.g., sell to customers or clearance), we should see the provision values go down.

The following section will show some results that we can create using the data that we have aggregated in the centralized database. And how we gain insights from these results.

## Results

This section will review some preliminary results from the newly created centralized database. No results or visuals have been released within the company yet, as we are still in the process of collecting, aggregating, and checking data. This section will only focus on the SCL actuals data from region 7 (Countries U, P, H, G, I, R, T, Q, J, S). So, we are excluding country L, country N, and NON-region 7 countries. The data used in this section consists of data from the months P01-P11 of 2021.

### YTD Update

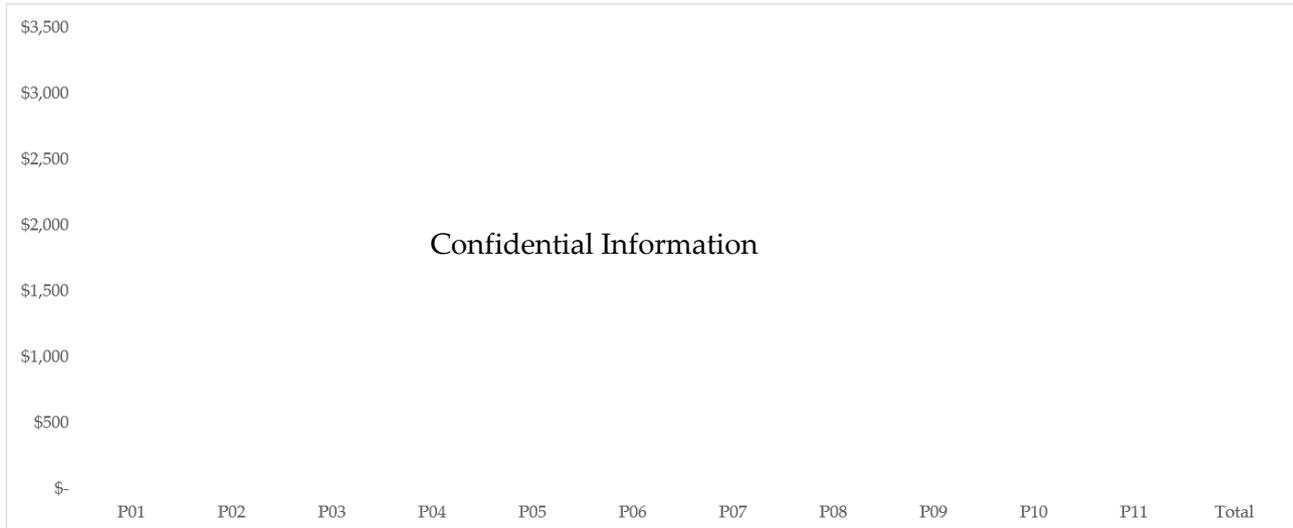


Figure 27: YTD update – Region 7, 2021 in \$k

In figure 27, we see the YTD update of region 7. This includes all SCL types. For every month except for November and February, there was a negative hit on the financials. November is a clear outlier, and this graph helps us warn for such outliers, even though it's a negative number meaning it's a positive hit on the financials. The next step is to check the specifics for November and see if we can gain insights from that.

### Monthly Update

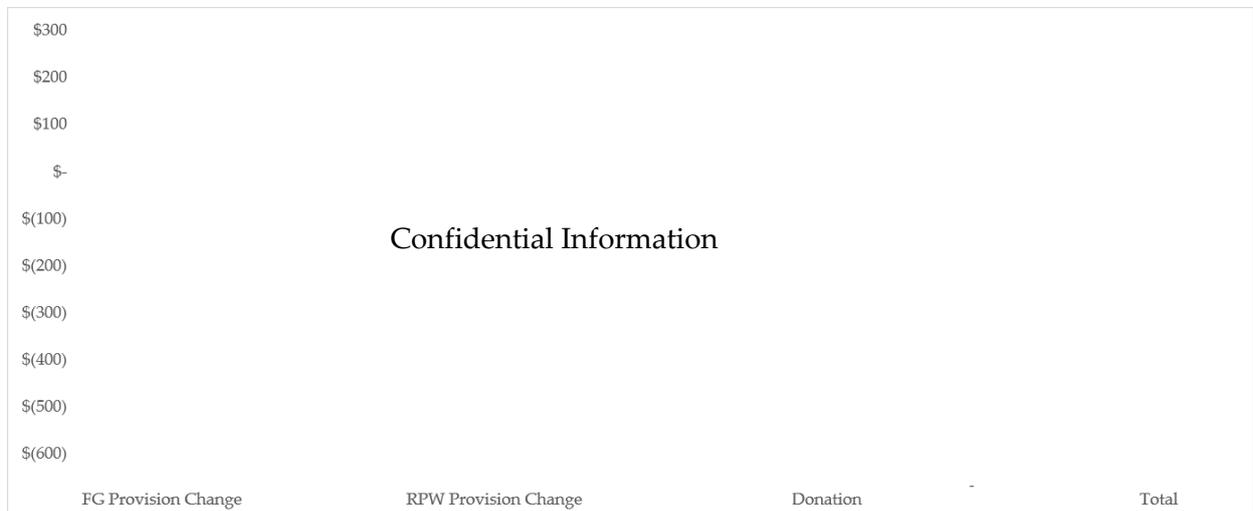


Figure 28: Monthly update – Region 7, November 2021 in \$k

In *figure 28*, the monthly update graph is given. This is the complete SCL actuals data for region 7 in November 2021. The strength of this graph is that we can see which SCL actual types make up the total SCL actuals value of this month. The total SCL financial hit is -\$XXXk. We can see that both types of provision have decreased in value compared to October, and we see a negative number for the liquidation. A negative value in supply chain losses means a positive financial hit. We can still go deeper in the data and look at the country level to the November data.

### Country Update



*Figure 29: Country update – Region 7, November 2021 in \$k*

In *figure 29*, we can see that country **U** mainly causes the decrease in SCL value in November. Although many other countries decreased in SCL value, the country **U** stands out. The country update gives us a quick understanding of the main drivers of SCL on the country level. The next step is to investigate the SCL country **U** data for November further.

### Country **U** November update

In *figure 30*, we see the country **U** November update with the SCL types. The main drivers for the decrease in SCL value for November are the RPW provision change and liquidation data. This graph has the same benefits as the *Monthly Update* graph but zooms in on one country.

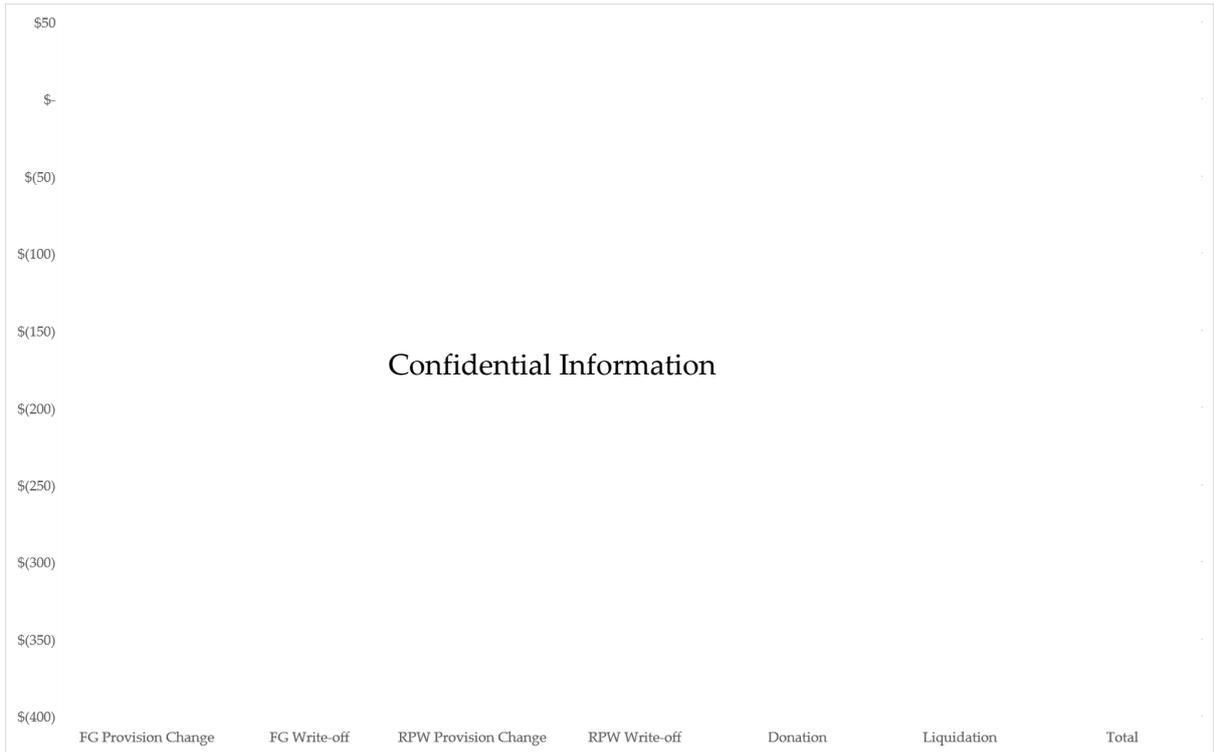


Figure 30: Country U SCL type November update in \$k

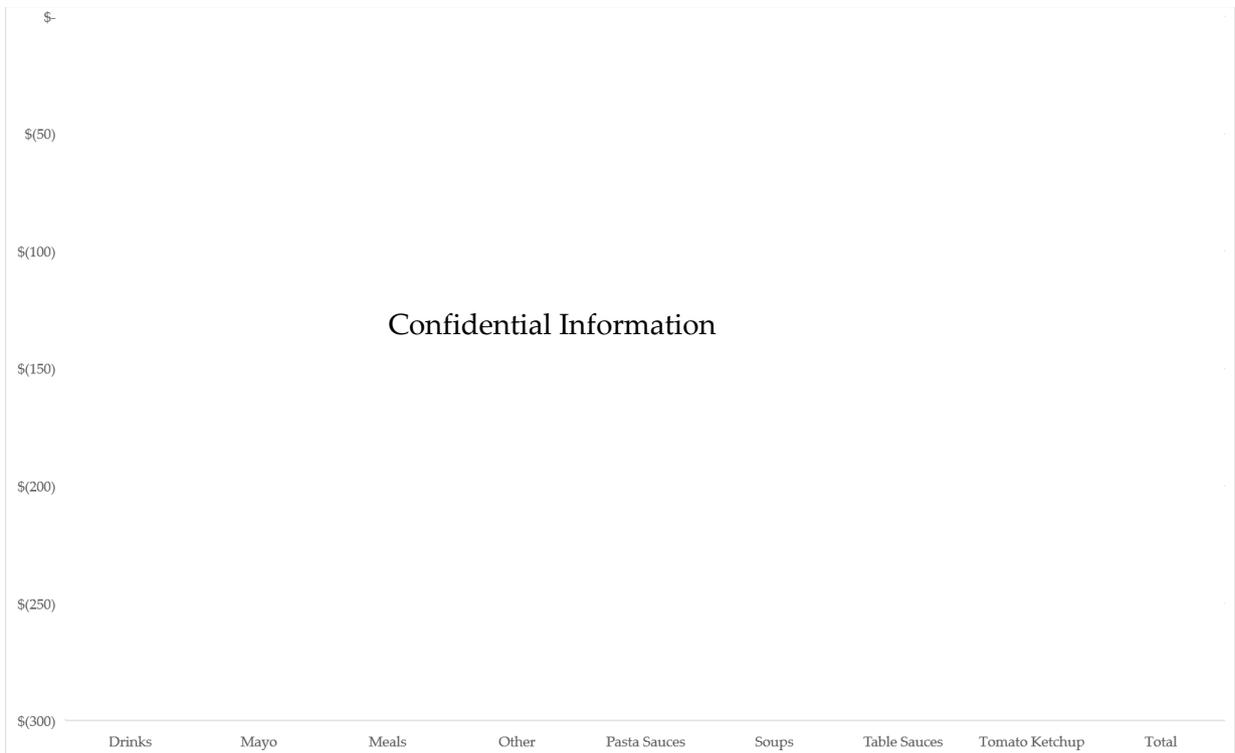


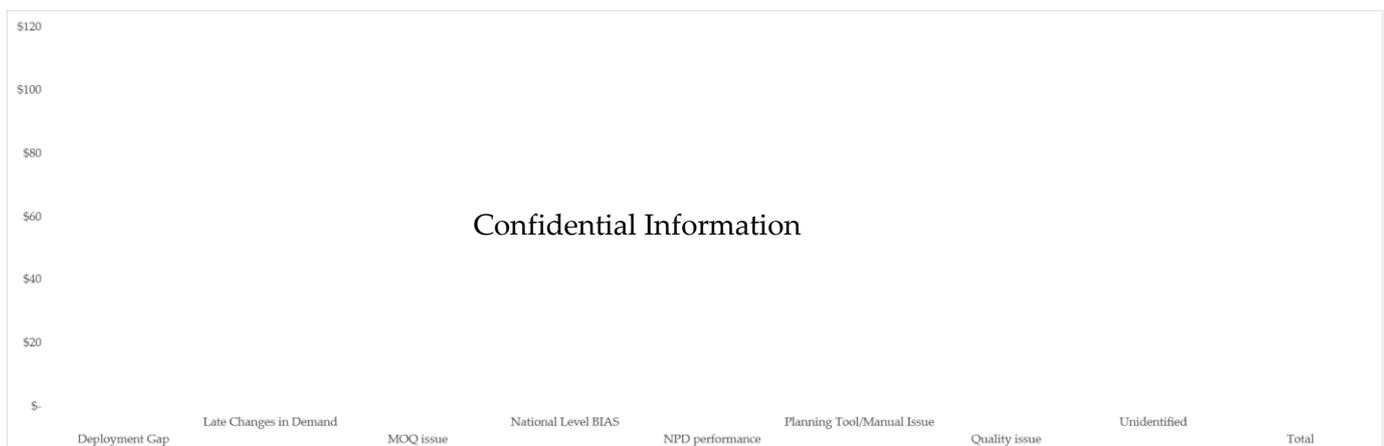
Figure 31: Country U Liquidation Category November update in \$k

### Category update

The two main categories in *figure 31* that are the main drivers for the decrease in risk value in liquidation in November in country **U** are categories **VI** and **X**. We can provide this information to the country **U** team, and they can use it to get more insights into their monthly SCL actuals. We conclude that the liquidation process for these two categories was very successful and even provided us with positive hits on the financials. The centralized database has proven its worth by quickly letting us reduce the reason for the anomaly of the decrease in SCL value in November, as seen in *figure 27*.

### Root Cause

As we are also interested in the root cause analysis for the SCL actuals, I want to close this section by looking at a graph where the root causes are represented. As we can see in *figure 29*, country **T** has an SCL risk value of \$XXk. This is the highest value from all the region 7 countries, so it would be interesting to look at the root causes that explain this value. In *figure 32*, the root causes for the provision change in country **T** are given. We see that the positive financial hit is entirely unidentified. We are focussing on the negative financial impacts, and we see that the *Planning Tool / Manual Issue*, which is a supply issue, is causing the provision change and the high SCL value. We now have a clear link between the SCL actuals data and the root causes from the risk data.



*Figure 32: Country T November Provision Change Root Cause update in \$k*

This insight into the root causes of the provision change can help us prevent more supply chain losses or at least reduce the value of the supply chain losses by finding alternatives for destroying the items. We know that the reason for this hit is planning tool or manual issues, and the country **T** team can research what exactly went wrong here.

The success of our centralized database is in the interplay between SCL actuals data, the root causes, and the mitigation actions. As we've seen in the academic review, a company like the KHC with an efficient supply chain can create competitive advantages by improving its information coordination. This project and the resulting database can help improve this information coordination for the KHC.

## Conclusion

The centralized database we have created during this project yields many advantages, such as the deduction of information about the SCL actuals on category, country, and SCL type level. We can quickly understand where the increases or decreases of the SCL actuals values come from. This project helps improve the connection between operational teams and financials. We have increased the in-depth understanding of the SCL actuals from just the sub-packages to more information about SCL types and categories. And by creating the routine and the BU-specific templates, we have improved the automation of data collecting and aggregation for the SCL international team.

Risk management and, more specifically, risk mitigation can take many forms, as mentioned in the academic review. With this centralized database of SCL actuals, we are on top of the SCL actuals. Therefore, we can learn from the trends we see to prevent future losses.

The future steps for the project are to keep improving the automation of the process. We will also create visuals that we can share with the BUs to give them insights into their monthly SCL actuals. These graphs can take the form of the waterfalls graphs we see in the results section. And eventually, we will also start adding more countries to the routine, such as country N, such that we get the full scope of supply chain losses in the international zone.

Overall, the project and the resulting database are a success in that they help with the information flow between different BUs. This information flow is vital for large FMCG companies like the KHC.

The reporting of SCL actuals and the linking to the root causes is something many companies, especially the size of the KHC, can use to improve their efficiency and reduce future losses. This centralized database is a framework on which we can expand and easily add more data points. Other companies can use a similar trajectory by collecting, aggregating, and linking the data to the risk data to create similar databases.

## Limitations

Working with different data flows from different BUs meant we encountered a few challenges. As we've mentioned in the data collecting section, different systems resulted in different definitions and SCL actuals reporting. We are dependent on the different BUs, so it takes time to obtain the desired data and figure out how all the various local reports line up.

Another limitation is the different checks for the different BUs and countries. We only have total SCL actuals for some BUs, which are not on country level. This is a limitation, for example, with the data from country **K**. At the moment, we only have the total SCL actuals data for both country **K** and country **V**. This means that if we want to check country **K** data, we must always keep in mind that the totals won't match. This is also a limitation that will be solved over time since the reporting of the SCL actuals will be split between those countries in the coming months.

In the academic review section, we've mentioned multiple types of risk identification and root causes. In our centralized database, we work with the standardized root causes that have already been defined. More in-depth analysis, and root cause types, could lead to even more insights about the SCL actuals data. To avoid overcomplicating the information flow, it is essential to balance too many defined root causes and too few root causes.

## Self-reflection

My hope for the internship was to better understand working as a small part of a large company. I've learned what it means to do this and how the smaller teams and parts of the company make up the whole of the company. Moreover, I wanted to gain the confidence to get a job at a company after this internship, with the skills I could develop during the internship, besides learning how to deal with different stakeholders in a professional manner.

During this internship, one of the skills I have developed was organizing and structuring data flow. With the vast amounts of risk data and SCL actuals data that I needed to work with on a weekly and monthly basis, I needed to learn quickly how to keep an overview of these data flows. I've also learned how to connect with cross-functional stakeholders to obtain data by researching what data or information was missing and setting up meetings to ask the stakeholders about the missing information. This had to be done for both the project as well as some of my work assignments. In addition, I've developed the ability to standardize and aggregate different datasets in an automated way. As mentioned in the project, during the data aggregating stage of the process, I've created many BU-specific templates that help us automate transforming local SCL actuals data in one format for the centralized database. Finally, I've gained the flexibility to adhere to specific requests from stakeholders. An example of this flexibility was the delays we sometimes encountered in both the risk data and the SCL actuals data. Coming up with solutions and informing other stakeholders of the delays helped me understand to take responsibility for my work and that I'm part of the chain of data flow.

Before the internship, I lacked experience with Excel (besides the simple calculations we've done during the *Operations Management* course). So, a few weeks before the start of the internship, I did an advanced Excel course to be prepared once the internship started. This immensely helped me quickly understand the different data flows already established within the SCL international team and enabled me to work out ideas about templates and automation faster.

At the start of the internship, the course *International Business* immensely helped me prepare for the challenges of working in a large multinational company. Knowing some of the challenges these companies face regarding internal communications between different BUs, I could be prepared for setbacks when BUs on the other side of the globe couldn't provide us with desired information or data.

During the internship, I became aware of some of the skills I was lacking. Starting with the internship, I wasn't completely aware of the responsibilities entrusted to me. This eventually led to problems where I lost the overview of data flows and wasn't fully committed to the data I was working with. I learned from my supervisor that I was responsible for the data that I shared. No matter where the data came from or in what state the data arrived, I needed to be confident and be able to defend the eventual data that I shared and the reports that I created using this data. Not making excuses about the data already lacking, but

actively solving this by researching, chasing stakeholders, and setting up meetings with BUs to get information. Another lesson I've learned is to keep communicating with my manager, for them to be able to trust you in the work you're doing, without them having to doubt your actions and, for example, need to continue checking the work you've done.

The key takeaway from this internship is the skills that I have developed regarding working with large sets of data and gaining a more professional perspective instead of the student view I had at the beginning of the internship. Furthermore, during this internship, I was truly part of the SCL international team, which meant that I needed to fulfill responsibilities. Therefore, these lessons are priceless for the next steps in my career since this internship has helped me transform from a student to a starting professional.

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