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Handling inflation within the sourcing strategy of HP Valves Oldenzaal B.V.

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Abstract

The strategic management of inflation within sourcing presents a critical aspect in contemporary business operations. Numerous academics propose sourcing models as frameworks for organisations to optimise their sourcing strategies. However, it is important to note that these sourcing models often overlook the variable of inflation, placing greater emphasis on general costs. It is also often difficult for organisations to transform these sourcing models into practical actions. There is a notable gap between theoretical frameworks and practical implementation in organisational contexts in times of inflation.

This research aims to develop an inflation model designed to navigate diverse economic scenarios. The literature review highlights diverse methods for identifying and managing inflation within sourcing strategies, addressing objectives for effective category management. Drawing insights from interviews with experts, the study identifies key steps in the model, encompassing the assessment of an organisation's ability to pass on costs, strategic positioning within the inflation heat map tool, selection of appropriate methods, and the transformation of identified levers into actionable strategies.

The findings underscore the importance of a nuanced approach, considering factors such as supply-side or demand-side inflation, and the unique challenges posed by each. Interviews with professionals from various sectors have generated a variety of inflation handling levers applied by the experts. The model aligns with practical experiences, offering a comprehensive guide for organisations to strengthen their ability to withstand inflationary challenges.

The study proposes a developed model by combining the strategic insights derived from expert interviews with the strength of an inflation matrix. This innovative approach provides a systematic means to formulate and deploy inflation management strategies, aiding organisations in developing effective sourcing strategies.

Keywords: Inflation management, strategic positioning, sourcing strategies, inflation levers

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1. Introduction: the need for a strategy for handling price fluctuations due to inflation

1.1 The strategic relevance of sourcing in times of inflation

In contemporary business, it is important for strategies to be aligned across different levels: corporate, business, and functional. Recent studies demonstrate that strategic sourcing and supply management have a positive impact on the overall performance of an organisation.¹ Hence, it is crucial to synchronise sourcing strategies with corporate and business strategies.² Strategic sourcing has several positive influences.

Strategic sourcing improves contract negotiation and the identification of cost-effective suppliers, leading to cost savings. Strategic sourcing also helps in streamlining the supply chain and therefore making it more efficient. An efficient supply chain reduces lead times and minimises stockouts, resulting in increased operational efficiency and smoother operations.³ Building strong relationships with key suppliers, stimulating collaboration is also involved within strategic sourcing. This leads to better supplier performance and increased reliability. With risk mitigation within strategic sourcing, organisations can proactively identify and mitigate supply chain risks, such as disruptions in the availability of inputs.⁴

The strategic relevance of sourcing and supply management has been established throughout the years. Purchasing and supply management are crucial aspects of how organisations get the resources they need and manage costs efficiently.⁵ Currently, the function of purchasing is impacted by changes in the external environment, one current challenge being inflation. Especially in times of rapid change, e.g. inflation, strategic decisions have a direct link to the competitive forces of an organisation.⁶

When faced with changes in the external environment, managing them becomes crucial. Having reliable sourcing strategies and levers as described by Hesping and Schiele helps organisations manage uncertainties within sourcing.⁷ Unfortunately, traditional sourcing levers and tools may not be effective when dealing with inflation. This complication highlights the need to find new strategies to handle the specific challenges that come with inflation. An overall example where these changes can be seen are within the purchasing department of HP Valves. The cost of raw

¹ See Carr and Smeltzer (1999), p. 44.

² See Kraljic (1983), p. 115-116.

³ See Chen, Paulraj and Lado (2004), p. 510.

⁴ See Carr and Pearson (2002), p. 1047.

⁵ See Ateş and Memiş (2021), p. 831-832.

⁶ See Song, Calantone and Anthony Di Benedetto (2002), p. 976.

⁷ See Hesping and Schiele (2015), p. 138.

materials and intermediate products has risen significantly due to the effects of inflation.⁸ In recent years, inflation has been an important issue when formulating a purchasing strategy within the purchasing department.

The purchasing strategy can be categorised into various levels of hierarchy, as can be seen in Figure 1. The study by Hesping and Schiele suggests a multi-level approach to strategy development within purchasing.⁹ This includes overarching firm strategy, purchasing strategy (as one of the functional strategies), category strategies tailored to diverse supply markets, sourcing levers employed to define category strategies, and specific supplier strategies for each supplier within a sourcing category.¹⁰

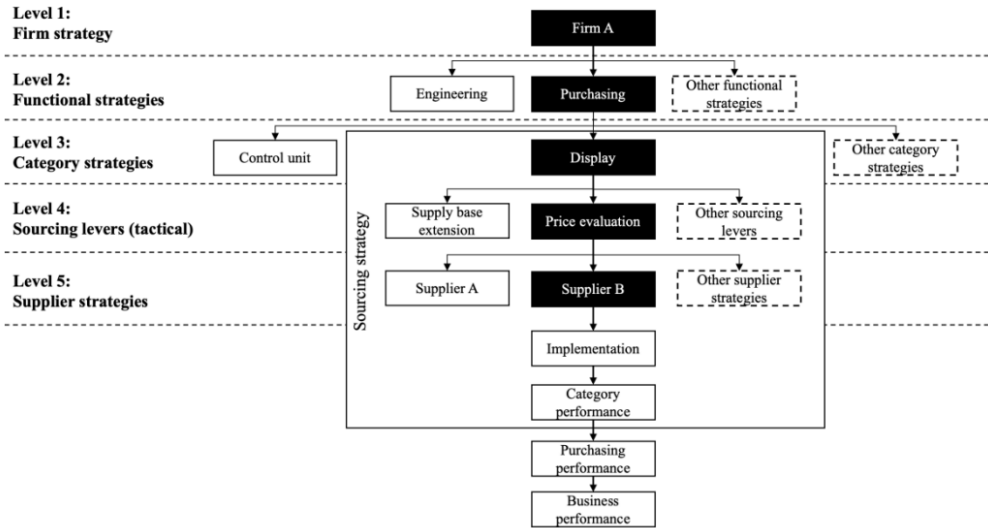


Figure 1 - Five levels of strategy development in purchasing (Hesping and Schiele, 2015, p.139)

Managing inflation is important at the level of category strategies and sourcing levers. While there are existing sourcing levers, they currently lack a specific focus on inflation. Therefore, it is essential to gain insights from current purchasing practices at level 3 and 4 of Figure 1.

To understand how professionals handle inflation in purchasing, it is essential to gain insights in challenges and best practices. Examining how experienced procurement experts create strategies tailored for inflation, using tools and frameworks, is essential. Additionally, investigating the specific situations and conditions under which these strategies prove effective is essential for a comprehensive understanding.

⁸ See Jaggi (2016), p. 267.
⁹ See Hesping and Schiele (2015), p. 144
¹⁰ See Hesping and Schiele (2015), p. 139.

1.2 The aim of the research is to develop a model that helps organisations handle inflation

The literature provides different strategies and sourcing levers organisations can use. However, less literature describes sourcing levers that take into account the variable inflation. The starting point of the research is the exploration of literature about identifying types of inflation and managing its risks. Next, the objectives and levers within a sourcing strategy will be examined alongside existing inflation handling methods and models in literature. However, the literature does not provide inflation handling levers and how to identify and applicate these within a sourcing strategy.

Based on this, the goal of this research is to develop an inflation model with applicable inflation handling levers. Within their sourcing strategy, organisations can draft an implementation plan for suppliers based on the applicable inflation levers. With this plan organisations can effectively mitigate the impact of inflation.

The thesis will identify the types and drivers of inflation and evaluate the available sourcing strategies and inflation fighting methods to determine the most effective approach for manufacturing organisations. As a result, the following main question is formulated: *“How can a manufacturing organisation optimise their sourcing strategy with applicable inflation handling levers?”* The main research question will be answered with three sub-questions:

- 1. What are applicable inflation handling levers within purchasing?*
- 2. What dimensions and conditions influence the placement of levers within an inflation handling model?*
- 3. How should organisations use the inflation handling model as a framework?*

To answer the research question in a structural matter, the guidelines for publishing Design Science Research of Stange, Schiele and Henseler are used.¹¹ First, the problem review will be explained. Second, a solution space review is conducted to gather information about inflation, sourcing strategies and inflation fighting methods. After the literature review is the methodology section, were the data collection will be explained. Based on the literature review and interviews, the concept of the model will be presented in the creative leap.

The model created with the interviews will be applied through a workshop group with stakeholders of HP Valves such as supply chain managers and purchasers. This workshop aims

¹¹ See Stange, Schiele and Henseler (2022), p. 6-8.

to gather information about the possible solution and organisation's approach to manage risks due to inflation. After the application the solution will be assessed and evaluated in the discussion.

This research contributes to the existing literature and holds practical relevance for manufacturing organisations. By examining the impact of inflation on sourcing decisions, the research provides inflation handling levers and valuable insights for organisations seeking to mitigate risks and optimise their sourcing processes.

The findings of this thesis offer practical guidance and actionable recommendations for HP Valves and other manufacturing organisations wanting to enhance their sourcing practices in the face of dynamic markets. This research not only adds to the existing knowledge base but also provides relevant and applicable insights for sourcing professionals and organisations operating in today's challenging business environment.

2. The problem review: what is happening within the manufacturing sector?

2.1 Class of problems: The impact of environmental changes and geopolitical tensions on inflation and manufacturing firms

Environmental changes and geopolitical tensions have profound implications for global economies. As climate patterns shift, natural disasters become more frequent, and as geopolitical tensions escalate, the world witnesses disruptions in the production and distribution of goods and services.¹² These disruptions create a ripple effect that extends to manufacturing firms, contributing to inflationary pressures. For instance, extreme weather events can disrupt the supply chains of various industries, leading to shortages and increased production costs. The resultant inflationary pressures are a direct consequence of the environmental changes that disrupt the global economic systems.¹³

Inflation causes manufacturing firms to reassess their sourcing decisions and overall strategies. As the cost of production inputs rises, firms are forced to evaluate alternative sourcing options to maintain profitability.¹⁴ This may involve shifting suppliers or exploring local sources. The strategies adopted by these firms in response to inflationary pressures become pivotal in determining their resilience and competitiveness in an increasingly turbulent global market.¹⁵

Inflation not only affects the cost structure of manufacturing firms but also introduces a layer of uncertainty and reduced transparency into their supply chains.¹⁶ Chopra and Meindl's model outlines roles and allocations in a supply chain based on the level of uncertainty. The model, illustrated in Figure 2, provides a strategic framework for organisations about who in the supply chain absorbs the most uncertainty and to adapt to varying levels of responsiveness.¹⁷

The manufacturing firm is positioned in the middle of a complex network, with suppliers on the left and retailers on the right. The extent to which the manufacturer absorbs the most or least implied uncertainty determines the degree to which they need to be efficient or responsive.¹⁸

¹² See Schaeffer, Roberto et al. (2012), p. 12; Misati et al. (2022), p. 47.

¹³ See Schaeffer, Roberto et al. (2012), p. 10.

¹⁴ See Gwin and Taylor (2004), p. 143-144.

¹⁵ See Song, Calantone and Anthony Di Benedetto (2002), p. 976

¹⁶ See Gupta and Maranas (2003), p. 1226

¹⁷ See Chopra and Meindl (2007), p. 32-33.

¹⁸ See Chopra and Meindl (2007), p. 34.

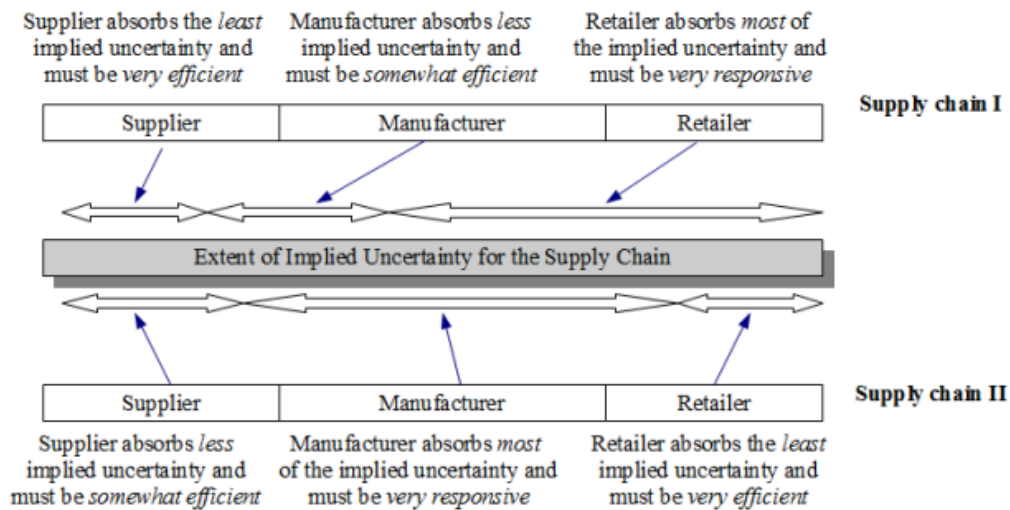


Figure 2 - Different roles and allocations for a given level of supply chain responsiveness (Chopra and Meindl, 2007, p. 33)

The surrounding business environment is currently marked by inflation. In such a scenario, the lack of transparency in the supply chain amplifies the challenges faced by manufacturing firms. Inflation-induced uncertainty may lead to fluctuating prices and increased risk across the supply chain.¹⁹ The absence of clear information and transparency hinders effective decision-making and disrupts the smooth flow of goods and services. The model illustrates that the more uncertainty a manufacturing organisation absorbs, the more responsive it needs to be to the market, especially during times of inflation. This is the trade-off that manufacturers must navigate in these uncertain times.

2.2 The need for including an inflation model as part of sourcing strategy development and application to handle price fluctuations

Inflation directly influences the cost of goods and services, impacting the overall expenses from organisations.²⁰ Without a strategy to handle inflation, organisations are vulnerable to financial instability, reduced profit margins and difficulties in supplier selection. The impact of inflation on sourcing strategies can affect the overall profitability of an organisation.²¹ Hence it becomes increasingly important to include the factor inflation as part of sourcing strategy development.

Therefore, the inclusion of an inflation model within the sourcing strategy becomes important to effectively manage these challenges. An inflation model serves as a tool in understanding price fluctuations and handling these fluctuations. By using commercial levers and cross

¹⁹ See Gupta and Maranas (2003), p. 1224.

²⁰ See Maybury (2004), p. 28-29.

²¹ See Doyran (2013), p. 736.

functional levers as mentioned in the paper of Schiele (2007) an inflation model can provide insights into sourcing strategies and inflation handling actions.²²

Integrating an inflation model into a sourcing strategy enhances optimisation by providing levers for inflation handling. This guides decisions in contract negotiation, sourcing process optimisation, and supplier selection, enabling cost savings and maintaining profitability. Incorporating the model in sourcing strategy is crucial for effectively managing price fluctuations, offering valuable insights and improved navigation of inflation challenges.

2.3 Particular problem: inflation leading to price increases for HP Valves

Policy makers within organisations are typically concerned about inflation due to its propensity to generate uncertainty.²³ The policy within HP Valves is no exception. Rising prices of raw materials like steel, production costs and logistics directly impact the organisation's profitability and operational efficiency.

The high inflation in the sector has resulted in a decrease in profit margins. As the prices rise, organisations are faced with cost pressures. However, passing on these increased costs to customers is not always feasible due to competitive pressures.²⁴ Consequently, organisations experience a shrinking margin, affecting their profitability and long-term sustainability.

Another consequence is supply chain disruptions.²⁵ Supply chain disruptions leads to inflation, as it introduces volatility into the market.²⁶ Manufacturers experiences these disruptions within their supply chain, materials are not available, or suppliers experience long lead times.

Inflation causes fluctuating prices and cost uncertainties, which make it difficult to secure stable and cost-effective suppliers.²⁷ This volatility leads to delays in the sourcing process, addressing this process is crucial for maintaining a reliable and efficient supply chain.²⁸ Inflation also affects the customer relationships. As prices rise, customers resist accepting these higher costs or buy the products from competitors.²⁹ This leads to conflicts with customers and potentially

²² See Schiele (2007), p. 280.

²³ See Maaghool, Monfaredi and Poormehri (2014), p. 831.

²⁴ See Thomas and Griffin (1996), p. 12.

²⁵ See Tang, Gurnani, and Gupta (2014), p. 1198.

²⁶ See Pasimeni (2022), p. 384.

²⁷ See Bimpikis, Fearing and Tahbaz-Salehi (2018), p. 1024.

²⁸ See Hong et. al. (2023) p. 3.

²⁹ See Thomas and Griffin (1996), p. 2-3; Eydi and Fazli (2013), p. 18-19.

damaging relationships. Organisations need to balance their profitability with their customer relationships.³⁰

Decreasing profit margins, supply chain disruptions and customer relationship challenges due to unpredictable price increases are the key problems with inflation. These problems can be seen at HP Valves. By identifying and clarifying these specific challenges, HP Valves can move forward to a sourcing strategy that addresses the problem of inflation head-on. These challenges can be handled with an inflation handling tool.

2.4 Solution objective: designing a tool to identify inflation handling tactics in sourcing, concept and application within HP Valves

The objective of the thesis is to develop a tool that enables organisations to handle the effects of inflation. This can be done with a tool with inflation handling levers, which recommend actions for specific situations. The tool needs to identify and apply the correct inflation handling levers within the organisation's sourcing strategy. The model aims to provide a structured approach for organisations to effectively manage the impact of inflation.

The model will assist in determining relevant actions based on the specific context of the organisation and the various product categories. The model describes various dimensions and conditions, outlining the methods that an organisation can use to manage inflation. Based on this, specific actions can be implemented. The formulated model is applied within HP Valves.

The model's application and assessment within HP Valves will involve a collaborative effort between various stakeholders, including procurement professionals and supply chain managers. Through a group workshop, the tool will be assessed to the organisation's specific objectives and product categories.

The implementation of the inflation handling model is expected to have several benefits for manufacturing organisations. The model will provide levers with recommended actions, allowing organisations to make better informed choices. By incorporating this model into their sourcing strategy, organisations can proactively address the challenges posed by inflation.

³⁰ See Fynes, Voss and de Búrca (2005), p. 13.

3. Solution space review: identifying and managing inflation within a sourcing strategy through inflation handling levers

3.1 Identify the types and effects of inflation and manage its risks within sourcing

3.1.1 The identification and different types of inflation

3.1.1.1 Defining inflation: examining price increases and the devaluation of money

Inflation, a complex economic phenomenon, is characterized by a multitude of interpretations and definitions that vary among economists and scholars.³¹ Maybury (2004) defines inflation as follows: "Inflation is an increase in the amount of money. When the supply of money expands, the value of each unit of currency decreases. As a result, more money is needed to purchase the same goods, leading to rising prices".³²

In the process of defining inflation, it becomes evident that it involves an expansion of the money supply, which in turn drives up prices and diminishes the value of the currency.³³ There are different types of inflation. Figure 3 displays the decomposition of consumer price inflation in the Eurozone from 2004 to 2023.

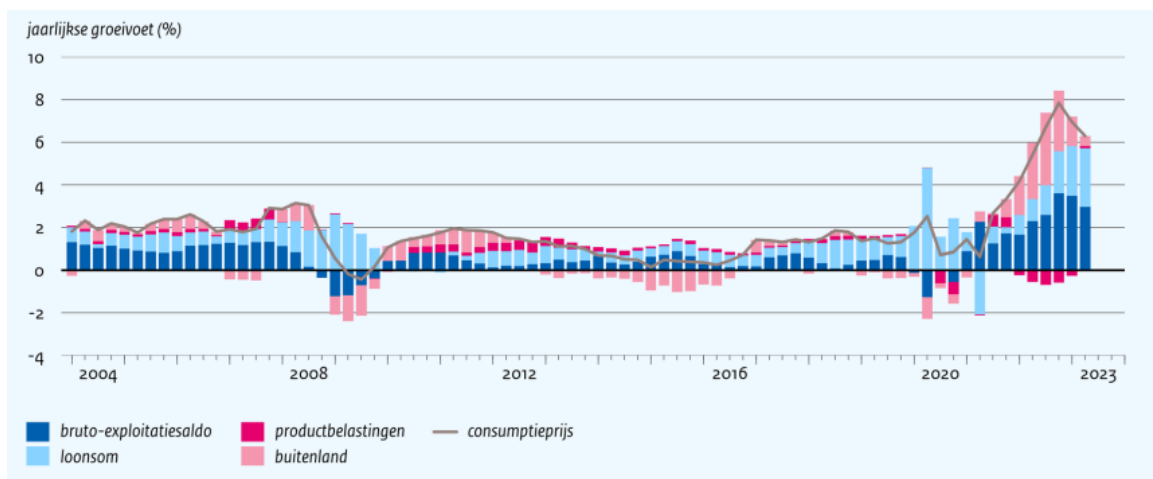


Figure 3 - *Decomposition of consumer price inflation in euro area (CBS, 2023, p. 21)*

The distinct types of inflation are visible in the graph. The annual consumer price inflation growth in the Euro area is influenced by various factors. These include the gross operating surplus, indicating the impact of business profitability. The wages, reflecting changes in labour costs, product taxes, representing taxation on goods and foreign factors, accounting for the influence of external elements on inflation. The decomposition of these factors provides insights into the dynamics of inflation. From the begin of 2002, there is a notable increase in

³¹ See Mishchenko et al. (2018), p. 154.

³² See Maybury (2004), p. 28-29.

³³ See Hung and Thomspson (2016), p. 448.

prices from abroad, indicating the impact of external factors on inflation. Subsequently, there is a delayed but noticeable rise in wages, suggesting a delay in the response of labour-related costs to the external price movements. This decomposition raises some questions: What are the types of inflation and how can organisations manage these risks?

3.1.1.2 Demand-site inflation happens when the demand for a product exceeds its supply

Wilson (1961) describes two types of inflation, 1) demand-pull inflation and 2) cost-push inflation.³⁴ These types of inflation can also be defined as 1) demand-side inflation and 2) supply-side inflation.

Demand-side inflation occurs for the most basic economic reasons. Prices increase when the demand for a product exceeds its supply. For this type of inflation full-employment must be in place, the increase in demand cannot be solved by using more resources to produce more products.³⁵ This type of inflation can be illustrated by explaining the impact of travel restrictions during the Covid-19 pandemic. Hindered access to services led to changed consumption patterns, spiking demand for certain goods. However, the supply side faced limitations in meeting this increased demand. As a consequence, prices inevitably escalated, adding to inflationary pressures.³⁶

An important theory behind demand-side inflation is the Keynesian theory. According to Keynesian economics, inflation occurs when the increase in goods demand exceeds the economy's capacity to produce goods and services. When there is excess demand, businesses may respond by raising prices to maximise their profits.³⁷ The theory states that inflation can be managed through demand-side policies, such as fiscal measures and monetary policy adjustments. These policies aim to align overall demand with productive capacity. Managing the aggregate demand is important to achieve full employment and price stability.³⁸

3.1.1.3 Rising prices of production process inputs leads to supply-side inflation

In addition to demand-side inflation, there is another type of inflation known as supply-side inflation.³⁹ Supply-side inflation occurs if there is a rise in prices through production process inputs, such as raw materials, energy or labour.⁴⁰ This type of inflation happens when the costs

³⁴ See Wilson (1961), p. 75.

³⁵ See Wilson (1961), p. 82.

³⁶ See Celasun et. al. (2022), p. 24; Bhushan and Struyven (2021), p. 3.

³⁷ See Kim (2020), p. 645.

³⁸ See Kim (2020), p. 653.

³⁹ See Wilson (1961), p. 75.

⁴⁰ See Wilson (1961), p. 91.

of materials or product categories rise. When there is a sudden change in the availability or cost of key inputs for a production process a supply shock occurs. These shocks can disrupt the equilibrium of the economy and lead to supply-side inflation.⁴¹ For example, an oil price shock can increase the cost of production across various industries, leading to higher prices for goods and services.

Supply-side inflation can be explained by the cost-push theory of inflation: the theory suggests that rising production costs can lead to increased prices. When organisations experience higher input costs, they want to pass on these expenses to consumers through higher prices for goods and services.⁴² Supply-side inflation can have significant effects on the economy. As production costs increase, organisations may face reduced profit margins, potentially leading to lower investments. Lower investments lead to reduced job creation and slower economic growth.⁴³

Next to demand-site and supply-side inflation there is another type of inflation often mentioned in scientific papers. This type of inflation is called monetary inflation.

3.1.1.4 Monetary inflation occurs when the money supply increases more than the production of goods

Monetary inflation refers to the increase in the money supply within an economy, resulting in a decrease in the value of money and a general rise in prices. It occurs when there is an expansion of the money supply beyond the corresponding increase in the production of goods and services.⁴⁴ Monetary inflation has various theories. Two common ones are the Quantity Theory of Money and the Austrian theory. The Quantity Theory links money supply changes to price level shifts, suggesting that more money causes inflation over time if other factors stay the same.⁴⁵

Austrian monetary inflation theory suggests that central banks cause inflation by expanding the money supply.⁴⁶ This can lead to economic distortions. Central banks manage inflation using tools like adjusting interest rates and regulating the money supply. Finding the right balance is challenging, as too little or too much inflation can harm the economy.⁴⁷

⁴¹ See Furlong and Ingenito (1996), p. 32-33.

⁴² See Takami (2015), p. 610-612.

⁴³ See van Wijnbergen (1983), p. 63.

⁴⁴ See Morana (2007), p. 231.

⁴⁵ See de Grauwe and Polan (2005), p. 240; See Nelson (2003), p. 1042-1045.

⁴⁶ See Balac (2008), p. 2.

⁴⁷ See Păun and Topan (2013), p. 19-20; Woodford (2011), p. 671-679

The Austrian Business Cycle Theory (ABCT) is an economic theory that provides insights into the causes of economic cycles due to the increase in money supply. The ABCT argues that artificially created credit expansions, often by central banks, disrupt the structure of the economy. These disruptions manifest as booms and busts, where artificial prosperity periods are followed by severe recessions.⁴⁸ The theory emphasises the importance of stable monetary policies and avoiding artificial manipulation of interest rates to promote sustainable economic growth and mitigate the harmful effects of cyclical fluctuations. The ABCT remains a relevant perspective, with insights into financial stability and prevention of economic imbalances.⁴⁹

There are different types of inflation with different origins. Employees and organisations respond to inflation in different ways. Employees want higher wages and organisations want to remain profitable. This effect is described in the wage-price spiral.

3.1.2 The wage-price spiral: perpetuation of inflation

The phenomenon build-in inflation is also mentioned within the purchasing literature. This is related to the expectation of customers that inflation rates will continue in the future. It occurs when individuals and organisations expect that prices will continue to rise in the future, leading to behaviors and decisions that fuel inflationary trends, called build-in inflationary behavior.⁵⁰ When this happens employees demand a higher wage, as they expect their purchasing power to decline in the future. Higher wages lead to an upward wage-price spiral due to higher costs of goods and services.⁵¹ The course of the wage-price spiral can be seen in Figure 4.

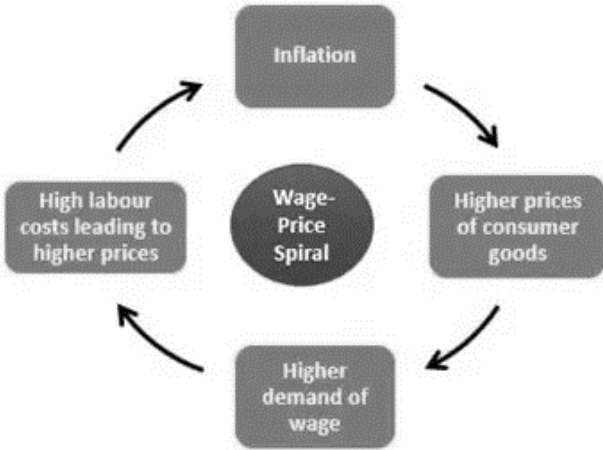


Figure 4 - *The Wage Price Spiral (Model based on Blanchard, 1986, p. 560)*

⁴⁸ See Braun and Howden (2017), p. 236-237.
⁴⁹ See Bismans and Mougeot (2009), p. 251.
⁵⁰ See Nashed and Hanafy (2014), p. 3099.
⁵¹ See Lucotte and Pradines (2023), p. 4-8.

Blanchard (1986) describes the wage-price spiral as the interaction between nominal wages and prices when these are adjusted at various times.⁵² Workers attempt to maintain or increase their real wage while organisations try to maintain their margins. This results in a higher price level and to the perpetuation of inflation.⁵³ The wage-price spiral can be caused by tightness within the labor market, the bargaining power between workers and organisations or the expectation of inflation in the future.⁵⁴

It can be concluded that inflation comes with various risks within an organisation, which can influence both the organisation and its employees. Organisations needs to manage these risks, this can be done through different strategies and models.

3.1.3 The risks of inflation can be managed through various strategies and models

3.1.3.1 Risks of inflation: financial and environmental challenges

Inflation poses risks to sourcing processes and strategies, requiring organisations to adopt effective inflation risk management measures. Hoffmann, Schiele and Krabbendam define different types of supply risks, these types of risks can be seen in Figure 5.

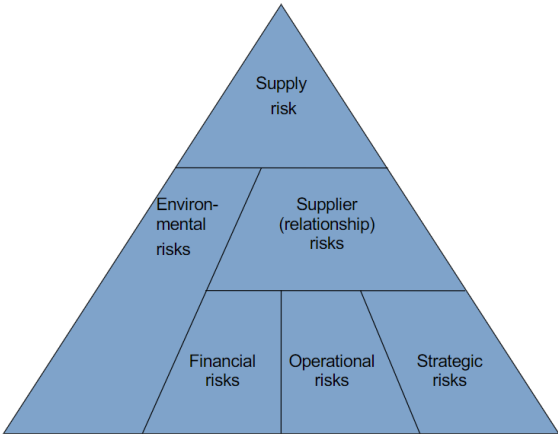


Figure 5 - Types of supply risks (Model adapted from Hoffman, Schiele and Krabbendam, 2013, p. 208)

In the context of manufacturing firms, inflation can be viewed as a hybrid risk that encompasses elements of both environmental and financial risks. Inflation is linked to financial risk within manufacturing firms. It impacts the cost structure by potentially increasing the prices of raw materials, labor, and other operational expenses. The financial stability of a manufacturing firm

⁵² See Blanchard (1986), p. 560.
⁵³ See Blanchard (1986), p. 544.
⁵⁴ See Den Haan, Rendahl and Riegler (2018), p. 1286.

may be compromised due to rising costs, which can lead to challenges such as reduced profit margins and potential liquidity issues.⁵⁵

While inflation itself may not be a traditional environmental risk, it can be influenced by broader economic conditions and external factors, such as changes in global markets, geopolitical tensions, and natural resource availability.⁵⁶ These external economic conditions, which are beyond the direct control of a manufacturing firm, can be considered as environmental factors that contribute to the financial risk posed by inflation.⁵⁷ Organisations require inflation risk management strategies to mitigate the risks of inflation.

3.1.3.2 Inflation risk management: mitigating the impact on sourcing processes

Risk management involves identifying, assessing, and addressing the potential effects of risks (e.g. inflation) on sourcing activities.⁵⁸ By proactively managing these risks, organisations can maintain supplier relationships and optimise their overall sourcing strategy.⁵⁹

Several studies show different strategies for inflation risk management. The study of Currie (1998) shows that supplier contracts and negotiations play an important role in risk management. Organisations should include conditions for price adjustments.⁶⁰ Negotiating pricing terms and long-term agreements can also provide stability while handling inflation.⁶¹

According to Xue et. al. (2020), diversifying suppliers and sourcing locations can help reduce the vulnerability to risks. Organisation should consider a two-tier supply chain consisting of two dedicated suppliers and a backup supplier.⁶² Within risk management, organisations must choose between single sourcing or multiple sourcing. Single sourcing is a suitable approach for a stable environment, however can it increase an organisation's exposure to risks (e.g., supplier default). Multiple sourcing involves higher costs due to managing more than one supplier, but reduces the risks within sourcing and the supply chain.⁶³ By engaging multiple suppliers and sourcing from different geographic regions, organisations can minimise the impact of localised

⁵⁵ See Maybury (2004), p. 28-29; Doyran (2013), p. 736

⁵⁶ See Hoffman, Schiele and Krabbendam (2013), p. 2019-210.

⁵⁷ See Schaeffer, Roberto et al. (2012), p. 9.

⁵⁸ See Tang, Gurnani, and Gupta (2014), p. 1200.

⁵⁹ See Christopher, Mena, Khan and Yurt (2011), p. 70-71.

⁶⁰ See Currie (1998), p. 171-173.

⁶¹ See De Toni and Nassimbeni (1999), p. 602.

⁶² See Xue, Li, Zhen and Wang (2020), p. 998-990.

⁶³ See Costantino and Pellegrino (2010), p. 27.

risks like inflation.⁶⁴ This strategy provides flexibility in sourcing options and ensures a more balanced supply chain, reducing the reliance on a single supplier or location.⁶⁵

Organisations can also create a sourcing risk management culture. Within this culture there needs to be continuous monitoring and managing of the risk profile. The focus within the risk profile lies on the impact of the supply chain and sourcing decisions. This enables the right decision-making and the ability to adjust sourcing strategies accordingly.⁶⁶ The sourcing strategy, taking into account the risks of inflation, can vary across different product categories.

3.1.4 Navigating inflation: different category impacts and identification methods

3.1.4.1 Impact of inflation on different product categories

Inflation has an impact across different product categories, causing various challenges.⁶⁷ Because each category responds differently to inflation, there isn't a single solution. Instead, organisations need to find specific strategies for each category, considering their unique circumstances. This approach is important for effectively dealing with the impact of inflation on sourcing activities.

Commodities, such as raw materials and basic goods, are sensible to inflationary pressures. Changes in commodity prices directly influence the cost structure of products.⁶⁸ Inflation in commodities are caused by an interplay of different factors like cost escalation, supply-demand imbalances or gross domestic product (GDP) growth.⁶⁹ By monitoring commodity markets, risks associated with commodity price volatility can be mitigated. Developing strategies to source commodities at stable prices, such as multiple sourcing options, can help minimize the impact of inflation within these products.⁷⁰

Components refer to the parts and elements used in the assembly or manufacturing of finished goods. Inflation in component prices can stem from factors like material scarcity, increased production costs or changes in global trade dynamics.⁷¹ It is important for organisations to proactively manage this risk. This can be done by exploring alternative component sources or redesigning products to utilize cost-effective alternatives. Close collaboration with suppliers

⁶⁴ See Hu and Kostamis (2015), p. 808

⁶⁵ See Costantino and Pellegrino (2010), p. 29.

⁶⁶ See Christopher, Mena, Khan and Yurt (2011), p. 71.

⁶⁷ See Lim and Sek (2015), p. 670.

⁶⁸ See Kyrtsov and Labys (2006), p. 257.

⁶⁹ See Nair and Eapen (2012), p. 46; Chien, Chau, Sadiq and Hsu (2022), p. 2.

⁷⁰ See Bernardi, Leippold and Lohre (2018), p. 77.

⁷¹ See Shi and Chumnumpan (2019), p. 208.

and continuous market monitoring can aid in identifying cost-effective component sourcing opportunities.⁷²

By integrating category-specific strategies into their sourcing strategy, organisations can mitigate the effects of inflation. Therefore they need to identify the inflation per product category.

3.1.4.2 Various methods to identify the individual inflation per product category

It is important for organisations to identify and understand the specific types of inflation that affect the different product categories.⁷³ There are various steps and methods involved in identifying the distinct forms of inflation. The first step in identifying individual inflation per product category is to conduct a data analysis within the various countries where the products are sourced.⁷⁴ This involves gathering relevant data on price movements, the economic business cycle and the exchange rate.⁷⁵ By examining historical pricing data, e.g. for specific metals such as steel, aluminium or copper, it becomes possible to identify patterns and demonstrate fluctuations of prices over time.⁷⁶ This analysis helps uncover the presence of inflation and the specific impact on each metal category.

Market research also plays a role in understanding the factors influencing inflation within product categories. It involves external considerations (technology, market size, competition), internal factors (resources) and financial considerations.⁷⁷ By combining data analysis with market research, organisations can gain insights into the drivers of inflation and their effects on different product categories. Comparative analysis, as shown in the study of Samarina, Terpstra and De Haan (2014), allows for the examination of inflation among various product categories.⁷⁸ This analysis leads to a more accurate understanding of individual inflation characteristics of product categories.

Price indexes can also serve as valuable tools for identifying different types of inflation. Price indexes, such as the Producer Price Index (PPI) or Commodity Price Index, provide comprehensive data on price movements across various industries and sectors. These indexes track changes in prices over time and help identify inflation within product categories.⁷⁹ By

⁷² See Carr and Pearson (2002), p. 1047.

⁷³ See Jang and Kim (2017), p. 210.

⁷⁴ See Nell (2004), p. 1442-1443.

⁷⁵ See Arespa and González-Alegre (2002), p. 4060.

⁷⁶ See Shafiee and Topal (2010), p. 186.

⁷⁷ See Shafiee and Topal (2010), p. 178-181.

⁷⁸ See Samarina, Terpstra and De Haan (2014), p. 43.

⁷⁹ See Agdas et. al. (2011). p. 439; Chen, Turnovsky and Zivot (2014), p. 121.

using price indexes, such as the PPI for metals, organisations can further validate the analysis. For example, if the PPI for steel consistently shows an upward trend, it confirms the presence of inflation within the steel product category. Similarly, comparing the PPIs of different metals enables the identification of variations in inflation rates across the metal categories.

Identifying the individual inflation per product category is an important step in handling inflation.⁸⁰ Through data analysis, market research and the use of price indexes, it becomes possible to discern the different types of inflation impacting each product category. The understanding of inflation within different product categories enables organisations with the development of targeted sourcing strategies.

3.2 Overview of a sourcing strategy: sourcing levers, the translation into inflation handling levers and existing levers in literature

3.2.1 The importance of a well-developed sourcing strategy through objectives

3.2.1.1 The definition and place of sourcing within the supply chain

Whenever an organisation must source products under complex conditions, a sourcing strategy becomes relevant.⁸¹ Kraljic (1983) states that strategic sourcing is crucial in developing effective supplier relationships and achieving cost savings throughout the supply chain.⁸²

Figure 6 provides a visual representation of the supply chain, illustrating the various stages within the framework. Sourcing is the process from specification to contracting, this can be seen as the strategic side of procurement.⁸³ Sourcing is referred to as a process that aims to secure access to the best capabilities available for all activities within an organisation’s value chain, with the goal of attaining a sustainable competitive advantage in the long term.⁸⁴

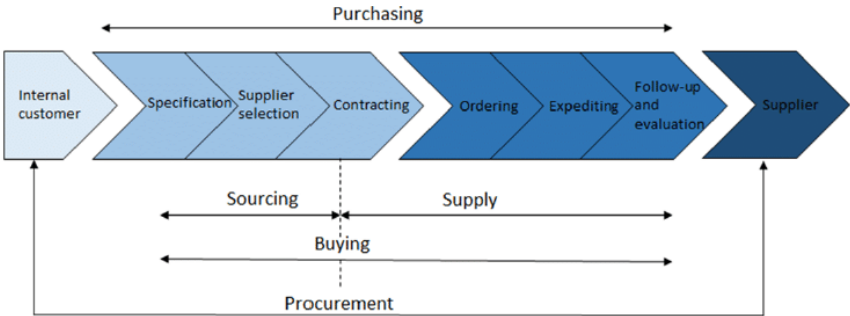


Figure 6 - Process model of purchasing (Van Weele, 2010, p. 9)

⁸⁰ See Samarina, Terpstra and De Haan (2014), p. 55.
⁸¹ See Walker and Hampson (2008), p. 134.
⁸² See Kraljic (1983), p. 110.
⁸³ See van Weele (2010), p. 84.
⁸⁴ See Rafati and Poels (2014), p. 341.

In the supply chain, sourcing connects suppliers to an organisation's internal operations. A supply chain can be managed based on market structure and resources, ranging from analysing first-tier suppliers to adopting a comprehensive supply chain network approach.⁸⁵ In the past decade, there has been a shift from reduction of costs toward a model based on the value-for-money principle. Given the limited resources at hand, especially in times of inflation, strategies must be created on how to approach the supply chain to achieve the best value.⁸⁶ There are multiple objectives organisations need to consider when formulating their strategy.

3.2.1.2 Formulating a sourcing strategy: the different objectives

Formulating a sourcing strategy is an important task within the context of handling inflation. In sourcing, a strategy covers three key aspects: what products to source, choosing suppliers, and building relationships with them.⁸⁷ Organisations need to focus on various objectives when developing an effective sourcing strategy. The study of Arnold (1997) mentions different objectives to include within an organisation’s sourcing strategy.⁸⁸ By understanding and addressing these objectives organisations can enhance their sourcing processes. The study describes six objectives. The different objectives can be seen in figure 7.

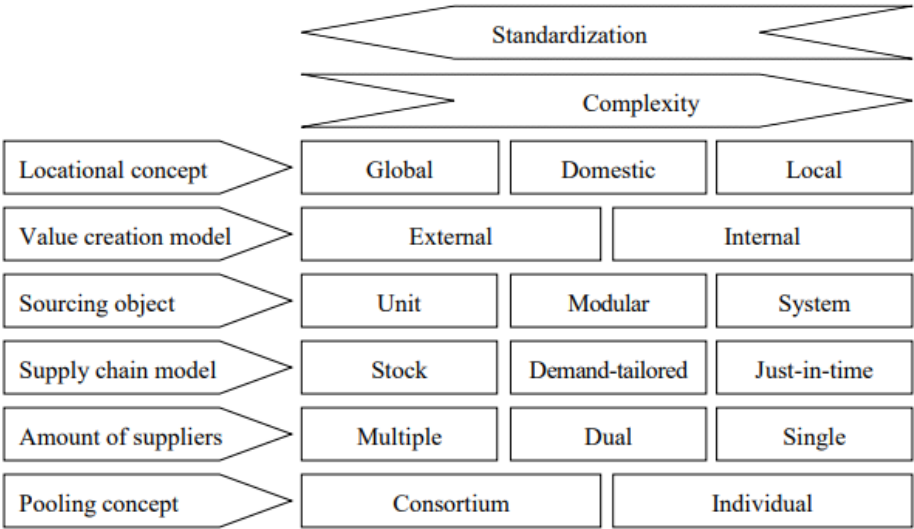


Figure 7 - Sourcing objectives (Arnold, 1997, p. 125)

The locational concept considers global, domestic, and local sourcing. Local sourcing, referring to procuring goods from regional suppliers, minimises logistical challenges.⁸⁹ Domestic sourcing involves countrywide suppliers, with longer transportation distances than local but

⁸⁵ See Cox (2015), p. 727.
⁸⁶ See Cox (2015), p. 730.
⁸⁷ See Gadde and Snehota (2000), p. 307.
⁸⁸ See Arnold (1997), p. 120-122.
⁸⁹ See Essig (2000), p. 19.

shorter than global sourcing.⁹⁰ Dahms (2019) notes that shorter geographic distances positively impact sourcing activities. Within this concept, organisations must assess the inflation impact on transportation costs and exchange rates.

Another objective to consider is the value creation model. The model encompasses the organisation's strategic approach to sourcing and its overall goals.⁹¹ It involves determining whether the emphasis is on cost reduction, quality improvement, innovation or a combination of these factors. Organisations must align their sourcing strategy with their value creation model to drive value and achieve desired outcomes.

The sourcing object is an objective that refers to the specific goods or services that an organisation aims to procure. Defining the sourcing object involves considering factors such as complexity, criticality and market characteristics. The terms "general," "industry-standard," or "special supplies" are also useful when describing sourcing objects.⁹²

The supply chain model shapes the network, which is crucial for global sourcing capabilities.⁹³ It involves decisions on supplier selection, interaction, and collaboration, shifting from a short-term focus to a long-term, strategic view.⁹⁴ A well-managed supply chain benefits both the customer and supplier, providing a competitive advantage.⁹⁵

Optimising the number of suppliers requires balancing benefits of consolidation, diversification, and risk mitigation. A compromise between single and multiple sourcing offers supply security with fewer negotiation costs. Cost considerations often favour single sourcing due to the efficiency of managing fewer contracts.⁹⁶

The pooling concept consolidates sourcing across multiple units, comprising consortium and individual sourcing. Consortium sourcing involves collaborative purchasing among organisations, combining volumes and information.⁹⁷ Individual sourcing, in Essig's (2000) words, is "a strategic choice that seeks to develop a strong individual demand position in supply markets."⁹⁸

⁹⁰ See Su (2013), p. 24-25.

⁹¹ See Arnold (1997), p. 130.

⁹² See Steinle and Schiele (2008), p. 7-8.

⁹³ See Petersen, Prayer and Scannell (2000), p.33.

⁹⁴ See O'Leary-Kelly and Flores (2002), p. 223-225; Arnold (1997), p. 20-21.

⁹⁵ See Arnold (1996). p. 19.

⁹⁶ See Xue, Li, Zhen and Wang (2020), p. 998-990.

⁹⁷ See Essig (2000), p. 13-22

⁹⁸ See Essig (2000), p. 19.

With the study of Hesping and Schiele (2016) there can be one more objective added to the model of Arnold: sourcing levers. Sourcing levers describe tactics to operationalise the sourcing strategy.⁹⁹ Organisations can use these sets of activities and implement them in their sourcing strategy.¹⁰⁰ Formulating a sourcing strategy that addresses the before mentioned objectives is important for handling inflation within sourcing. These objectives need to be adapted for different product categories within category strategy development.

3.2.2 Category strategy development and the translation into inflation handling levers

3.2.2.1 Category strategy development

3.2.2.1.1 Preparation of the category development based on market scan

Before an organisation can start with their sourcing processes, they need to establish the category strategies. Hesping and Schiele (2015) define five levels of strategy development within purchasing. The study suggests that (1) firm strategy and (2) functional strategies can be extended by (3) category strategies for the different supply markets, (4) sourcing levers, i.e., tactics applied to specify category strategies, and (5) supplier strategies toward each supplier within a sourcing category.¹⁰¹ This chapter focuses on the preparation of the category strategies.

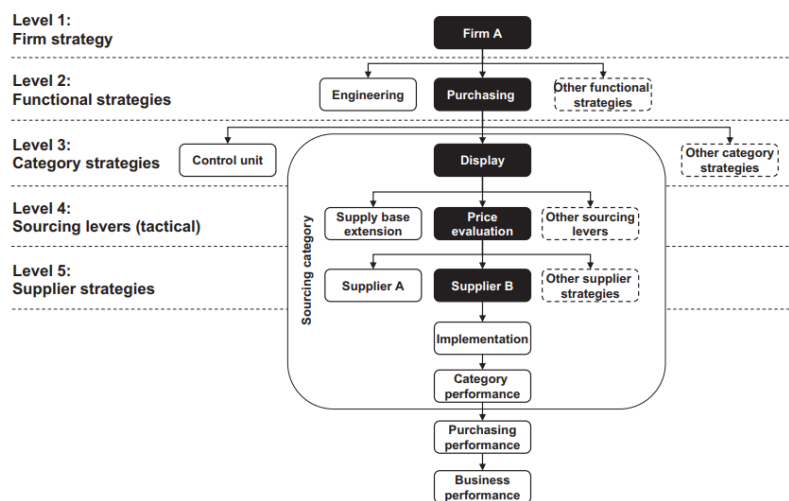


Figure 8 - Five levels of strategy development in purchasing (Hesping and Schiele, 2015, p. 139)

Category strategies, formulated by managers, outline how a purchase category and supplier portfolio contribute to the broader purchasing strategy.¹⁰² Developed through category roadmaps, these strategies set specific targets, encompassing goals like cost savings,

⁹⁹ See Schiele (2007), p. 280.

¹⁰⁰ See Hesping and Schiele (2016), p. 103.

¹⁰¹ See Hesping and Schiele (2015), p. 139.

¹⁰² See Ahtonen and Virolainen (2009), p. 264; Nollet, Ponce and Campbell (2005), p. 135-136.

innovation, and overall performance. Research indicates that effective category management significantly enhances organisational performance.¹⁰³

In order to establish the best category strategy for a certain situation, it is necessary to analyse the market. Within the larger framework of category strategy development, the market scan provides insights into the market and potential risks.¹⁰⁴ By conducting a thorough market scan, organisations can develop category strategies that align with the market and business objectives.

Market scanning includes identifying trends, like industry developments and technological advancements, helping organisations anticipate demand changes and align sourcing strategies.¹⁰⁵ Competitive analysis reveals key competitors' strategies, aiding effective positioning of category strategies.¹⁰⁶ It also assesses risks like supply chain disruptions, guiding organisations in developing strategies amid uncertainties.¹⁰⁷

Through a market scan, organisations can prepare the category development. The next step is to classify the different products which are sourced by an organisation.

3.2.2.1.2 Classifying different products within category strategy development

Every organisation had a limited amount of resources, these resources have to be allocated as efficient and effective as possible. Therefore it is important to classify the different products that are sourced.¹⁰⁸ Next to this, it is important to recognise that not all product categories hold equal significance in terms of their impact on the organisation's financial performance or ensuring a steady supply for the production of the products.¹⁰⁹

This classification of products is primarily based on various attributes that encompass not only the product itself but also its market dynamics, supplier relationships, and historical performance. The different attributes for classification are:

- Inflation sensitivity: some products are more prone to price fluctuations, like raw materials during inflation.¹¹⁰ Categorising based on sensitivity helps determine appropriate mitigation strategies.

¹⁰³ See Chen, Paulraj and Lado (2004), p. 518; Hespings and Schiele (2016), p. 101; Ellram et. al. (2002), p. 14.

¹⁰⁴ See Dupre and Gruen (2004), p. 456.

¹⁰⁵ See Christopher and Peck (2004), p. 6.; Dupre and Gruen (2004), p. 457-458.

¹⁰⁶ See Drejer, Olesen and Strandkov (2004), p. 48-49.

¹⁰⁷ See Christopher and Peck (2004), p. 4-5; Baghalian, Rezapour and Farahani (2013), p. 200.

¹⁰⁸ See Pulles et al. (2014), p. 21.

¹⁰⁹ See Childs and Jin (2015), p. 96; Zhong, Qu and Hu (2013), p. 925-926.

¹¹⁰ See Jaggi (2016), p. 270.

- Strategic importance: the strategic importance of a product within an organisation's operations must be considered.¹¹¹ Critical components may necessitate unique inflation handling strategies compared to those of less vital categories.
- Market dynamics: understanding the supply and demand dynamics of a product category is important.¹¹² Products with limited supplier diversity or high demand volatility may require more careful strategies to address inflation.
- Historical performance: analysing historical price trends, demand patterns and cost drivers can provide insights into potential future inflation risks.¹¹³

To effectively classify products within category strategy development, organisations can employ models tailored to their specific needs. Within category strategy development, two main groups of models can be identified (1) portfolio models and (2) lever analysis models.

3.2.2.1.3 Portfolio models for category strategy development

The first category strategy models the literature provides are portfolio models. These models categorise resources based on strategic importance in different quadrants, aiding decision-making.¹¹⁴ The concept originated in the 1980s with the introduction of the purchasing portfolio matrix, categorising spend based on supply risk and impact on profitability.¹¹⁵ Category strategies have recently gathered attention in the scientific community.¹¹⁶ Kraljic's (1983) purchasing portfolio matrix is widely referenced in literature.

According to Kraljic (1983) an organisation supply strategy depends on profit impact and supply risk. By assessing the organisations situation in terms of these two variables can be determined what type of strategy needs to be used. The organisations need to use its purchasing power with important suppliers and reduce the risks to an acceptable minimum.¹¹⁷ The described dimensions can also be seen in figure 9.

¹¹¹ See Wagner and Johnson (2004), p. 719.

¹¹² See Shi and Chumnumpan (2019), p. 208.

¹¹³ See Shafiee and Topal (2010), p. 186.

¹¹⁴ See Luzzini, Caniato, Ronchi, and Spina (2012), p. 1017; Wagner and Johnson (2004), p. 719.

¹¹⁵ See Kraljic (1983), p. 113

¹¹⁶ See Gelderman and van Weele (2005), p. 20; Hespings and Schiele (2015), p. 145

¹¹⁷ See Kraljic (1983), p. 112.

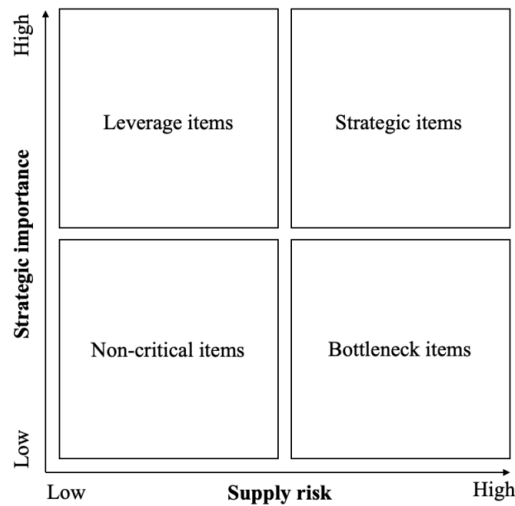


Figure 9 - *The Kraljic Matrix (Kraljic, 1983, p.113)*

Associated with the matrix are four corresponding strategies. Organisations need to exploit their purchasing power for leverage items and form partnerships for strategic items. Next to these strategies are the insurance of efficient processing for non-critical items and assurance of supply for the bottleneck items.¹¹⁸

However, critics argue that the model can be counterproductive, suggesting organisations should leverage their power.¹¹⁹ Additionally, concerns exist about mitigating risks arising from supplier power. Gelderman and van Weele (2005) state that the model lacks proactive thinking about changing power dynamics. They recommend strategic partnerships for leverage items and alternative solutions for bottleneck items.¹²⁰ Applying the Kraljic Matrix in sourcing allows organisations to employ diverse strategies for product categories.

Based on the Kraljic Matrix and the criticism, Cox (2003) introduced a power matrix that aims to consider the relationship and power interdependencies within the buyer-supplier relationship. This matrix is derived from two key strategic business competences: buyer power and supplier power. Considering the supply chain network, nearly every organisation finds itself either on the buyer side or the supplier side at various stages of the chain.¹²¹ The matrix positions the supplier or buyer in a more dominant role. The relationship can be either interdependent or independent, forming a Janus-faced relation. This term refers to organisations having

¹¹⁸ See Caniëls and Gelderman (2005), p. 142.

¹¹⁹ See Olsen and Ellram (1997), p. 106.

¹²⁰ See Gelderman and van Weele (2005), p. 24-25.

¹²¹ See Cox (2001), p. 44.

downstream supply relationships with customers and upstream buying relationships with suppliers.¹²²

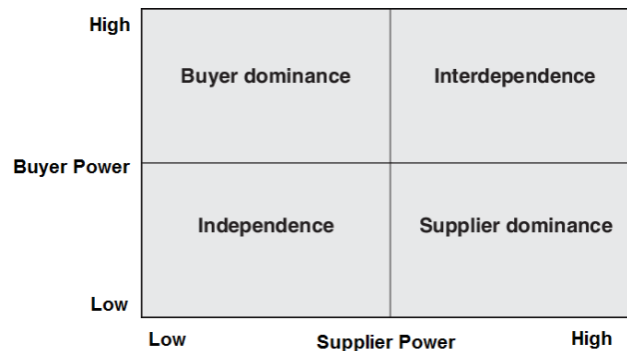


Figure 10 - *The Power Matrix* (Cox, 2003, p. 44)

An extension of the Kraljic (1983) matrix is the Dutch Windmill, known as the account portfolio.¹²³ This model addresses the need for a supplier-focused perspective, combining buyer and supplier approaches for more realistic collaborations.¹²⁴ It evaluates customer attractiveness and the supplier's competitive position based on factors like profit margin, business prospects, payment behaviour, existing suppliers, switching costs, and substitute product availability.¹²⁵ The four segments within the model are core, development, exploitation and nuisance. These segments result in 16 different types of business relationships. Core is suitable for building lasting and close supplier relationships. Due to competition from other suppliers for the customer's business, the supplier is in a weaker position in the development area. The supplier has an advantage over its customers in the exploitation area. The hallmark of a nuisance customer is their ease in switching suppliers.¹²⁶ See appendix 1 for a more thorough descriptions of the 16 quadrants and suggested actions.

¹²² See Cox (2001), p. 11-12.

¹²³ See van Weele (2010), p. 179.

¹²⁴ See van Weele (2010), p. 179-180.

¹²⁵ See van Weele (2010), p. 181.

¹²⁶ See van Weele (2010), p. 183-184.

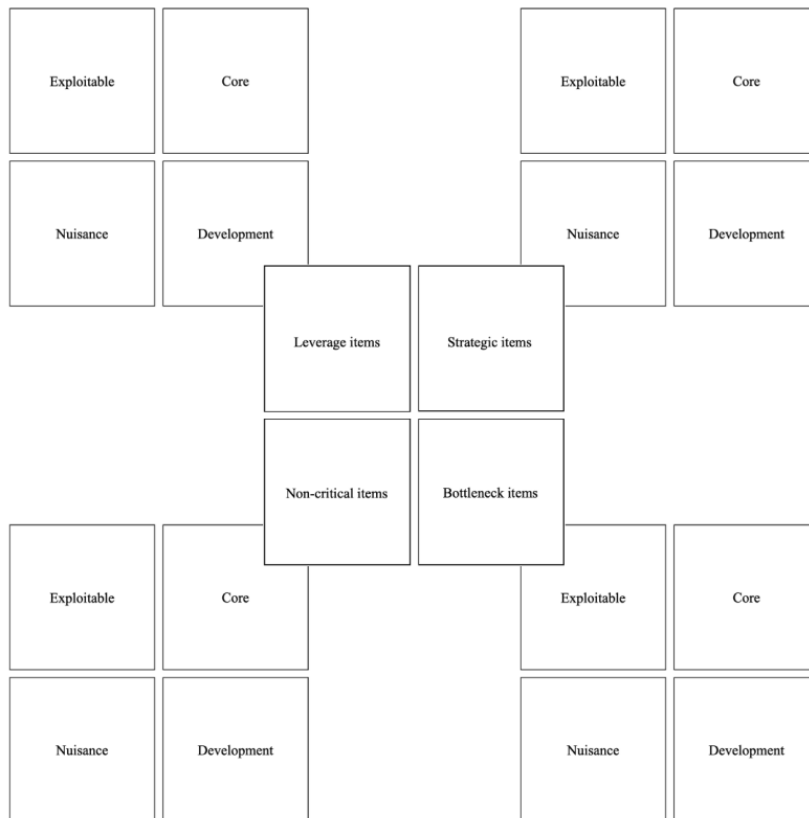


Figure 11 - *The Dutch Windmill* (Van Weele, 2010, p. 183)

The research conducted by Hesping and Schiele (2016) reveals that the collection of tactics and strategies suggested by portfolio models lacks coherence, as different tactics can be applicable to multiple quadrants within the portfolio model.¹²⁷ In modern category management, the varied portfolios call for different and unique approaches to portfolio management. The study argues that in order to achieve performance goals, category managers should employ sourcing levers. These specific approaches provide a more effective means of addressing the requirements and challenges associated with specific purchase categories.¹²⁸ There are different sourcing levers and models mentioned in literature.

3.2.2.2 Lever management

3.2.2.2.1 History and concept of sourcing levers

The second type of models for developing category strategies identified in the literature are lever analysis models. The idea of sourcing levers has been well-documented in literature as a means of implementing overall strategies through specific tactics.¹²⁹ According to Schiele (2007) each sourcing lever consists of “a set of similar measures that are used to improve the

¹²⁷ See Hesping and Schiele (2016), p. 113.

¹²⁸ See Hesping and Schiele (2016), p. 109.

¹²⁹ See Hesping and Schiele (2016), p. 476.

firm's sourcing performance in a commodity group or sourcing category''. One objective of sourcing levers is to tackle competitive priorities such as innovation, quality improvement, cost reduction or flexibility.¹³⁰ While sourcing strategies outline the overall objective and approach for a specific category of goods or services, sourcing levers provide the tactical steps and methods to achieve those goals on a more detailed and tactical level.¹³¹

Lever analysis occurs in workshops where buyers and partners explore sourcing levers to enhance category performance. Unlike portfolio models, which offer broad category strategies, sourcing levers provide specific tactical approaches and actions for each category and its supply market.¹³²

Hesping and Schiele's study (2016) of 107 sourcing projects revealed that sourcing levers aren't confined to single purchasing portfolio quadrants. They are used additively, spanning multiple quadrants.¹³³ Sourcing levers provide a range of activities to achieve category strategy objectives, with various frameworks in literature differing in the number and complexity of levers.

3.2.2.2 Lever analysis models for category strategy development

The literature provides different existing lever analysis models. The first version of lever analysis was introduced by Schuh and Bremicker (2005) in the form of a model known as the "sourcing lever diamond." This model comprised six levers and served as an initial framework for conducting lever analysis.¹³⁴

Expanding upon the 'sourcing lever diamond' model, Schiele (2007) introduced a sourcing lever framework consisting of seven levers, as depicted in Figure 12.¹³⁵ While there are a few other academic attempts to develop sourcing frameworks, such as the seven levers from Schumacher et. al. (2008) and the 'purchasing bull's eye' discussed in this chapter.¹³⁶ The most extensively researched and developed framework is the one proposed by Schiele (2007). The presented lever analysis framework has been thoroughly tested and validated. This framework employs seven sourcing levers to identify areas where performance improvements can be made.¹³⁷

¹³⁰ See Hesping and Schiele (2016), p. 104-105.

¹³¹ See Hesping and Schiele (2016), p. 102; Schiele, Horn and Vos (2011), p. 322.

¹³² See Hesping and Schiele (2015), p. 145

¹³³ See Hesping and Schiele (2016), p. 112-113.

¹³⁴ See Schuh and Bremicker (2005), p. 68.

¹³⁵ See Schiele (2007), p. 280.

¹³⁶ See Schumacher et. al. (2008), p. 38.

¹³⁷ See Hesping and Schiele (2016), p. 105.

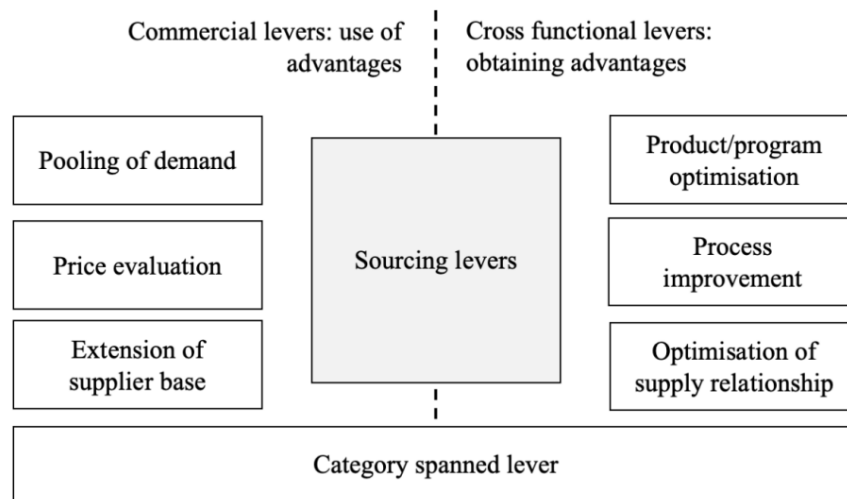


Figure 12 - *The seven sourcing levers* (Schiele, 2007, p. 280)

Six out of the seven sourcing levers can be categorized into two groups, each focusing on optimisations within specific categories. The remaining lever applies to categories in general. The first group includes the following commercial levers:

- Pooling of demand: This lever involves consolidating purchasing volumes to benefit from advantages that come with ordering larger quantities. Purchase managers strive to consolidate demand and increase the volume per request for quotation.
- Price evaluation: Managers set price targets, analyse bids, and compare with past offers or similar purchases for cost efficiency.
- Extension of supplier base: this lever manages supplier numbers and market competition. It involves international sourcing and the development of sources.¹³⁸

The second group within the model consists of cross-functional levers:

- Product and program optimisation: this lever engage purchasing in cross-functional teams, leveraging supplier expertise to innovate in the development process.
- Process improvement: focusing on the efficiency of the buyer-supplier interface, this lever aims to reduce transaction costs by emphasizing information exchange, transparency, and streamlined processes.
- Optimisation of supply relationship: this lever emphasizes long-term collaboration and joint efforts between buyers and suppliers to optimize the supply relationship.¹³⁹

¹³⁸ See Hesping and Schiele (2016), p. 105.

¹³⁹ See Hesping and Schiele (2016), p. 105.

The remaining lever is category spanned lever, which examines potential synergies and trade-offs across different materials or services. It addresses the interplay between cost reduction in one commodity group and potential cost increases in another.¹⁴⁰ These seven tactical sourcing levers implement a category strategy, but managers must select them based on specific circumstances. While these levers address key factors in enhancing sourcing strategy, they don't directly account for the impact of inflation.

In addition to Schiele's 7-levers model (2007), there is another sourcing levers model known as the purchasing Bull's Eye, this model can be seen in Figure 13. The Bull's Eye model emphasizes the identification of category-specific levers to achieve maximum cost efficiency.¹⁴¹ It categorizes the main levers into four types, each with its own set of sub-levers: demand, specifications, sourcing and execution. When implementing the Bull's Eye model, four rules should be followed: selecting the appropriate input sources, generating ideas through cross-functional teams, utilizing technology to its fullest and establishing a realistic implementation roadmap.¹⁴²

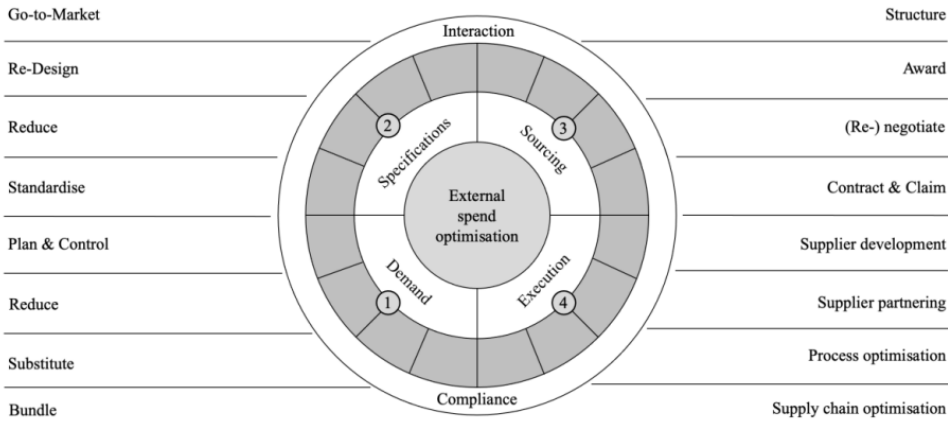


Figure 13 - Purchasing Bull's Eye (Aichbauer et al., 2022, p. 100)

The purchasing chessboard by Schuh (2009) is derived from the Kraljic matrix. It utilizes four power positions and comprises 64 methods or 'moves' divided into four strategies: 'Managing Spend,' 'Changing the Nature of Demand,' 'Seeking Joint Advantage with Suppliers,' and 'Leveraging Competition Among Suppliers.' These strategies facilitate discussions between the purchasing department and top management, serving as a framework to enhance communication and decision-making.¹⁴³ The purchasing chessboard can be seen in figure 14.

¹⁴⁰ See Schiele (2007), p. 279-280.

¹⁴¹ See Aichbauer et al. (2022), p. 99.

¹⁴² See Aichbauer et al. (2022), p. 101-103

¹⁴³ See Schuh et. al. (2009), p. 13.

Supply power	High	8	Invention on demand	Leverage innovation network	Functionality assessment	Specification assessment	Value chain reconfiguration	Revenue sharing	Profit sharing	Strategic alliance		
	7	Core-cost analysis	Design for sourcing	Product teardown	Design for manufacture	Supplier tiering	Sustainability management	Project-based partnership	Value-based sourcing			
	6	Vertical integration	Intelligent deal structure	Composite benchmark	Process benchmark	Collaborative capacity management	Virtual inventory management	Total life cycle concept	Collaborative cost reduction			
	5	Bottleneck management	Political framework management	Product benchmark	Complexity reduction	Visible process organization	Vendor-managed inventory	Supplier development	Supplier fitness program			
	4	Sourcing community	Buying consortia	Cost-data mining	Standardization	RFI/RFP process	Expressive bidding	Total cost of ownership	Leverage market imbalances			
	3	Procurement outsourcing	Mega supplier strategy	Master data management	Spend transparency	Supplier market intelligence	Reverse auctions	Price benchmark	Unbundled prices			
	2	Compliance management	Closed loop spend management	Supplier consolidation	Bundling across generations	Make or buy	Bestsourcing	Cost-regression analysis	Factor-cost analysis			
	Low	1	Demand reduction	Contract management	Bundling across product lines	Bundling across sites	Global sourcing	LCC sourcing	Cost-based price modeling	Linear performance pricing		
			Low	A	B	C	D	E	F	G	H	High
				Demand power								

Figure 14 - *The Purchasing Chessboard* (Schuh et al., 2009, p. 216)

The research conducted by Schiele et al. (2011) and Hesping and Schiele (2016) indicates that sourcing levers aren't confined to just one specific portfolio quadrant, which could potentially restrict procurement managers when making lever selections.¹⁴⁴ This limitation also arises when using the purchasing chessboard, as it's structured with predetermined levers, making it impossible to use every lever in each quadrant. Consequently, the studies by Schiele et al. (2011) and Hesping and Schiele (2016) raise doubts about the practicality of the purchasing chessboard.

Cox (2015) discusses "The Purchasing Chessboard," critiqued for recommending the same four sourcing strategies as in Purchasing Portfolio Analysis, resulting in 64 tactical methods for cost reduction. Critics argue that the methodology lacks clarity in identifying power resources and fails to explain their importance in sourcing decisions. The overall critique emphasizes the lack of analytical rigor and inadequacy in practical recommendations for supply category segmentation and sourcing strategy development.¹⁴⁵

3.2.2.2.3 Inflation methods used in other sectors

Different sectors use various inflation methods to mitigate the effects of rising prices. The literature explains which tactics different sectors might use.

Finance Sector:

¹⁴⁴ See Schiele et al. (2011), p. 327; Hesping and Schiele (2016a), p. 111

¹⁴⁵ See Cox (2015), p. 719.

Interest rate management: financial institutions, like banks, adjust interest rates to influence borrowing and spending, curbing inflation.¹⁴⁶

Diversification: in finance, diversification involves spreading investments across a variety of asset classes. This strategy helps protect against inflation's eroding effect on the value of assets.

Investment in inflation-linked bonds: investors can opt for inflation-linked bonds like TIPS (Treasury Inflation-Protected Securities), adjusting with inflation.¹⁴⁷ Finance models like CAPM (Capital Asset Pricing Model) and APT (Arbitrage Pricing Theory) assess inflation's impact on portfolios, aiding informed decisions in managing inflation risks.¹⁴⁸

Construction Sector:

Long-Term contracts: construction firms secure fixed prices for materials and labor through long-term contracts, shielding them from project cost fluctuations.

Efficiency improvements: construction organisations focus on enhancing operational efficiency to reduce overall project costs, compensating for inflation-related cost increases.¹⁴⁹

Value engineering (cost optimization): value engineering entails analysing projects to find cost-effective alternatives in design and construction without sacrificing quality.¹⁵⁰

Outsource the logistics process: construction firms outsource logistics, including material handling, to manage inflation risks, reducing costs by minimizing transportation and storage facilities. Sobotka and Czarnigowska (2005) observed that logistics outsourcing leads to cost reduction.¹⁵¹

Retail Sector:

Price adjustments: retailers use dynamic pricing strategies to adapt to inflation, considering consumer demand elasticity and managing inventory for profitability.¹⁵²

Supply chain optimisation: retailers optimise supply chains by streamlining processes and managing inventory effectively to mitigate rising costs.

¹⁴⁶ See Schmidt (2011), p. 2-3.

¹⁴⁷ See D'Amico, Kim and, Wei (2018), p. 396.

¹⁴⁸ See Brueggeman, Chen and Thibodeau (1984), p. 334; Hamao (1988), p. 49; Chen, Chen and Terrell (2007), p. 265-266.

¹⁴⁹ See Cheng and Li (2002), p. 201.

¹⁵⁰ See Cheah and Ting (2005), p. 156.

¹⁵¹ See Sobotka and Czarnigowska (2005), p. 73–75.

¹⁵² See Huang and Liu (2021), p. 460.

Private labeling: retailers may invest in developing and promoting private-label products, which often yield higher profit margins than brand-name products, helping offset inflation.¹⁵³

Manufacturing Sector:

Cost reductions: manufacturers focus on reducing production costs through measures like energy-efficient practices, lean manufacturing, and process improvements.¹⁵⁴

Inventory management: efficient inventory management helps minimize storage and carrying costs, preventing capital from getting tied up in excess inventory. Just-in-Time (JIT) inventory management is also used to minimize the impact of inflation by reducing holding costs and inventory levels.¹⁵⁵

Lean manufacturing practices: lean principles aim to eliminate waste in production, improving efficiency and reducing costs, making manufacturers more resilient to inflation.¹⁵⁶

Energy Sector:

Investment in renewables: energy companies invest in renewable sources such as solar and wind to reduce dependence on fossil fuels and stabilize energy prices.¹⁵⁷

Long-term supply agreements: energy companies can employ long-term contracts with inflation clauses to manage the impact of inflation on their operations and maintain stable prices for their customers.¹⁵⁸

Energy efficiency improvements: adopting energy-efficient technologies and practices can help reduce operational costs, making energy providers more resistant to inflation.¹⁵⁹

Technology Sector:

R&D investments: continued research and development can lead to innovations that reduce manufacturing costs and enhance product offerings.¹⁶⁰

¹⁵³ See Chandrachud and Rajagopalb (2018), p. 17-18.

¹⁵⁴ See Palange and Dhatriak (2021), p. 730.

¹⁵⁵ See Polat and Arditi (2005), p. 711; Pace (2004), p. 14.

¹⁵⁶ See Palange and Dhatriak (2021), p. 730.

¹⁵⁷ See Deka, Özdeşer and Seraj (2023), p. 8-9.

¹⁵⁸ See Wood and Mokhtab (2011), p. 79-80.

¹⁵⁹ See O'Driscoll, Cusack and O'Donnell (2013), p. 734.

¹⁶⁰ See Bor et. al. (2010), p. 180.

Cost-effective sourcing: finding cost-effective sources for components and materials can help tech companies mitigate cost increases.

An extended list of inflation handling methods with recommended actions can be found in appendix 2. Here are also other sectors mentioned. In addition to these methods, there have also been inflation fighting methods found in the literature used within product category management.

3.2.3 Other inflation fighting methods found in literature: hedging and price indexes

3.2.3.1 Hedging strategies are widely used within product category management

The literature provides various other inflation fighting methods, one of those is hedging. Bell and Kettel (1983) refer to hedging as the act of avoiding or covering the risk of foreign exchange.¹⁶¹ Peirson et al (2015) state that hedgers are individuals or organisations that enter into contracts to mitigate risks.¹⁶² The goals of hedging strategies within product category management are to mitigate the impact of price fluctuations and manage risks associated with market volatility.

The literature provides four main hedging strategies: futures contracts, forwarding contracts, options contracts and option strategies.

1. Futures contracts: futures contracts are standardized contracts in which the buyer commits to purchasing or selling an amount of a commodity at a predetermined price on a specific future date. A futures contracts does trade on exchange.¹⁶³
2. Forwarding contracts: forwarding contracts can be customised to the needs of the organisation. It is a contract between two organisations to purchase or sell a product for a certain price, a forwarding contract does not trade on exchange.¹⁶⁴
3. Options contracts: an agreement between two parties to enable a transaction at a predetermined price and date. The right, but not the obligation, to buy or sell the underlying asset is provided when an organisation purchases an option.¹⁶⁵

¹⁶¹ See Bell and Kettel (1983), p. 164.

¹⁶² See Peirson et al. (2015), p. 215-217.

¹⁶³ See Tauser and Čajka (2014), p. 178.

¹⁶⁴ See Islam, M., Chakraborti, J. (2015), p. 69.

¹⁶⁵ See Spinler, Huchzermeier and Kleindorfer (2003), p. 394.

4. Option strategies: option strategies represent a combination of multiple option positions. Popular "zero costs strategies" include combinations of two or more option positions with the same amount of premiums collected and paid.¹⁶⁶

The objectives of hedging strategies include price stability, cost control and supply chain stability. These objectives collectively help organisations navigate price movements and enhance their competitive position in the marketplace. Next to hedging strategies, there are also other strategies mentioned in literature.

3.2.3.2 Price indexes to analyse product prices and their fluctuations

Another method found in the literature is the use of price indexes. Price indexes are composed of a selected basket of goods and services that represent the overall market or specific sectors. Price indexes play an important role in monitoring and analysing inflation trends, enabling organisations to make informed decisions regarding pricing and cost management.¹⁶⁷ The literature provides different price indexes for product categories. Graham, Kiviaho and Nikkinen (2013) use the S&P GSCI Commodity Index to measure the performance and track price fluctuations of commodities from various sectors, including energy and metals.¹⁶⁸ This index can be used to analyse commodity price trends and analyse the relationships between commodity prices and economic variables.¹⁶⁹

Other important price indexes within the manufacturing industry are the Metal Price Index and the Energy Price Index. Purchasing studies highlight the importance of the Metal Price Index in providing insights into metal price trends and fluctuations. The index serves as a benchmark for tracking price movements of various metals, such as steel, aluminium and copper.¹⁷⁰ By monitoring this index, organisations can anticipate changes in metal prices and adjust their sourcing strategies accordingly. It enables them to effectively manage the costs associated with the product category metals.¹⁷¹ The Energy Price Indexes monitor the price changes of energy commodities, including oil, natural gas and electricity. Energy costs have an impact on various industries, making energy price indexes important for effective product category

¹⁶⁶ See Tauser and Čajka (2014), p. 179.

¹⁶⁷ See Li, Kang and Xia (2004), p. 2.

¹⁶⁸ See Graham, Kiviaho and Nikkinen (2013), p. 584.

¹⁶⁹ See Smolík, Karas and Rejnuš (2014), p. 1418.

¹⁷⁰ See Fernandez (2014), p. 46.

¹⁷¹ See Kyrtsov and Labys (2007), p. 228.

management.¹⁷² By tracking energy prices, organisations can assess the impact of inflation on their energy expenses and explore energy-efficient alternatives.

Price indexes are a valuable tool in fighting inflation, providing organisations with insights into price changes and inflationary trends. Understanding the types and composition of price indexes enables organisations to effectively monitor and analyse inflation impacts. By utilizing price indexes, organisations can make informed decisions regarding pricing strategies and cost management, thereby mitigating the adverse effects of inflation and maintaining competitive in the market.¹⁷³

3.3 Solution gap: The absence of a model for lever identification and application

Identifying and managing the risks associated with inflation is essential for organisations to maintain financial stability and competitiveness.¹⁷⁴ However, there is a challenge within managing these risks because of the absence of specific inflation handling levers. Existing literature on inflation and sourcing strategies lack a framework or model that specifically focuses on identifying and applying the right inflation handling levers for organisations.¹⁷⁵ The gap in literature can be visualised within the five levels of strategy development in purchasing from Hesping and Schiele.¹⁷⁶ The gap is mainly present within level 4: sourcing levers (tactical).

Different lever frameworks have been presented. Several concepts, such as the sourcing lever diamond from Schuh and Bremicker (2005), the purchasing chessboard of Schuh et. al. (2008) and the seven sourcing levers from Schiele (2007) present levers that can be implemented within a sourcing strategy of an organisation.¹⁷⁷ However, these models which do not provide specific inflation handling levers. The seven sourcing levers focus on optimising an organisation's sourcing strategy, but they do not directly address the impact of inflation on costs and supplier dynamics. Similarly, the Purchasing Chessboard and the Purchasing Bull's Eye offer strategies for different product categories but do not explicitly factor in inflation as a variable. As a result, they lack specific tactics for mitigating the effects of inflation on sourcing decisions.

¹⁷² See Kirikkaleli and Güngör (2021), p. 2-3.

¹⁷³ See Li, Kang and Xia (2004), p. 3.

¹⁷⁴ See Allen and Wood (2006), p. 169.

¹⁷⁵ See Dikiy et. al. (2019), p. 196; Angeriz and Arestis (2006), p. 568; Albulescu, Oros and Tiwari (2017), p. 1527.

¹⁷⁶ See Hesping and Schiele (2015), p. 139.

¹⁷⁷ See Schuh and Bremicker (2005), p. 68; Schuh et. al. (2009), p.216; Schiele (2007), p. 280.

To bridge this solution gap, a comprehensive model for lever identification and application within a sourcing strategy needs to be developed. This model will provide organisations with a structured framework to identify the specific levers relevant to their market conditions and guide the implementation of these levers.

The proposed model will draw on existing research on inflation management, sourcing strategies and inflation fighting methods. It will draw from existing sourcing levers from Hesping and Schiele such as pooling of demand, price evaluation and process improvement to customise the lever identification and application process.¹⁷⁸ Developing a comprehensive model to address this solution gap will empower organisations to optimise their sourcing strategies and mitigate the impact of inflation.

¹⁷⁸ See Hesping and Schiele (2016), p. 105.

4. The methodology offers an understanding of the approach taken in Design Science Research and the methods used for data collection

4.1 Design research framework to develop a model for handling inflation

To answer the central research question and sub-questions, the Design Science Research Framework of Stange, Schiele and Henseler is used.¹⁷⁹ In the previous chapters, the problem was identified and clarified. Furthermore was the solution space reviewed through a literate review. This chapter discusses the selected research methodology.

By following the Design Science Research Methodology (DSRM) (Figure 15) it is possible to create a model. In order to come to a solution the full design will be executed. After the methodology section the process consists of five steps. The research method is operationalised by selecting a sample of purchasing experts from various mid-sized or large manufacturing companies. The solution concept will be designed by conducting semi-structured interviews, followed by transcription and systematic coding for a comprehensive analysis of inflation levers. The solution will be applied through a group workshop with the purchasing experts. Next the solution will be assessed and evaluated upon. The research approach with data collection methods can be seen in Figure 15.

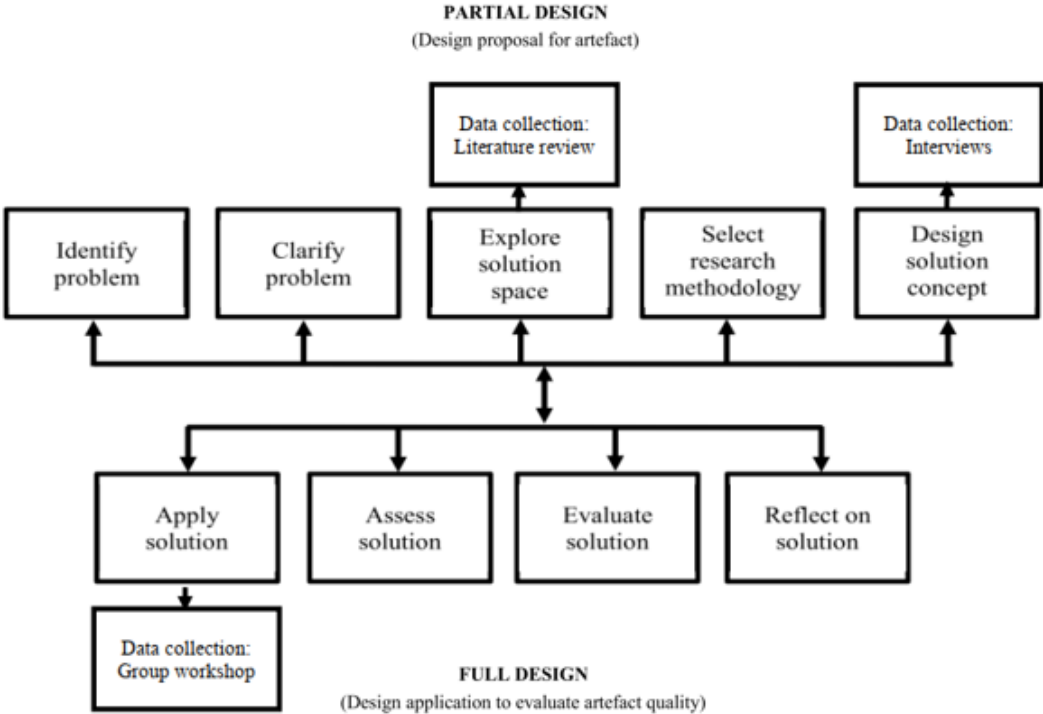


Figure 15 - Research approach with data collection methods

¹⁷⁹ See Stange, Schiele and Henseler (2022), p. 5.

4.2 Literature research about the inflation model

Several data collection techniques are used in the creation of a research design. A thorough literature research was conducted to gain insights into the topic. The literature review includes the topics inflation, sourcing strategies, price fluctuations and risk management. In order to support the requirement for the development of an inflation model, a structured literature review on several databases was done. Within the solution space review, existing models to handle inflation-related topics were compared. Scopus and Web of Science were the main search engines employed to guarantee that the literature on the topic was academic and relevant.

4.3 Sampling, collecting and analysing data from professionals to enhance understanding on how to manage inflation

The sample selection is not entirely random as it focuses on specific organisations for interviews. These organisations are predominantly midsize or large (with more than 100 employees), where purchasing plays a significant role in their revenue. Prior to selecting interviewees, the sample size was established. Guest et al. (2006) suggest that six interviews are adequate for developing meaningful themes and useful interpretations.¹⁸⁰ To ensure data saturation, the sample size is set on ten.

Due to the belief that production companies, as opposed to service companies, prioritise purchasing, they are given preference in this study. Consequently, the research concentrates on the technology, manufacturing, and food industry. In order to establish a certain degree of variety, five purchasers from HP Valves and five external purchasing experts were interviewed.

Once the sample size and its characteristics were established, the interviewees were chosen through a non-random process, contacted, and interview appointments were scheduled. The complete list of interviewees for this research is detailed in Table 1.

Number	Organisation	Job Title	Industry
1	Aeronamic	Supply Chain Manager	Technology
2	Benchmark	Procurement Director	Technology
3	Gefa	Purchasing Manager	Manufacturing
4	Nedap	Tactical Purchaser	Technology
5	Europastry	Procurement Director	Food
6	HP Valves	Tactical Purchaser	Manufacturing
7	HP Valves	Project Purchaser	Manufacturing
8	HP Valves	Project Purchaser	Manufacturing

¹⁸⁰ See Guest et al. (2006), p. 78

9	HP Valves	Project Purchaser	Manufacturing
10	HP Valves	Project Purchaser	Manufacturing

Table 1: *Research sample*

The analysis of the interviews with the purchasing experts employs content analysis. According to Assarroudi et al. (2018), content analysis is a systematic and replicable method for condensing extensive text into fewer content categories, guided by explicit coding rules.¹⁸¹

The first stage of analysing interview data involves transcribing spoken words into written text. Transcriptions are produced using Amberscript. The transcriptions generated by Amberscript are manually reviewed to correct any potential errors in the text.

The transcriptions undergo analysis through coding, resulting in codes that are input into the ATLAS.ti program. This software facilitates a systematic and structured analysis of the transcriptions, allowing for the coding of the text. Based on this the interviews can be deeper analysed for further connections. The following subchapters describe the interviews being held.

4.4 Explorative interviews about the inflation model

To design the solution concept of the inflation model semi-structured interviews with purchasing experts are conducted. Semi-structured interviews offer a mix of flexibility and structure. According to McIntosh and Morse (2015), semi-structured interviews involve a relatively detailed guide and are applicable when there sufficient objective information about a phenomenon, but a shortage of subjective knowledge.¹⁸² This aligns with the research objective, where the aim is to explore the subjective practices of procurement professionals.

The explorative interviews are about inflation handling methods that purchasing experts are using when handling inflation. There is asked in which situations they use these methods, for example when the product is high risk or low risk for their operations. The interview guide of the explorative interviews can be found in appendix 3.

1) Which inflation handling methods within sourcing do you know or use?
2) In which situations do you use these methods? How do you use them?

Table 2: *Guiding lines for explorative expert-interviews*

The result of these interviews is a list of inflation handling levers used by purchasing experts. Based on these levers the framework for the solution concept can be formulated. In the second

¹⁸¹ See Assarroudi et. al (2018), p. 42

¹⁸² See McIntosh and Morse (2015), p. 1

interview, the model is discussed with external experts to validate its accuracy. The next subchapter discusses the validation of the inflation handling model.

4.5 Design the inflation model through second interviews with external experts

To ensure the practical applicability and relevance of the proposed inflation model, the solution concept is verified through second semi-structured interviews. There are insights gathered from the five external experts. Together with the purchasing experts, the concept solution is tested and reviewed to determine if they consider it applicable. The following questions are asked.

-
- 1) What do you think about the applicability and effectiveness of these inflation handling levers for sourcing?

 - 2) Are the identified axes in the model accurate for determining when to use specific methods?

 - 3) Are there any additional methods or strategies you recommend including in the model?

 - 4) Do you see any limitations or challenges to the inflation model?

 - 5) Can you use these levers for your own area/commodities?
-

Table 3: *Guiding lines for accessing concept inflation model*

The interview guide of the second interviews can be found in appendix 4. The result of the second interview includes feedback from the purchasing experts regarding the applicability and relevance of the inflation model. This helps validating the inflation handling model in practice.

4.6 Applying the inflation model through a group workshop

After the second interviews about the inflation model within external experts, the model can be applied. This model is applied to a commodity within HP Valves, which is done during a group workshop.

The workshop begins by presenting the inflation handling model. This is the model with inflation handling levers and the situations in which they are applied. The participants are encouraged to ask questions and seek clarifications about the model.

The next step in the group workshop is to apply the inflation model for a commodity from HP Valves. A commodity is selected together with the employees. The inflation levers are applied to the commodity and actions are established. The saving potential of the actions is also noted, which can vary from high to low. The result of the group workshop is an overview of different inflation levers that can be applied within the commodity and concrete actions with saving potentials.

There is also a discussion about the final inflation model. The purchasing experts can share their thoughts and feedback related to the inflation handling levers. The participants are asked if there are any specific inflation handling levers they find particularly useful or irrelevant. This discussion can also include any suggestions for further improvements of the model.

The group workshop provides a collective and comprehensive understanding of the inflation model. This collaborative approach helps ensure the model is well-suited for practical challenges. After the two rounds of semi-structured interviews and the group workshop, the inflation model can be assessed and evaluated upon.

4.7 Validity and reliability assessment through implementation of the model

For every research, recognizing the importance of reliability and validity is essential for lowering the risk of inadequate findings. Reliability is conceptualized as when using the same research instruments and measurement tools again, the same results are obtained. Research techniques, practices and methods that show a degree of stability in their outcomes are referred to as reliable.¹⁸³

The reliability can be ensured by conducting interviews with relevant experts with knowledge of sourcing and inflation. Michell (2009), describes validity as the degree to which a test or method measures what it is supposed to measure.¹⁸⁴ To assess the validity of the focus group, there will be experts from the field present. To assess the validity of the designed model and to further develop it, the design concept is developed through semi-structured interviews with experts of HP Valves and external experts. Next to this will be a workshop group to apply the inflation model.

¹⁸³ See Lindhult (2019), p. 23-26.

¹⁸⁴ See Michell (2009), p. 112.

5. Creative leap: design the inflation model based on literature and interviews

5.1 Ideation: developing of the inflation model based on exploratory interviews

5.1.1 Different inflation handling levers have been found in the first interviews

This section discusses the results from exploratory interviews with ten purchasing professionals, categorising their provided methods and citations. The different inflation handling levers mentioned in the interviews are categorised under overarching categories. The content analysis in Table 4 visualises whether the methods specifically targets the effects of inflation or focus on general cost reduction. Consideration is given to the organisation's implementation of the method and its primary applicability to supply-side inflation, demand-side inflation, or both. These results stem from the analysis of the interviews. It has been considered how many interviewees named the different methods. The number of times a method was mentioned is also visible in the table below.

Inflation handling methods	Inflation or general costs	Type of inflation	Total	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Strategic Contract Management and Collaboration													
Fixed price contracts with suppliers	General costs	Both	6	✓	✓				✓	✓	✓		✓
Long-term contracts with inflation clauses	Inflation	Demand-side	3	✓	✓				✓				
Buy according to market opportunities	Inflation	Supply-side	3							✓	✓		✓
Make contracts with sub-suppliers	General costs	Both	2		✓					✓			
Align customer and supplier contracts	General costs	Both	1	✓									
Supply Chain Optimisation													
Build up strategic inventory	Inflation	Both	8	✓	✓		✓	✓	✓	✓	✓	✓	✓
Diversify sourcing across multiple suppliers	Inflation	Supply-side	7	✓	✓			✓	✓	✓	✓		✓
Enhance transport efficiency	General costs	Both	7	✓		✓	✓	✓	✓			✓	✓
Determine optimal order quantities	General costs	Both	6	✓	✓			✓	✓	✓	✓		
Optimise product delivery and packaging	General costs	Both	6	✓				✓	✓		✓	✓	✓
Explore alternative suppliers	General costs	Supply-side	6			✓	✓	✓	✓			✓	✓
Streamline the supply chain	General costs	Both	4	✓	✓					✓			✓
Foster collaborative planning with suppliers	General costs	Both	1									✓	
Digital Transformation and Process Efficiency													
Digitalisation and ERP implementation	General costs	Both	8	✓	✓	✓		✓	✓	✓	✓		✓
Automate the procurement process	General costs	Both	7			✓	✓	✓	✓	✓	✓	✓	✓
Utilise data analytics	General costs	Both	5	✓	✓		✓		✓	✓			
Utilise price development dashboards	Inflation	Supply-side	2						✓	✓			

External Relations and Communication												
Build strong supplier relationships	General costs	Supply-side	10	✓	✓	✓	✓	✓	✓	✓	✓	✓
Promote transparency with suppliers	Inflation	Supply-side	8	✓	✓	✓	✓	✓	✓			✓
Conduct on-site visits to suppliers	General costs	Supply-side	6		✓	✓		✓		✓	✓	
Allocate resources and investments in supplier development	General costs	Supply-side	6		✓	✓	✓	✓		✓		✓
Communicate with sub-suppliers	General costs	Supply-side	4			✓			✓	✓		✓
Evaluate and assess supplier performance	General costs	Supply-side	4		✓	✓			✓			✓
Forge partnerships with suppliers	General costs	Supply-side	2		✓							✓
Continuous improvement												
Standardise products	General costs	Demand-side	6	✓	✓	✓		✓			✓	✓
Enhance production processes	General costs	Both	5	✓		✓				✓		✓
Improve operational efficiency	General costs	Both	4						✓	✓		✓
Engage in early purchasing involvement	General costs	Demand-side	4		✓					✓	✓	✓
Implement product improvements	Inflation	Both	2			✓	✓					
Learn from other organisations	General costs	Both	1			✓						
Adopt long product lifecycles	General costs	Both	1	✓								
Market Analysis and Pricing Strategies												
Price negotiation strategies	General costs	Both	10	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitor market trends and price indexes	Inflation	Both	8	✓	✓	✓	✓		✓	✓	✓	✓
Conduct price evaluations	General costs	Both	6	✓	✓				✓	✓		✓
Implement competitive pricing strategies	General costs	Both	5	✓	✓				✓			✓
Transparent cost breakdown of products	General costs	Supply-side	5		✓				✓	✓	✓	✓
Explore cost-effective alternatives products and materials	Inflation	Supply-side	5	✓	✓				✓		✓	✓
Identify different types of inflation	Inflation	Supply-side	1						✓			
Proactive Risk Management and Financial Planning												
Consider geographical considerations	General costs	Both	7	✓	✓	✓		✓	✓	✓		✓
Implement risk management	General costs	Both	7	✓	✓	✓		✓	✓	✓		✓
Collaborate with suppliers by sharing forecasts	General costs	Demand-side	5		✓		✓			✓	✓	✓
Obtain multiple quotations	General costs	Both	3				✓				✓	✓
Stay informed about inflation and rising costs	Inflation	Both	1						✓			
Analyse historical figures	General costs	Both	1						✓			

Table 4: Cross comparison table

5.1.2 When to use an inflation lever depends on the situation and type of product

The interviews conducted on inflation handling methods have provided a comprehensive view of the diverse strategies used by organisations. The focus will be on the levers from Table 4 specifically for inflation. After analysing the interviews, several situations and conditions when the inflation levers are used were found. The inflation methods “identify different types of inflation” and “stay informed about inflation and rising costs” were only mentioned by one interviewee and will therefore not be included in the model. This section describes when organisations use the various methods.

Long-term contracts with inflation clauses: these contracts involve extended agreements that account for inflation with suppliers or partners and offer predictability and stability in costs. R1 states that they close these contracts: *“Not with all of them, but with the critical components. So the components with the greatest risk”*. R2 states that these contracts are mostly entered into when the costs can be passed on to the customers. This is because, in such cases, organisations gain predictability and stability in their cost structure. They also can adjust prices to accommodate increased costs, minimising the impact on their own profitability.

Buy according to market opportunities: this method is according to the interviewees most effective when costs can be passed on to customers, enabling organisations to take advantage of good market conditions by adjusting prices. Its effectiveness is influenced by supply risk; it is generally more suitable for products with lower supply risk, where companies can confidently make strategic purchasing decisions based on stable product availability. For products with high supply risk, companies may need to adopt more cautious and proactive approaches to mitigate potential disruptions. R10 even states that: *“If you get the timing right with sourcing, it's going to be more profitable than playing suppliers off against each other”*.

Building strategic inventory: this method can be effective in both scenarios, whether costs can be passed on or not. It serves as a buffer against cost increases, maintaining profitability when costs can be passed on. When costs cannot be passed on, strategic inventory ensures a stable supply contributing to overall supply chain resilience. Strategic inventory building is more beneficial for high-supply-risk products, mitigating potential shortages during disruptions. However, for low-supply-risk products with stable supply chains, maintaining large strategic inventory may result in unnecessary holding costs and capital tie-up. Next to this, R9 states two more benefits: *“That way we save a lot on transportation costs and you also reduce delivery times”*

Diversify sourcing across multiple suppliers: this method is beneficial whether or not costs can be passed on to customers. This method helps mitigate supply chain risks by reducing dependence on a single supplier. Diversifying sourcing is crucial for products with high supply risk, as relying on a single supplier can lead to vulnerabilities such as shortages and delays. R1 emphasizes this need, stating: *“For some parts, especially the critical ones [...] we work with dual sourcing”*.

Utilise dashboards for price developments: organisations use dashboard for price developments mostly when they cannot pass on price increases. In these situations, they monitor price developments to make sure suppliers are updating prices correctly. It helps them stay informed when they cannot pass on the price increases to their customers. R7 uses Power BI dashboards to track prices: *“We track how purchase prices have developed over a certain period of time”*. Dashboards are helpful for both low and high-risk products, providing real-time insights to adapt strategies. They play an important role in ensuring cost efficiency and competitiveness regardless of the supply risk level.

Promote transparency with suppliers: this method is particularly important in situations where organisations cannot pass costs through to their customers. In such cases, building a transparent and collaborative relationship with suppliers becomes crucial. R2 describes this as follows: *“Inflation is there, but you can make it transparent”*. Transparency about the cost breakdown with suppliers is used with both low- and high supply risk products but is according to the interviewees more reliable for products with low supply risks. In stable supply conditions, it optimises long-term planning, innovation, and building strong relationships.

Implement product improvements: the interviewees mentioned this method is particularly important when price increases cannot be passed on. The value proposition of a product can be improved through improved product features or efficiency, which allows the organisation to absorb rising costs internally. R4 states that this is a cross functional lever: *“You have to take up projects together to improve the product, also to counteract possible inflation”*. Product improvements are generally more feasible for products with low supply risk, where stable supply chains allow greater flexibility and predictability. In high-supply-risk scenarios, where disruptions are frequent, organisations may prioritise addressing supply chain challenges, potentially making it more challenging to focus on product enhancements.

Monitor market trends and price indexes: in situations where cost increases cannot be transferred to customers, closely monitoring market trends and price indexes becomes crucial.

This information allows organisations to proactively manage costs, identify potential areas for savings, and adapt pricing strategies. R1 also looks at trends: “*We use statistics [...] to know how inflation affects us*”. Monitoring market trends and price indexes is generally more important for products with high supply risk, because of the less-stable supply chain.

Exploring cost-effective alternatives for products and materials: this method is generally more important in sandwich situations when rising costs cannot be passed on. Seeking alternatives that provide cost efficiencies becomes crucial for maintaining profitability. Exploring alternatives is more crucial for products with high supply risk. In high-supply-risk scenarios, where the supply chain is more susceptible to disruptions and uncertainties, it becomes crucial to prioritise the identification of alternative sourcing options.

Based on the analysis of the methods and situations mentioned in the first interview, the concept of the inflation model can be established.

5.1.3 Transforming the inflation levers into the first concept model for handling inflation

In this chapter, the initial concept of the inflation model is presented, constructed through the coding and analysis of the first interviews. The interviews extensively elaborated on two aspects when to use certain inflation handling levers:

- The ability to pass on costs to their customers, resulting in a 'pass-through' or 'sandwich' situation. According to Genakos and Pagliero (2022), a key economic concern revolves around how organisations navigate cost shocks, leading to specific pass-through scenarios.¹⁸⁵ Additionally, organisations may encounter a 'sandwich' situation when they are unable to pass on costs. Passing on costs is important as it directly impacts an organisation's financial performance. R2 states that: “*Making sure we can pass on costs is crucial. It directly affects our financial situation, helping us stay profitable despite inflation*”. The capability to pass on costs allows organisations to offset inflationary pressures, maintain profit margins and ensuring sustained economic viability.
- The supply risk, which is the level of risk of obtaining the products. Supply risk is a crucial dimension as it directly impacts the stability of the supply chain.¹⁸⁶ Assessing and managing supply risk helps organisations to secure the continuity of the supply chain and mitigate the effects of inflation on sourcing costs and overall operational

¹⁸⁵ See Genakos and Pagliero (2022), p. 35.

¹⁸⁶ See Alicke and Forsting (2017), p. 17.

efficiency.¹⁸⁷ R4 even has a supply risk profile of every supplier and a risk plan for strategic suppliers: “Of our strategic suppliers, we have a plan with the different risks and what to do”.

For an organisation, determining whether each product carries a high or low supply risk is relatively straightforward, however, assessing the feasibility of cost pass-through or potential sandwich situations proves to be more challenging. Using a scale of 1-5, four key statements determine the situation of an organisation. The first factor is pricing flexibility, determining the room for price adjustments of an organisation.¹⁸⁸ Other factors are the customer relationship and the market acceptance of price changes, while some markets are highly sensitive to price changes other markets have accepted the necessity of price adjustments.¹⁸⁹ The last factor is supplier negotiation and collaboration, which has an influence on the supplier relationship between an organisation and its supplier.¹⁹⁰

The validation interviews with the external experts suggest that a cumulative score surpassing 13 indicates the organisation's ability to successfully pass on costs. The analysis criteria for being able to pass on costs are visible in figure 16. Based on this, organisations can determine what situation they are in.

Pass-through or Sandwich Situation Quick Checklist								
			1	2	3	4	5	
Pass-through	Pricing Flexibility	1 = The organisation's pricing is non-flexible, with limited room for adjustments in response to cost increases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The organisation has the flexibility to adjust pricing swiftly to offset rising costs without significant customer resistance
	Customer Relationship and Communication	1 = The organisation has weak customer communication channels, making it challenging to explain and justify price increases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The organisation has strong customer relationships and effective communication strategies to justify and navigate price adjustments.
Sandwich	Market Acceptance of Price Changes	1 = The market is highly sensitive to price changes, making it difficult for the organisation to implement increases successfully.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The market has historically accepted and understood the necessity of price adjustments, allowing the organisation to pass on costs effectively.
	Supplier Negotiation and Collaboration	1 = The organisation has limited negotiation power with suppliers, hindering its ability to manage and pass on increased costs effectively.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The organisation has strong supplier relationships and agreements that facilitate transparent pass-through of cost increases to customers.
Pass-Through situation: > 13								
Sandwich situation: ≤ 13								

Figure 16 - Pass-through or Sandwich Situation Quick Checklist

¹⁸⁷ See Wan and Chen (2019), p. 1456.

¹⁸⁸ See Petrella, Santoro and De la Porte Simonsen (2018), p. 9.

¹⁸⁹ See Shanks and Carrol (1959), p. 48-49.

¹⁹⁰ See Golmohammadi and Hassini (2021), p. 110.

Based on the analysis, the dimensions of the inflation model have been determined, these are the two axes in the inflation matrix. The ability to pass on costs will be on the horizontal axis. The supply risk will be on the vertical axis.

The developed inflation model represents a variant of the Kraljic Matrix, incorporating the dimension of supply risk. In addition to assessing the complexity of the supply chain of a certain product or commodity, this model places emphasis on the dimension of cost pass-through. This is a change from the original Kraljic model where the profit impact is displayed.¹⁹¹ This modification aligns more closely with the variable of inflation and addresses insights derived from the interviews. Within this matrix, organisations can strategically position themselves based on their unique circumstances, fostering a tailored approach to inflationary challenges.

The two dimensions obtained from the interviews serve as the foundation upon which the various inflation methods are positioned within the model. The methods are placed within the inflation matrix based on the analysis of the interviews. The first concept of the inflation matrix can be seen in Figure 17.

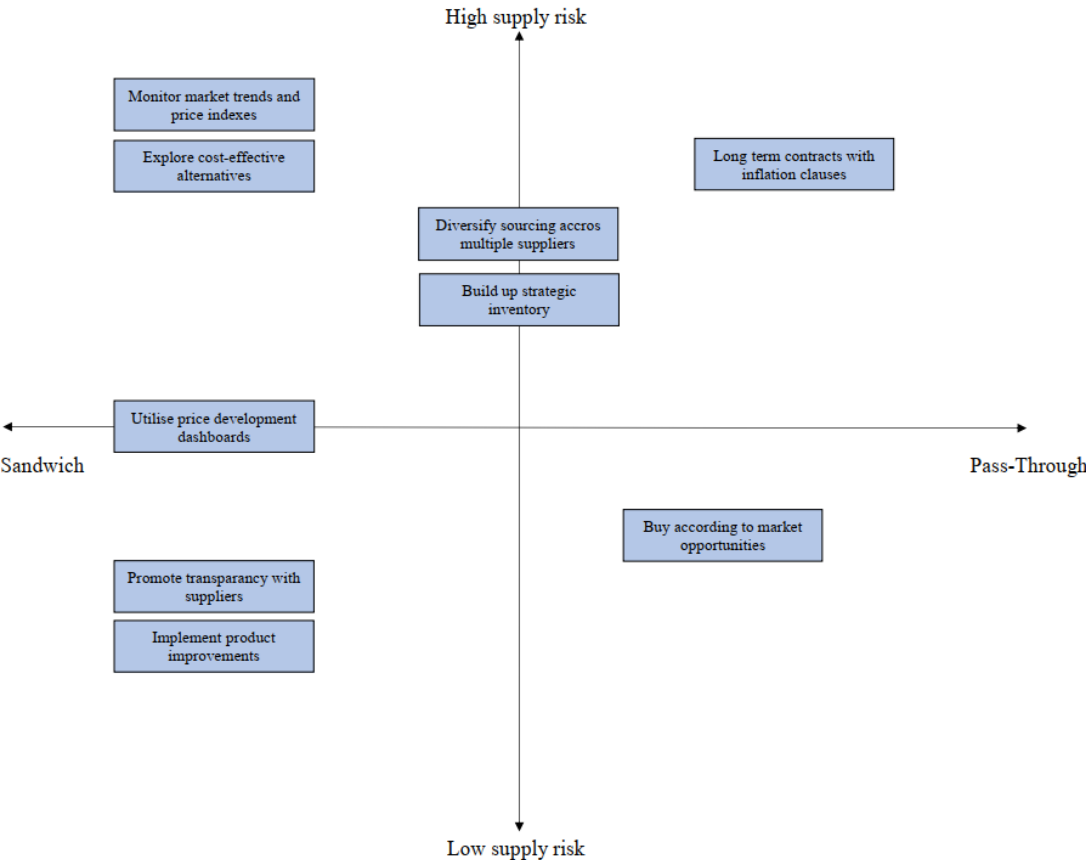


Figure 17 - The inflation matrix

¹⁹¹ See Kraljic (1983), p. 113.

Next to the inflation matrix an additional model has been developed, a heat map tool, to assess the application of the inflation levers. In this tool, displayed in Figure 19, the methods are further evaluated based on their suitability for supply-side inflation and demand-side inflation. Within supply-side inflation, the main risk for organisations is a shortage of products. The main risk with demand-side inflation is the loss of profitability.

Distinguishing between supply-side and demand-side inflation can be challenging for organisations. To facilitate this assessment, some guidelines with characteristics have been developed based on the literature about the different types of inflation, offering clarity on the features of each scenario. Dabrowski's (2022) paper outlines multiple characteristics of demand-side inflation. It emphasizes the impact of deflationary shocks on currency areas like the US dollar and Euro, influencing overall demand. The analysis also underscores the role of both monetary and fiscal expansion, as well as loose monetary and fiscal policies, including large-scale fiscal stimulus packages, in driving increased demand.¹⁹² Other characteristics are consumer spending, influencing the demand, and employment dynamics. High employment boosts spending, while unemployment suppresses demand.¹⁹³ Interest rate impact also influences demand, with fluctuations driven by central bank policies affecting overall economic activity.¹⁹⁴

The paper of Dabrowski also describes multiple characteristics for supply side inflation. It specifically covers geopolitical factors, where political instability affects sourcing and transportation, underscores product shortages as a primary risk in the market, and addresses global supply chain disruptions, emphasizing interruptions that impact goods' availability.¹⁹⁵ Charaia and Papava (2023) describe the effects of supply side inflation on the costs of raw material and energy prices, disruptions of the supply chain and the escalation of costs disrupt the production of organisations.¹⁹⁶ Another factor of supply side inflation is the impact of natural disasters, which impact the supply of goods.¹⁹⁷

Based on the guidelines organisations can determine the main type of inflation they experience. Both guidelines of demand side inflation and supply side inflation need to be filled in. The total score of the type of inflation is the sum of all factors. The type of inflation with the highest

¹⁹² See Dabrowski (2022), p. 2.

¹⁹³ See Nigusse, Tadesse and Melaku (2019), p. 10; Berentsen, Menzio and Wright (2011), p. 375.

¹⁹⁴ See De Janvry, McIntosh, Sadoulet (2010), p. 177.

¹⁹⁵ See Dabrowski (2022), p. 2-3.

¹⁹⁶ See Charaia and Papava (2023), p. 25.

¹⁹⁷ See Cantelmo (2022), p. 478.

score is the main type of inflation an organisation experience. Based on this they can place themselves in the inflation heat map tool (Figure 19). The guidelines to determine the main type of inflation can be seen in Figure 18.

Supply side inflation Quick Checklist							
		1	2	3	4	5	
Supply-side inflation	Product Shortages: Primary risk is a shortage of products in the market.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Raw Material Costs: Escalation in the costs of raw materials affecting production.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Global Supply Chain Disruptions: Interruptions in the global supply chain impacting the availability of goods.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Energy Prices: Fluctuations in energy prices affecting production and transportation costs.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Natural Disasters: Disruptions caused by natural disasters impacting the supply of goods.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Geopolitical Factors: Political instability affecting the sourcing and transportation of goods.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
Total score= sum of all scores							

Demand side inflation Quick Checklist							
		1	2	3	4	5	
Demand-side inflation	Monetary and Fiscal Expansion: Both monetary and fiscal policies contribute to the potential for increased demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Deflationary Shock: deflationary shocks impact major currency areas such as the US dollar and Euro which influence the demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Loose Monetary and Fiscal Policies: Loose monetary and fiscal policies, including large-scale fiscal stimulus packages, contributed to boosting demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Consumer spending: Varying consumer spending driving up or down the prices of goods, impacting demand	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Employment dynamics: High employment boosts spending, while unemployment suppresses demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Interest rate impact: Changes in interest rates, driven by central bank policies, can impact overall demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
Total score= sum of all scores							

Figure 18 - Guidelines supply-side and demand side inflation

The inflation heat map tool considers the ability to pass on costs and the main type of inflation. Each situation and method is assigned a specific code. The nine inflation handling levers from the inflation matrix are incorporated into the columns of the model. A code of 1 strongly recommends using the method in a certain scenario, while a code of 10 advises against using the method in that specific context. The inflation heat map tool is displayed in Figure 19.

Types of inflation	Type of business	Proposed actions pros: positive consequences cons: negative consequences						Score 1 = Highly appropriate 10 = Not appropriate		
		Long term contracts with inflation clauses Pros: price stability amid inflation Cons: Reduced flexibility when market changes	Buy according to market opportunities Pros: buy in favourable market conditions Cons: potential missed opportunities	Building strategic inventory Pros: fixed price and security Cons: Ties up capital	Diversify sourcing across multiple suppliers Pros: mitigates supply chain risks Cons: increased complexity supplier management	Utilize dashboards for price developments Pros: real-time insight into price trends Cons: dependence on accurate data	Promote transparency with suppliers Pros: enhances trust and collaboration with suppliers Cons: Sensitive to inaccurate information	Implement product improvements Pros: Less price increases Cons: resource intensive and time to implement	Monitor market trends and price indexes Pros: informed decision-making Cons: dependence on accurate data	Exploring cost-effective alternatives for products or materials Pros: less price increase Cons: time to implement
Supply-side inflation Main risk: Shortage of products	Pass-through	2	4	1	1	4	3	8	4	4
	Sandwich	7	6	1	1	3	4	5	2	2
Demand-side inflation Main risk: Loss of profitability	Pass-through	3	3	8	4	5	3	7	4	3
	Sandwich	7	5	1	4	2	2	5	2	2

Figure 19 - Inflation heat map tool, adapted from the model from F. Fontes (2023)

Based on a organisation's specific situation, there can be decided whether a particular inflation levers should be applied. The tool and score justifications are further explained in Appendix 5. The next objective is to validate and test the concepts of the inflation model with external experts through additional semi-structured interviews.

5.2 Concept: testing if the inflation model is feasible through validation interviews with external experts

The model will undergo testing through validation interviews with external experts. In preparation for these interviews, a process model has been developed to illustrate the application of the inflation models and guidelines outlined in the preceding chapter. This process model can be found in Appendix 6, providing a visual representation of the structured approach tested during the validation interviews. The interviews are conducted using the interview guide in Appendix 4 and are held with the external experts from Table 5.

Number	Organisation	Job Title	Industry
1	Aeronamic	Supply Chain Manager	Technology
2	Benchmark	Procurement Director	Technology
3	Gefa	Purchasing Manager	Manufacturing
4	Nedap	Tactical Purchaser	Technology
5	Europastry	Procurement Director	Food

Table 5: External experts second interviews

The validation of the model will follow Nguyen's (2005) points, which include assessing the quality of the model, discussing the usefulness of the model and recommending improvements for the model.¹⁹⁸ The model is tested for a specific commodity at each organisation.

The first step of the model tested through interviews is Step 1: 'Check the ability to pass on costs.' This step, also extensively discussed during the first interviews, has been addressed with external experts filling out the quick checklist (Figure 16). Insights from validation workshops indicate that if the sum of the ratings surpass 13, it suggests an organisation's capability to pass on their costs. Reinforcing this perspective, R3 states: *"From the test, it can be concluded that we are in a sandwich position, which is also how I experience it in practice"*. This real-world confirmation further validates the efficacy of the model in practical scenarios.

The second phase involves positioning the organisation within the matrix (Figure 17). All external experts established they have both high-risk and low-risk products, R2 says the following: *"We have products that are almost always available and products with an unstable supply chain"*. This observation leads to the conclusion that the five external experts must source products from at least two quadrants of the model. As a result, distinct inflation methods are applicable to different products within their portfolio.

As anticipated, organisations find it challenging to precisely determine the main type of inflation. R1 states: *"We don't know exactly what type of inflation is mainly present with us"*. Consequently, in collaboration with the five external experts, the inflation guidelines from, Figure 18 were filled out. During the COVID-19 pandemic, the interviewees primarily encountered supply-side inflation. Currently, the situation is characterised by a mix of both supply-side and demand-side inflation, as customer demand fluctuates due to economic uncertainty. R5 notes: *"We see that our customers are buying less because their own demand is also uncertain"*. The utilisation of the guidelines contributes to a clearer understanding of the primary type of inflation in a current scenario.

After determining for organisations whether they can pass on costs and what type of inflation they primarily experience, the appropriate situation can be determined in the inflation heat map tool (Figure 19). In the validation interviews with the external experts the scores given to the different methods in various situations were verified. For example, R2 is in a sandwich situation with mainly supply-side inflation. For this situation it is appropriate to build strategic inventory and to diversify sourcing across multiple suppliers. R2's response to this is: *"We are indeed*

¹⁹⁸ See Nguyen (2005), p. 43.

already sourcing our high-risk products from multiple suppliers, in doing so we want to work more with dual sourcing. And in our situation, it is certainly interesting to take a good look at the different inventory levels“. The external experts agreed with the recommended actions for each situation and the scores attached to them.

The last step in the model is translating the inflation levers into practical actions. Organisations can determine these actions using the provided inflation methods, making it easy to implement the strategies into practice. R3 added an additional note about formulating the actions: *“It is important to consider the profit impact, implementation time, and potential costs of the certain action. This enables an organisation to prioritise the most suitable actions.“* This consideration will be taken into account when applying the model.

The validation interviews with external experts confirm the feasibility and effectiveness of the developed inflation model. The structured approach, as illustrated in the process model (Appendix 6), proved valuable in guiding organisations through inflation analysis. External experts' feedback underscores the model's practical utility. This validation affirms the model's feasibility and its potential as a valuable tool for organisations addressing inflation challenges in real-world scenarios. The next step is applying the inflation model to a commodity within HP Valves.

6. Applying the inflation model through a group workshop within HP Valves

6.1 Category management within HP Valves: choosing a commodity to which the model will be applied

Following the validation of the model, the next step involves its application within the context of HP Valves. In collaboration with the supply chain manager, it has been determined that the model is most relevant and applicable to the commodity steel. This decision stems from the substantial volume of the sourcing of steel and its significant impact on the overall product costs. The chosen commodity holds strategic importance in the organisation's sourcing strategy.

A typical group discussion comprises an average of 6 to 8 participants.¹⁹⁹ The group workshop at HP Valves involved 7 participants, including the supply chain manager, strategic buyers and project purchasers. This representation ensures a comprehensive understanding of the commodity's sourcing dynamics and facilitates collaborative decision-making. The workshop delves into challenges, brainstorming solutions, and tailoring the inflation model for managing steel category inflation at HP Valves.

6.2 Applicable levers for handling inflation within HP Valves

During the group workshop, stakeholders explored the strategic application of the inflation model to the sourcing of steel within HP Valves. The first step of the inflation model is checking the ability to pass on rising costs to customers. During the workshop, the Pass-through or Sandwich Situation Quick Checklist was completed collaboratively with the participants. The outcome of the checklist for the steel commodity for HP Valves is depicted in Figure 20.

Pass-through or Sandwich Situation Quick Checklist								
			1	2	3	4	5	
Pass-through	Pricing Flexibility	1 = The organisation's pricing is non-flexible, with limited room for adjustments in response to cost increases.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The organisation has the flexibility to adjust pricing swiftly to offset rising costs without significant customer resistance
	Customer Relationship and Communication	1 = The organisation has weak customer communication channels, making it challenging to explain and justify price increases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 = The organisation has strong customer relationships and effective communication strategies to justify and navigate price adjustments.
Sandwich	Market Acceptance of Price Changes	1 = The market is highly sensitive to price changes, making it difficult for the organisation to implement increases successfully.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The market has historically accepted and understood the necessity of price adjustments, allowing the organisation to pass on costs effectively.
	Supplier Negotiation and Collaboration	1 = The organisation has limited negotiation power with suppliers, hindering its ability to manage and pass on increased costs effectively.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The organisation has strong supplier relationships and agreements that facilitate transparent pass-through of cost increases to customers.
Pass-Through situation: > 13 Sandwich situation: ≤ 13			Total Score HP Valves: 12 Sandwich situation					

Figure 20 - Pass through or Sandwich situation HP Valves

¹⁹⁹ See Cortini, Galanti and Fantinelli (2019), p. 33.

In collaboration with external experts, a minimum threshold of 13 has been established as the criterion for an organisation to be considered in a pass-through situation. With a score of 12, HP Valves finds itself in a sandwich position, experiencing increased costs and limited opportunities to transfer these to the customer. Within the steel commodity, HP Valves encounters various risks, ranging from high to low. While some types of steel are consistently obtainable, others pose availability challenges, adding complexity to the sourcing strategy.

In the group workshop, evaluating the guidelines for the two types of inflation was important to assess the applicability of the inflation handling lever. This assessment aims to determine whether HP Valves primarily experiences mainly demand-side inflation or supply-side inflation. The outcome of this evaluation is depicted in Figure 21.

Supply side inflation Quick Checklist							
		1	2	3	4	5	
Supply-side inflation	Product Shortages: Primary risk is a shortage of products in the market.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Raw Material Costs: Escalation in the costs of raw materials affecting production.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5 = Highly prevalent
	Global Supply Chain Disruptions: Interruptions in the global supply chain impacting the availability of goods.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5 = Highly prevalent
	Energy Prices: Fluctuations in energy prices affecting production and transportation costs.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Natural Disasters: Disruptions caused by natural disasters impacting the supply of goods.	1 = Not present	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Geopolitical Factors: Political instability affecting the sourcing and transportation of goods.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
Total score = 19							

Demand side inflation Quick Checklist							
		1	2	3	4	5	
Demand-side inflation	Monetary and Fiscal Expansion: Both monetary and fiscal policies contribute to the potential for increased demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Deflationary Shock: deflationary shocks impact major currency areas such as the US dollar and Euro which influence the demand.	1 = Not present	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Loose Monetary and Fiscal Policies: Loose monetary and fiscal policies, including large-scale fiscal stimulus packages, contributed to boosting demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Consumer spending: Varying consumer spending driving up or down the prices of goods, impacting demand	1 = Not present	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Employment dynamics: High employment boosts spending, while unemployment suppresses demand.	1 = Not present	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Interest rate impact: Changes in interest rates, driven by central bank policies, can impact overall demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
Total score = 15							

Figure 21 - The main type of inflation HP Valves

Based on the type of inflation and whether HP Valves can pass on the rising costs, the scores for the inflation methods, as depicted in the heat map tool in Figure 19, can be better assessed. Figure 22 displays the row in the inflation heat map tool in which HP Valves is positioned.

Types of inflation	Type of business	Proposed actions pros: positive consequences cons: negative consequences						Score 1 = Highly appropriate 10 = Not appropriate		
		Long term contracts with inflation clauses Pros: price stability amid inflation Cons: Reduced flexibility when market changes	Buy according to market opportunities Pros: buy in favourable market conditions Cons: potential missed opportunities	Building strategic inventory Pros: fixed price and security Cons: Ties up capital	Diversify sourcing across multiple suppliers Pros: mitigate supply chain risks Cons: increased complexity supplier management	Utilize dashboards for price developments Pros: real-time insight into price trends Cons: dependence on accurate data	Promote transparency with suppliers Pros: enhances trust and collaboration with suppliers Cons: Sensitive to inaccurate information	Implement product improvements Pros: Less price increases Cons: resource intensive and time to implement	Monitor market trends and price indexes Pros: informed decision-making Cons: dependence on accurate data	Exploring cost-effective alternatives for products or materials Pros: less price increase Cons: time to implement
Supply-side inflation Main risk: Shortage of products	Pass-through	2	4	1	1	4	3	8	4	4
	Sandwich	7	6	1	1	3	4	5	2	2
Demand-side inflation Main risk: Loss of profitability	Pass-through	3	3	8	4	5	3	7	4	3
	Sandwich	7	5	1	4	2	2	5	2	2

Figure 22 - Position HP Valves in Inflation heat map tool

The stakeholders collectively evaluated the inflation handling methods from the model to determine their applicability. This collaborative effort aimed to identify the most effective approaches for managing inflation. The methods from the inflation model and the heat map tool are assessed to determine their effectiveness in the specific context for HP Valves. The applicable inflation levers are:

- **Diversify sourcing across multiple suppliers. Score: 1, highly appropriate.** Diversification provides resilience against disruptions and enables HP Valves to navigate price fluctuations and supply uncertainties in the steel market.
- **Build up strategic inventory. Score: 1, highly appropriate.** This method is highly recommended as it ensures supply chain certainty. The feasibility is influenced by storage costs and steel types variability, requiring careful balance for optimal results.
- **Monitor market trends and price indexes. Score: 2, highly appropriate.** Monitoring market trends and price indexes equips HP Valves with insights for proactive decision-making, enabling them to anticipate and respond to market fluctuations effectively.
- **Explore cost-effective alternatives. Score: 2, highly appropriate.** Given the availability challenges of certain steel types, actively exploring and adopting cost-effective alternatives allows HP Valves to maintain flexible.
- **Utilise dashboards for price developments. Score: 3, highly appropriate.** Real-time dashboards provide HP Valves with data on price developments, facilitating informed decision-making and enhancing their ability to navigate the steel market.
- **Promote transparency with suppliers. Score: 4, moderate appropriate.** Fostering transparency with suppliers establishes strategic partnerships, enhancing collaboration and more transparency within the cost price breakdown of the products.

- **Implement product improvements. Score: 5, moderate appropriate.** While product improvements contribute to overall efficiency, their direct impact on addressing the challenges of steel availability and pricing may be limited, making this method less applicable in the specific context of steel sourcing for HP Valves.

The inflation levers for handling inflation in steel sourcing have been identified. It is important for HP Valves to take concrete actions, which will be discussed in the next chapter. By implementing these strategies, the organisation can proactively address the impact of inflation on the sourcing processes.

6.3 Drafting the implementation plan with actions for HP Valves

After determining the most suitable inflation handling levers for HP Valves, the specific actions for the commodity can be formulated. In the verification interview with external experts, it was emphasised to consider profit impact, implementation time, and potential costs when formulating actions. Based on these criteria, the formulated actions are assessed. The established criteria are assessed on a scale of 3, ranging from low to high. These evaluations are estimated collaboratively with the participants of the group workshop. The final column represents the cumulative score of the three factors for each action, providing an overall assessment score.

In collaboration with the participants, guidelines have been established to determine when an action has a high profit impact or when it has a low impact. These guidelines are formulated for all three factors (profit impact, implementation time, and potential costs) and are elaborated in Appendix 7. The actions and assessment are shown in the figure below.

Implementation plan inflation levers - commodity steel - HP Valves								
Inflation handling levers	Actions HP Valves	Profit impact		Implementation time		Potential costs		Total
Diversify sourcing across multiple suppliers	Identify and qualify additional steel suppliers	Medium impact	2	Short time	3	Low costs	3	8
	Implement a supplier portfolio analysis	Low impact	1	Medium time	2	Low costs	3	6
	Establish a dual sourcing strategy for critical steel components	High impact	3	Medium time	2	Medium costs	2	7
	Negotiate flexible contracts with favorable terms and conditions	Medium impact	2	Short time	3	Low costs	3	8
	Conduct regular supplier audits for quality and stability	Low impact	1	Medium time	2	Medium costs	2	5
	Implement a supplier performance monitoring system	Medium impact	2	Medium time	2	High costs	1	5
Build up strategic inventory	Conduct a analysis of steel consumption demand	Low impact	1	Medium time	2	Low costs	3	6
	Determine optimal steel inventory levels based on demand forecasts	High impact	3	Medium time	2	Medium costs	2	7
	Establish protocols for periodic inventory reviews and adjustments	Low impact	1	Short time	3	Medium costs	2	6
	Implement efficient storage and inventory management systems	High impact	3	Medium time	2	High costs	1	6

Monitor market trends and price indexes	Invest in data analytics tools for real-time steel data	High impact	3	Medium time	2	High costs	1	6
	Establish a dedicated team for steel market monitoring	Low impact	1	Medium time	2	Low costs	3	6
	Adjust procurement strategies based on market trends and price index fluctuations	High impact	3	Medium time	2	Medium costs	2	7
Explore cost-effective alternatives	Conduct a comprehensive analysis of alternative steel materials	Medium impact	2	Medium time	2	Medium costs	2	6
	Pilot-test alternative materials in specific applications	Medium impact	2	Long time	1	High costs	1	4
	Conduct lifecycle cost analyses for various steel alternatives	Low impact	1	Long time	1	Medium costs	2	4
Utilise dashboards for price developments	Implement a dashboard for real-time price tracking of prices and KPI's relevant to steel sourcing	Medium impact	2	Short time	3	Medium costs	2	7
	Conduct regular training sessions on dashboard usage and interpretation	Low impact	1	Medium time	2	Medium costs	2	5
	Regularly review and update sourcing strategies based on dashboard insights	High impact	3	Medium time	2	Low costs	3	8
	Integrate dashboards with existing ERP systems	High impact	3	Medium time	2	Medium costs	2	7
Promote transparency with suppliers	Foster open communication channels with existing suppliers	Medium impact	2	Short time	3	Low costs	3	8
	Establish a feedback mechanism to address and resolve supplier concerns	Low impact	1	Medium time	2	Low costs	3	6
	Share forecasted steel demand with suppliers	Low impact	1	Short time	3	Low costs	3	7
	Provide clear cost breakdowns of the products	Medium impact	2	Short time	3	Low costs	3	8
	Explore joint cost-saving initiatives with suppliers	High impact	3	Long time	1	High costs	1	5
Implement product improvements	Collaborate with suppliers to identify enhancement opportunities	Medium impact	2	Long time	3	High costs	3	8
	Pilot-test product improvements to assess feasibility	High impact	3	Long time	1	High costs	1	5
	Gradually integrate successful improvements into production	High impact	3	Long time	1	High costs	1	5
	Monitor market trends for product innovations in the steel industry	Medium impact	2	Medium time	2	Low costs	3	7

Figure 23 - Actions for HP Valves

Based on the total scores, HP Valves can determine the most suitable actions. These can be prioritised for initial implementation by the relevant departments. Based on the group workshop, there have been multiple concrete implementation plans made for HP Valves. These have been made for the methods: negotiate flexible contracts, foster open communication channels, and collaborate with suppliers to identify enhancement opportunities. The implementation plans can be found in Appendix 8. These actions are designed to guide HP Valves in navigating the intricacies of steel sourcing effectively.

The inflation model has been applied in HP Valves' sourcing practices, providing valuable insights and concrete actions. It is now ready for utilisation by the purchasing professionals. The next step is to assess the overall quality and utility of the inflation handling model.

7. Assessing the model: the quality, efficiency and utility of the inflation handling model

7.1 The quality and pragmatic validity of the model will be assessed

In assessing the quality of the designed inflation handling tool within sourcing, it is evident that the solution shows a high level of effectiveness. The solution design is characterised by the incorporation of quality attributes, ensuring its adaptability and applicability in diverse business scenarios. The model's dimensions are aligned with the dynamics of inflation, providing a comprehensive approach to addressing fluctuations in pricing and cost structures. Moreover, the inclusion of practical inflation handling levers enhances the solution's utility,

The model underwent testing and verification with five external organisations, confirming its effectiveness and applicability across various commodities and situations. Examining the pragmatic validity of the solution, it is clear that the design effectively performs its intended functions. The tool integrates into sourcing processes, mitigating the impact of inflation on sourcing strategies. Its practical validity is evident in its ability to navigate and respond to real-world scenarios, showcasing a practical alignment between its design and operational outcomes. The solution stands as a practical approach to inflation handling within sourcing, contributing to the overall resilience and efficiency of an organisation.

7.2 The efficacy and utility of the inflation handling model

In evaluating the efficacy of the inflation handling model, it is important that the realised design contributes to producing the desired outcomes. The model effectively navigates the challenges posed by inflation within sourcing. Through its systematic approach and adaptive mechanisms, the solution demonstrates an impact on stabilising sourcing costs, thus aligning with the overarching goal of mitigating the effects of inflation on organisational expenses.

Furthermore, the utility assessment of the solution extends beyond its immediate problem environment. The achievement of goals within the context of inflation handling not only serves the purpose of cost control but also holds value in enhancing overall strategic adaptability. The model's utility is evident in its potential to inform broader business strategies, providing insights in facilitating more informed decision-making beyond sourcing. This broader utility underscores the strategic significance of the solution. The inflation handling model is an integral tool with implications for the organisation's overall financial health and competitive positioning.

8. Discussion on the model: contributions to the field and suggestions for future research

8.1 The inflation model contributes to existing theory and practice within the field

8.1.1 Theoretical contributions: the use of inflation handling levers within a sourcing strategy

The theoretical contributions stem from the solution space review and the interviews with the purchasing experts. Although the contributions vary, their main connection is the development and use of sourcing strategies. This especially when it comes to managing inflation and dealing with purchasing portfolios.

The first theoretical contribution underscores the nature of inflation as a hybrid risk, encompassing environmental and financial risks. The risk can be effectively managed through a risk management approach, including the identification, assessment, and mitigation of potential impacts on sourcing activities.²⁰⁰ Important within risk management are strategic supplier contracts and negotiations. Moreover, diversification of suppliers and sourcing locations emerges as a practical strategy to minimise vulnerability to these risks.

The second theoretical contribution centres around category strategy development. Managers formulate strategies that outline how a purchase category and supplier portfolio contribute to the broader purchasing strategy.²⁰¹ The study provides insights into category management processes as executed by procurement professionals, showcasing their role in bridging the gap between strategy development and implementation through the deployment of portfolios. Two primary groups of models emerge in this context: portfolio models and lever analysis models.

The third contribution involves portfolio models such as the Kraljic Matrix and the Dutch Windmill in sourcing. These models classify resources based on strategic importance in different quadrants. However, the literature critiques these methods, revealing a lack of coherence in the suggested tactics and strategies. This demonstrates that modern category management portfolios require distinct approaches to portfolio management. The study suggests the use of sourcing levers, challenging the effectiveness of relying solely on portfolio models in contemporary sourcing practices.²⁰²

²⁰⁰ See Tang, Gurnani, and Gupta (2014), p. 1200.

²⁰¹ See Ahtonen and Virolainen (2009), p. 264; Nollet, Ponce and Campbell (2005), p. 135-136.

²⁰² See Schiele et al. (2011), p. 327; Hesping and Schiele (2016a), p. 111

Fourth, there are a few lever analyses models in sourcing. Unlike the numerous portfolio models that can be found in literature, the review identifies only three academically based sourcing lever models. This observation highlights a difference in attention between sourcing lever models and portfolio models, indicating a relative underrepresentation of sourcing lever models in literature. There is potential value in delving deeper into the application and significance of these lever models, particularly in the context of sourcing during times of inflation.

Fifth, the study found various inflation methods employed across sectors. Hedging strategies and the utilisation of price indexes are prevalent in product category management. The interviews revealed diverse inflation methods, yet practical implementation lacks clear differentiation between methods for general cost savings and those specifically targeting inflation. Despite the limited representation of sourcing lever models in the literature, the results indicate that purchasers actively deploy these levers, with nearly all professionals using several of Schiele's (2007) seven levers.²⁰³

The last theoretical contribution involves identification of nine inflation handling levers and the development of an inflation matrix, where identified levers are positioned. The study identifies diverse situations in which purchasing experts use specific methods, forming the basis for the placement of levers within the matrix. The model also provides theoretical guidelines for assessing an organisation's capability to pass on costs and the predominant type of inflation. Tailored to an organisation's specific circumstances, the most applicable inflation handling levers can be determined.

8.1.2 Managerial implications: implementing a framework to efficiently handling inflation

The results of this study offer valuable insights for managers and purchasers seeking to enhance their sourcing strategy. The managerial implications and proposed actions relate to the designed approach of managing inflation within sourcing, aligning with the steps outlined in the process model in Appendix 6. By following this structured process, purchasers can attain a more effective and nuanced understanding of their sourcing strategy, facilitating informed decision-making. Additional explanations for each step are provided in this chapter.

The first step of the inflation model involves checking the ability of an organisation to pass on costs to their customers. By using the quick checklist provided, managers can efficiently assess their organisation's capability to pass on increased costs. This checklist serves as a practical tool

²⁰³ See Schiele (2007), p. 280.

to evaluate various aspects, such as pricing flexibility and customer relationships. Its usefulness lies in providing a quick and systematic evaluation, allowing managers to determine whether they are in a pass-through or sandwich situation.

Secondly, an organisation needs to determine the main type of inflation they encounter. This involves identifying the predominant type of inflation. The importance of this step lies in providing clarity on the specific challenges posed by inflation and selecting the most effective inflation levers. Using the guidelines with characteristics for supply side inflation and demand side inflation, organisations can assess the impacts they experience, ensuring that the chosen levers align with the organisation's unique context and challenges.

The third step is choosing the correct situation in the inflation heat map tool. This is better than just using a checklist, because it assists in selecting the correct actions. Building on the identified main type of inflation and the organisation's ability to pass on costs, this step provides guidance in selecting the appropriate situation within the inflation heat map tool. The framework provides an understanding of the suitability of various methods in a given situation. By aligning with the correct situation, the inflation heat map tool becomes a strategic resource, offering insights into which methods are suitable and which are not, thereby enhancing decision-making and the effectiveness of the organisation's inflation management strategy.

The fourth and final step is transforming the identified inflation levers into actions. Once the appropriate inflation levers are identified through the heat map tool, the focus shifts to practical application within the organisation. This step underscores the importance of translating theoretical knowledge into concrete actions. The managerial implication lies in the need for a strategic and well-coordinated approach to implement these levers effectively. By establishing concrete actions based on the identified levers, organisations can not only enhance their resilience to inflation but also optimise their sourcing strategy. This step ensures that the theoretical insights gathered from the previous stages are translated into tangible and impactful outcomes for the organisation's overall sourcing strategy.

Throughout the interviews, several best practices have emerged to guide and support the integration of inflation considerations into sourcing strategies. Establishing supplier collaboration, characterised by open communication and proactive relationship-building, proves important. Continuous market monitoring ensures real-time adaptation to the risk of inflation. Another best practise mentioned is cross-functional collaboration, involving engineering and the R&D department, fosters a comprehensive approach. Lastly, leveraging

technology, such as data analytics and artificial intelligence, enables data-driven decision-making and can enhance the sourcing practises.

8.2 Relative performance of the inflation model: the differences with inflation levers from other sectors and other models

Within the solution space review, inflation handling methods from other sectors have been investigated. The overview of these methods can be seen in Appendix 2. An aspect of the relative performance is to determine whether the methods identified in the inflation model significantly differ from those prevalent in other industries. The inflation model integrates diverse strategies such as long-term contracts with inflation clauses, diversification of sourcing, strategic inventory build-up, exploration of cost-effective alternatives and transparency promotion with suppliers. The study revealed that in other sectors, levers are predominantly oriented towards routine cost reduction rather than specifically targeting inflation.

Common methods like long-term contracts and diversifying sourcing are adaptable across sectors. However, the emphasis and preferences may differ based on industry dynamics. In finance, for instance, inflation levers involve inflation hedging strategies. The construction sector prioritises contractual arrangements and strategic inventory. The retail sector focuses on real-time price adjustments and market responsiveness and the manufacturing sector emphasises cost-effective alternatives and strategic inventory management. Each sector is likely to deploy tailored methods aligning with its operational needs and market conditions, reflecting the sector-specific challenges.

The sector-specific actions recognise the unique challenges faced by organisations in different industries. The model has been tested in various sectors and has been found to be applicable in those contexts. The model's applicability to various sectors underscores its adaptability and potential for widespread implementation. The model incorporates actionable steps applicable within the sourcing domain, setting it apart from generic sourcing models that primarily focus on routine cost reduction methods. The inclusion of variable inflation as a crucial consideration further differentiates this model, acknowledging the dynamic nature of economic conditions.

Comparing the model against existing models, it emerges that the identified inflation handling levers include a strategic mix of proactive and responsive measures. For instance, the emphasis on long-term contracts with inflation clauses signifies a proactive approach to mitigating future uncertainties, ensuring stability in sourcing costs. Similarly, the diversification of sourcing and the build-up of strategic inventory align with risk management strategies.

Moreover, the model underscores the significance of real-time market monitoring and trend analysis, a departure from conventional models that might lack a dynamic response mechanism. The utilisation of dashboards for price developments adds a technological dimension, emphasising the integration of innovative tools to enhance decision-making.

The steps outlined in the inflation model are not only applicable to managing inflation but can also be extended to other variables, such as a company's CO₂ emissions. By employing a similar approach, organisations can develop levers to reduce CO₂ emissions and subsequently implement concrete actions. This structured approach promotes sustainability and responsible business practices.

The inflation handling model include distinctive features in comparison to methods prevalent in other sectors. The strategic actions embedded in the model position it as a dynamic and effective tool for managing inflation within the sourcing domain and beyond.

8.3 Research limitations and future research: Evaluating the outcomes through more extensive research methods to examine the effectiveness of inflation levers

This research offers various theoretical and practical contributions. However, the research also knows limitations and areas for further investigation. The limitations stem from the qualitative nature of this study, necessitating the use of quantitative methods for result validation. The sample size of ten allows for the generalisation of the research findings; however, the research exclusively interviews procurement professionals from large organisations, both in terms of employees and revenue.

This limitation raises questions about the applicability of the results to smaller organisations. The insights predominantly stem from strategic-level purchase managers, potentially overlooking operational challenges encountered by operational buyers. While experienced professionals from large organisation are chosen for their presumed maturity, it remains uncertain whether these findings hold true for smaller organisations. Consequently, for a more thorough exploration of the inflation tool, it is advisable to concentrate on smaller organisations. Future research should encompass operational buyers and involve diverse sizes of organisations to offer a more comprehensive understanding of handling inflation.

Following this, the research had a comprehensive scope, aiming to provide a detailed understanding of how organisations address inflation, along with the models and tools aiding this process. However, this approach limited the interviews from delving into specific practices or situations within the sourcing process. For instance, the study did not inquire about the

precise steps as described by van Weele when sourcing a product or process.²⁰⁴ Exploring such details could yield valuable insights and contribute to enhancing practices. Therefore, future research is recommended to not only concentrate on managing inflation but also to delve deeper into specific steps of the sourcing process for a more nuanced exploration.

Moreover, the proposed model lacks empirical testing on a larger scale. The formulation of this model is based on insights from interviews and a group workshop, identifying challenges and best practices in handling inflation. While the model has been tested at five organisations and applied by one organisation, it has not undergone empirical testing on a larger scale. The interviews also revealed a practical knowledge gap among procurement professionals regarding the integration of new technologies, such as Data Analytics and Artificial Intelligence, in their sourcing processes or in addressing inflation. Future research should delve into exploring how these technologies can assist in sourcing and align them with the identified levers.

²⁰⁴ See van Weele (2010), p. 84.

9. Conclusion and learnings: reflection on the model and the most important findings

In this concluding chapter, the inflation handling model and most important findings will be reflected upon. The quality and pragmatic validity of the designed inflation handling tool are at the forefront of the evaluation. The solution's effectiveness was evident, marked by its adaptability and applicability across diverse business scenarios. With dimensions aligned with the dynamics of inflation, the model presented a comprehensive approach to handling pricing fluctuations and cost structures. Notably, practical inflation handling levers enhanced the model's utility, providing an actionable framework. Testing and verification with five external organisations underscored the model's real-world effectiveness. Its integration into sourcing processes showcased a practical alignment between design and operational outcomes. This pragmatic validity translated into a tool that contributes to an organisation's overall resilience and efficiency in times of inflation.

The model's efficacy in navigating the challenges posed by inflation within sourcing became evident through its systematic approach and guidelines. By stabilising sourcing costs, the model aligns with the overarching goal of mitigating the impact of inflation on organisational expenses. Beyond cost control, the utility assessment revealed the model's potential to inform broader business strategies. This extended utility underscored its significance as an integral tool with implications for an organisation's competitive positioning.

One of the theoretical contributions of this study lies in reshaping the traditional understanding of sourcing strategy through the incorporation of inflation handling levers. By exploring how to handle inflation within sourcing, the study introduces a shift in how organisations approach risk management. The risk of inflation is recognized as a hybrid risk, encompassing both environmental and financial dimensions. The study recommends a cross-functional risk management approach, emphasizing the identification, assessment, and mitigation of potential impacts on sourcing activities. Furthermore, methods like strategic supplier contracts and negotiations emerge as components of this approach, alongside the strategic diversification of suppliers.

Managerial implications are drawn from the structured approach offered by the model. The stepwise process, from assessing cost pass-through to transforming identified inflation levers into actionable strategies, provide valuable insights for managers and purchasers. The model's adaptability to various sectors and emphasis on inflation-specific strategies highlighted its broad applicability.

The relative performance analysis compared the inflation handling model with methods from other sectors, revealing its dynamic and effective nature. The model's mix of proactive and responsive measures, emphasis on real-time market monitoring, and technological integration positioned it as a tool well-suited for managing inflation within the sourcing domain.

While acknowledging the contributions, this study also recognized its limitations. Future research directions include addressing these limitations through quantitative validation, exploring the applicability of the model to smaller organisations, and delving deeper into specific steps of the sourcing process. Additionally, empirical testing on a larger scale and understanding the integration of new technologies and Artificial Intelligence in sourcing processes present directions for further research.

In conclusion, developing and evaluating the inflation handling model has been enlightening. From theoretical contributions to practical implications, the model is a valuable resource for organisations dealing with inflation in their sourcing strategies. As can be concluded in this study, it is clear that the inflation handling model contributes to advancing the understanding and practices in sourcing strategy development.

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Appendix 1 – The 16 quadrants of the Dutch Windmill

The model below displays the 16 quadrants within the Dutch Windmill more detailed.

	Exploit	Core	Nuisance	Develop
Leverage	Adversarial relationship. Assess the power balance. Consider other resources.	Good negotiating position; improves bottom line. Maximise competitive pressure on supply base.	Relationship mismatch. Accept situation in the short term. Change supplier if possible.	Supplier development potential. Encourage participation in savings opportunities.
Strategic	Risk of overdependency. Attempt to raise the supplier's dependency. Look at alternative sources.	Complementary; potential for a long-term relationship. Develop opportunities for mutual gain.	High risk of supplier exit. Look at alternative sources. Become more attractive to the supplier.	Potential for a good match. Work closely together to develop opportunities.
Routine	Moderate risk. Review prices periodically. Review alternatives periodically.	Buyer in a strong position. Maintain the relationship. Look at offering the supplier other opportunities.	Potentially a mismatch; anodyne relationship. Look at alternative sources.	Supplier interest. Look for further incentives to develop business opportunities.
Bottleneck	Moderate cost risk. Monitor the supplier closely for price and service changes. Change supplier if possible.	Complementary; potential for a long-term relationship. Develop mutually beneficial relationship to cover risk.	Disruption to service/ production risk high. Change supplier if possible.	Potential for risk. Work closely together to develop dependency and opportunities.

Figure A1: 16 quadrants of the Dutch Windmill (Cordell and Thompson, p.149)

Appendix 2 – Inflation levers and actions in various sectors

The model below displays the inflation levers with actions in the various sectors that are researched. There have been 10 sectors researched; finance, construction, retail, manufacturing, healthcare, agriculture, energy, hospitality and tourism, technology and transportation and logistics. First, the different inflation levers are listed. Next, the actions an organisation can take to implement the lever. Next, the saving potential of the method was estimated, which can range from low to high.

Sector	Inflation lever	Actions	Saving potential
Finance sector	Interest rate management	Monitor central bank policies and adjust interest rates Offer a range of investment products with varying interest rates to attract customers	High Low
	Diversification	Diversify investment portfolios Educate clients on benefits diversification to reduce risks	Medium Low
	Asset allocation	Adjust asset allocation within portfolios to favor historical well performing assets Develop investment models based on inflation expectations	High High
	Investment in Inflation-linked bonds	Invest in inflation-linked bonds such as TIPS (Treasury Inflation-Protected Securities). Promote these bonds to clients as a low-risk inflation hedge	Medium Low
Construction sector	Long term contracts	Negotiate long-term contracts to lock in prices and manage cost fluctuations Incorporate escalation clauses to account for inflation	High High
	Efficiency improvements	Implement lean construction practices to reduce waste Invest in technology and training to enhance construction productivity	Medium Medium
	Resource diversification	Explore alternative building materials and suppliers to reduce dependence on costly or scarce resources Evaluate the sustainability and cost-effectiveness of alternative resources	Medium Low
	Modular construction	Use modular construction methods to reduce labor costs and minimize material waste Develop standardized modular designs for various building types	Low Medium
	Value engineering (cost optimization)	Conduct value engineering analysis to identify cost-effective alternatives Collaborate with architects and engineers to find creative ways to reduce project costs	Medium Medium
Retail Sector	Price adjustments	Continuously monitor costs and adjust prices to reflect changes in the cost Communicate price changes transparently to customers	High Medium
	Supply chain optimization	Optimize supply chain logistics to reduce transportation and inventory costs Negotiate with suppliers for more favorable terms and discounts	High High
	Customer loyalty programs	Enhance customer loyalty programs to retain and reward loyal customers during price increases Offer exclusive discounts or perks to program members	Low Low
	Online sales expansion	Invest in e-commerce platforms and expand online sales channels to reach a wider customer base Offer online-only promotions and incentives	Medium Low
	Private labeling	Develop private-label products to offer cost-effective alternatives to brand-name items Market private-label products as high-quality and affordable options	Medium Low
Manufacturing sector	Cost reduction	Conduct regular cost analyses to identify areas where expenses can be reduced Implement cost-saving measures such as optimizing production processes	High High
	Inventory management	Employ just-in-time inventory management Use technology for real-time tracking and management of inventory levels	Medium Low
	Energy management systems	Invest in energy-efficient technologies and systems to reduce operational energy expenses Monitor and analyze energy consumption data for further efficiency improvements	Medium Low
	Local sourcing	Source raw materials and components locally to reduce transportation costs Establish relationships with local suppliers to ensure a stable supply of materials	High High
	Lean manufacturing practices	Implement lean principles to eliminate waste, improve efficiency, and reduce production costs Train employees in lean manufacturing techniques and encourage continuous improvement	Medium Low
Healthcare sector	Insurance adjustments	Review and adjust insurance policies to accommodate changing healthcare costs Offer a range of insurance plans with varying coverage options and premiums	High Medium
	Preventive care programs	Develop and promote preventive care programs to reduce long-term healthcare costs Encourage patients to schedule regular check-ups and screenings	Medium Low
	Telehealth services	Expand telehealth services to provide remote medical consultations, reducing physical infrastructure Ensure patients are aware of and comfortable with telehealth options	Medium Low
	Telemedicine adoption	Invest in telemedicine technology and training for healthcare providers Promote telemedicine services as convenient and cost-effective options for non-urgent care	Low Low
	Generic drug usage	Encourage the use of generic drugs whenever clinically appropriate to reduce medication costs Negotiate with pharmaceutical suppliers for favorable pricing on generic medications	Medium High
Agriculture sector	Crop rotation	Implement crop rotation plans to optimize yield and reduce the need for expensive inputs Educate farmers on the benefits of crop rotation	Medium Low
	Crop insurance	Purchase crop insurance to mitigate losses due to adverse weather conditions Ensure that insurance coverage is tailored to specific farming needs	Medium Low
	Hedging with future contracts	Use futures contracts to lock in prices for agricultural products and protect against price volatility Stay informed about market conditions and commodity prices	High Medium
	Diversified farming	Diversify the types of crops or livestock raised to spread risk and income sources Explore opportunities in niche or specialty farming to generate additional revenue	Medium Low
	Precision Agriculture technologies	Invest in precision agriculture technologies like drones, GPS, and sensors to optimize resource usage and maximize yields Train farm personnel to operate and maintain these technologies effectively	High Low
Energy sector	Investment in renewables	Allocate capital for the development and expansion of renewable energy projects like solar, wind, and hydropower Partner with renewable energy companies or invest in energy storage systems to ensure a stable supply of green energy	High Medium
	Long-term supply agreements	Secure long-term agreements with renewable energy suppliers to lock in energy prices Negotiate contracts with favorable terms that provide price stability in the face of inflation	High High
	Energy storage solutions	Invest in energy storage solutions like batteries or pumped hydro storage to store excess energy for later use Implement energy management systems to optimize energy storage and distribution	Medium Medium
	Carbon credits trading	Participate in carbon credits trading programs to generate additional revenue by reducing carbon emissions Monitor emissions and identify opportunities to reduce carbon footprints	Low Low
	Energy Efficiency Improvements	Upgrade equipment and facilities to improve energy efficiency Train employees to adopt energy-saving practices and regularly assess energy consumption	Medium Low

Hospitality and Tourism sector	Dynamic pricing	Implement dynamic pricing strategies that adjust prices based on demand and market conditions Use data analytics to determine optimal pricing adjustments	High Medium
	Cost containment	Analyze and optimize operational expenses by reducing waste and inefficiencies Implement sustainable practices that minimize resource consumption and waste	High High
	Experience bundling	Create bundled packages that combine various services to enhance the overall guest experience Promote these packages as cost-effective and convenient options	Medium Low
	Online booking optimization	Enhance online booking platforms with user-friendly features and promotions Invest in search engine optimization (SEO) and online advertising to increase online visibility and bookings	High Medium
	Smart hotel technologies	Implement smart technologies such as keyless entry systems and energy-efficient lighting to reduce operational costs Enhance the guest experience with technology, like mobile apps for check-in and room control	Medium Low
Technology sector	R&D investments	Allocate resources to research and development projects that can lead to innovations and cost reduction Collaborate with universities or research institutions for technology advancements	High Medium
	Cost-effective sourcing	Optimize the sourcing of materials and components by negotiating with suppliers for better pricing Explore global sourcing options while considering logistics and quality	High Medium
	Cloud sourcing	Migrate to cloud-based services to reduce infrastructure and maintenance costs Use cloud platforms for data storage, software-as-a-service (SaaS), and on-demand computing	Low Low
	Subscription-based services	Transition to subscription-based models for software, content, or services to generate predictable recurring revenue Offer subscription tiers to cater to various customer segments	High Medium
Transportation and Logistics sector	Fuel efficiency	Invest in fuel-efficient technologies, such as hybrid or electric vehicles, to reduce fuel costs Implement fuel-efficient driving practices and maintenance routines	High High
	Route optimization	Utilize route optimization software to minimize travel distances and reduce fuel consumption Monitor real-time traffic data to make route adjustments as needed	Medium Medium
	Alternative fuels	Explore the use of alternative fuels like natural gas, biofuels, or hydrogen Evaluate the feasibility of transitioning part of the fleet to alternative fuels	Low Medium
	Reverse logistics	Implement efficient reverse logistics processes for product returns, recycling, or refurbishment to recover value Reduce the environmental impact of returns while recouping costs where possible	Medium Low
	Intermodal transportation solutions	Optimize transportation modes by integrating trains, trucks, ships, and other means to reduce costs and improve efficiency Collaborate with intermodal transportation providers to streamline operations	Medium Low

Figure A2: Inflation levers in various sectors

Appendix 3 – Interview guide explorative interviews

Welcome to the interview. This interview is about dealing with rising prices in sourcing. There are multiple strategies and methods that organisations use to handle rising prices. Inflation can make it harder to control costs and work with suppliers, so it's important to have good methods or strategies to deal with this. This chat is all about your knowledge and what you actually do when it comes to handling inflation in sourcing.

The research is about inflation handling levers. These are strategies by which organisations can reduce the effects of inflation. Examples include long-term contracts with suppliers or price evaluations. There can be many different ways to reduce inflation and rising costs within an organisation. I would like to ask you the following questions:

1) Which inflation handling methods within sourcing do you know or use?

2) In which situations do you use these methods? How do you use them?

Table A3: Interview questions

The questions are asked. Based on the interviewee's answer, more in-depth questions are asked. At the end of the interview, the person is thanked and the next steps are explained: thank you for participating in the first interview. The second interview round takes place with external experts, here the inflation levers are discussed further and it is determined which ones are applicable.

Then a group workshop will be held internally at HP Valves where we will apply the inflation levers to a commodity and set up further actions. Thank you for participating in the first interview.

Appendix 4 – Interview guide for the second interviews

Welcome to the second interview. In the first interview we talked about strategies to handle inflation. The result of the first rounds of interviews is a list of various inflation levers. Today I want to discuss the solution concept and get your opinion about the applicability and limitations of this model.

-
- 1) What do you think about the applicability and effectiveness of these inflation handling levers for sourcing?

 - 2) Are the identified axes in the model accurate for determining when to use specific methods?

 - 3) Are there any additional methods or strategies you recommend including in the model?

 - 4) Do you see any limitations or challenges to the inflation model?

 - 5) Can you use these levers for your own area/commodities?
-

Table A4: Interview questions

The questions are asked. Based on the interviewee's answer, more in-depth questions are asked. At the end of the interview, the person is thanked and the next steps are explained: thank you for participating in the second interview. Based on the answers, I will enhance the inflation model with the definitively applicable inflation levers. You will also receive the levers so you can also use them within your organisation. Thank you for participating in the second interview.

Appendix 5 – Explanation inflation heat map tool

Below, the different scores in the inflation heat map tool are further explained.

Long term contracts with inflation clauses

Supply Side Inflation - Pass Through of Costs (Score: 2): Long-term contracts with inflation clauses are highly appropriate for this situation as they allow organisations to efficiently pass on increased costs to customers in a supply-side inflation scenario. With long-term contracts, organisations can also establish inventory when there is a shortage of products. The long-term contracts provide stability and ensure that the impacts of inflation are transparently transferred to customers.

Supply Side Inflation - No Pass Through of Costs (Score: 7): In a scenario where passing through costs is challenging on the supply side, long-term contracts with inflation clauses may be less appropriate (score 7). The inflexibility of these contracts may limit the organisation's ability to navigate and absorb the inflation-induced cost increases without affecting profitability.

Demand Side Inflation - Pass Through of Costs (Score: 3): Long-term contracts with inflation clauses are suitable in a demand-side inflation scenario (score 3). While not as effective as in supply-side inflation, they provide a degree of stability and cost transparency, allowing for partial mitigation of inflation impacts passed on to customers.

Demand Side Inflation - No Pass Through of Costs (Score: 7): When unable to pass on costs due to demand-side inflation, long-term contracts with inflation clauses may be less fitting (score 7). The inability to transfer increased costs to customers might limit the effectiveness of these contracts in maintaining profitability under demand-side inflationary pressures.

Buy according to market opportunities

Supply Side Inflation - Pass Through of Costs (Score: 4): Buying according to market opportunities is reasonably suitable when dealing with supply-side inflation and the ability to pass on costs (score 4). This method allows businesses to capitalise on favorable market conditions, adjusting prices to offset increased supply-side costs, maintaining competitiveness.

Supply Side Inflation - No Pass Through of Costs (Score: 6): In situations where passing through costs is challenging on the supply side, buying according to market opportunities may be less appropriate (score 6). The method relies on the flexibility to adjust prices, and limitations

in passing on costs might impact its effectiveness in adapting to inflation-induced supply-side challenges.

Demand Side Inflation - Pass Through of Costs (Score: 3): Buying according to market opportunities is suitable for demand-side inflation when costs can be passed through (score 3). This approach allows organisations to buy on favorable market conditions, such as lower input costs, while maintaining or improving profit margins by adjusting prices to reflect the increased demand.

Demand Side Inflation - No Pass Through of Costs (Score: 5): When facing demand-side inflation and unable to pass on costs, buying according to market opportunities remains moderately fitting (score 5). The method's flexibility in responding to market conditions may offer some advantages, but limitations in cost pass-through may impact its overall effectiveness in managing inflation-induced challenges.

Building strategic inventory

Supply Side Inflation - Pass Through of Costs (Score: 1): Building strategic inventory is highly appropriate in situations of supply-side inflation when costs can be passed through (score 1). By maintaining a strategic inventory, organisations can absorb and mitigate the impact of increased supply-side costs, ensuring a stable supply chain without negatively affecting profitability.

Supply Side Inflation - No Pass Through of Costs (Score: 1): Similarly, in scenarios where passing through costs is challenging on the supply side, building strategic inventory remains highly fitting (score 1). The method acts as a buffer, allowing the organisation to navigate through inflation-induced challenges without relying on cost pass-through to customers.

Demand Side Inflation - Pass Through of Costs (Score: 8): Building strategic inventory is less suitable when dealing with demand-side inflation and the ability to pass on costs (score 8). In such situations, the products are plenty available and the costs can be passed on, so the organisations should not build up their inventory.

Demand Side Inflation - No Pass Through of Costs (Score: 1): In situations of demand-side inflation where passing through costs is challenging, building strategic inventory remains highly appropriate (score 1). The method ensures a stable supply of goods, allowing the company to navigate through uncertainties without relying on cost pass-through to customers.

Diversify sourcing across multiple suppliers

Supply Side Inflation - Pass Through of Costs (Score: 1): Diversifying sourcing across multiple suppliers is highly appropriate in scenarios of supply-side inflation when costs can be passed through (score 1). This method enhances supply chain resilience, allowing companies to navigate increased costs by leveraging alternative suppliers without impacting profitability.

Supply Side Inflation - No Pass Through of Costs (Score: 1): Similarly, in situations where passing through costs is challenging on the supply side, diversifying sourcing across multiple suppliers remains highly fitting (score 1). By having diverse sources, companies can better manage and absorb inflation-induced cost increases without relying on cost pass-through to customers.

Demand Side Inflation - Pass Through of Costs (Score: 4): Diversifying sourcing across multiple suppliers is moderately suitable in cases of demand-side inflation where costs can be passed through (score 4). While it provides some flexibility, the method might not be as effective as other strategies in fully mitigating increased costs under demand-side inflationary pressures.

Demand Side Inflation - No Pass Through of Costs (Score: 4): In scenarios of demand-side inflation where passing through costs is challenging, diversifying sourcing across multiple suppliers remains moderately fitting (score 4). The method contributes to supply chain stability, allowing the company to navigate uncertainties without relying heavily on cost pass-through to customers.

Utilize dashboard for price developments

Supply Side Inflation - Pass Through of Costs (Score: 4): Utilizing dashboards for price developments is moderately appropriate in scenarios of supply-side inflation when costs can be passed through (score 4). The method provides valuable real-time insights, enabling companies to make informed decisions and adjust pricing strategies to navigate through supply-side inflationary pressures.

Supply Side Inflation - No Pass Through of Costs (Score: 3): Similarly, in situations where passing through costs is challenging on the supply side, utilizing dashboards for price developments is certainly fitting (score 3). The real-time insights help in monitoring and adapting to market conditions, but limitations in cost pass-through may impact its overall effectiveness in managing inflation-induced challenges.

Demand Side Inflation - Pass Through of Costs (Score: 5): Utilizing dashboards for price developments is somewhat suitable for demand-side inflation when costs can be passed through (score 5). The method offers flexibility in adjusting prices based on market conditions, aiding companies in partially mitigating the impact of increased costs under demand-side inflationary pressures.

Demand Side Inflation - No Pass Through of Costs (Score: 2): In scenarios of demand-side inflation where passing through costs is challenging, utilizing dashboards for price developments is very appropriate and effective (score 2).

Promote transparency with suppliers

Supply Side Inflation - Pass Through of Costs (Score: 3): Promoting transparency with suppliers is moderately appropriate in scenarios of supply-side inflation when costs can be passed through (score 3). Open communication and transparency help build stronger partnerships, aiding in negotiations and collaborative efforts to navigate through increased supply-side costs.

Supply Side Inflation - No Pass Through of Costs (Score: 4): Similarly, in situations where passing through costs is challenging on the supply side, promoting transparency with suppliers remains slightly less appropriate (score 4). While transparency is valuable, its effectiveness may be somewhat diminished when cost pass-through is limited, impacting the overall collaborative response to inflation-induced challenges.

Demand Side Inflation - Pass Through of Costs (Score: 3): Promoting transparency with suppliers is moderately suitable for demand-side inflation when costs can be passed through (score 3). Transparent communication supports collaboration, helping companies and suppliers navigate through market uncertainties and adapt to increased costs under demand-side inflationary pressures.

Demand Side Inflation - No Pass Through of Costs (Score: 2): In scenarios of demand-side inflation where passing through costs is challenging, promoting transparency with suppliers is considered appropriate (score 2). Open and honest communication becomes crucial in such situations, fostering stronger partnerships and collaborative problem-solving to manage challenges associated with demand-side inflation.

Implement product improvements

Supply Side Inflation - Pass Through of Costs (Score: 8): Implementing product improvements is not highly appropriate in scenarios of supply-side inflation when costs can be passed through (score 8). The focus on product enhancements may divert resources from addressing immediate cost challenges, making it less effective in navigating through increased supply-side costs.

Supply Side Inflation - No Pass Through of Costs (Score: 5): In situations where passing through costs is challenging on the supply side, implementing product improvements is moderately appropriate (score 5). While enhancing products can contribute to long-term competitiveness, the immediate impact on managing inflation-induced cost pressures may be limited without the ability to pass through costs.

Demand Side Inflation - Pass Through of Costs (Score: 7): Implementing product improvements is not highly appropriate in scenarios of demand-side inflation when costs can be passed through (score 7). The focus on product enhancements may not provide an immediate solution to the challenges posed by increased costs under demand-side inflationary pressures.

Demand Side Inflation - No Pass Through of Costs (Score: 5): In scenarios of demand-side inflation where passing through costs is challenging, implementing product improvements is moderately appropriate (score 5). While enhancing products can contribute to customer satisfaction, the immediate impact on managing increased costs may be limited without the ability to pass through costs.

Monitor market trends and price indexes

Supply Side Inflation - Pass Through of Costs (Score: 4): Monitoring market trends and price indexes is moderately appropriate in scenarios of supply-side inflation when costs can be passed through (score 4). The method provides valuable insights into market conditions, aiding companies in adjusting prices to navigate through increased supply-side costs.

Supply Side Inflation - No Pass Through of Costs (Score: 2): In situations where passing through costs is challenging on the supply side, monitoring market trends and price indexes is highly appropriate (score 2). The method helps companies proactively assess market conditions, enabling strategic decision-making even when direct cost pass-through is limited.

Demand Side Inflation - Pass Through of Costs (Score: 4): Monitoring market trends and price indexes is moderately suitable for demand-side inflation when costs can be passed through (score 4). The method assists companies in adapting pricing strategies based on market

conditions, contributing to a more informed response to increased costs under demand-side inflationary pressures.

Demand Side Inflation - No Pass Through of Costs (Score: 2): In scenarios of demand-side inflation where passing through costs is challenging, monitoring market trends and price indexes is highly appropriate (score 2). The method remains valuable for companies to stay informed about market dynamics, facilitating strategic decision-making in response to increased costs without the ability to pass through.

Exploring cost-effective alternatives for products or materials

Supply Side Inflation - Pass Through of Costs (Score: 4): Exploring cost-effective alternatives is moderately appropriate in scenarios of supply-side inflation when costs can be passed through (score 4). The method allows companies to proactively seek alternatives, balancing cost efficiency with the ability to adjust prices in response to increased supply-side costs.

Supply Side Inflation - No Pass Through of Costs (Score: 2): In situations where passing through costs is challenging on the supply side, exploring cost-effective alternatives is highly appropriate (score 2). The method becomes crucial for maintaining cost efficiency, providing organisations with strategic options to mitigate increased costs without the ability to pass them through.

Demand Side Inflation - Pass Through of Costs (Score: 3): Exploring cost-effective alternatives is highly appropriate in scenarios of demand-side inflation when costs can be passed through (score 3). The method enables companies to balance cost considerations while adjusting prices, ensuring a competitive edge in response to increased costs under demand-side inflationary pressures.

Demand Side Inflation - No Pass Through of Costs (Score: 2): In scenarios of demand-side inflation where passing through costs is challenging, exploring cost-effective alternatives is highly appropriate (score 2). The method becomes essential for companies to manage costs effectively, offering strategic alternatives without the ability to directly pass through the increased costs.

Appendix 6 – Process model and decision tree for the Inflation handling model

An overview has been created outlining the application steps of the inflation model within an organisation. Firstly, a visual representation of the five key steps is provided. Subsequently, a detailed process model is presented, offering a comprehensive guide for implementing the inflation model effectively. The visual representation of the steps can be seen in Figure A1. The process model can be seen in Figure A2.

IMPLEMENTING THE INFLATION MODEL

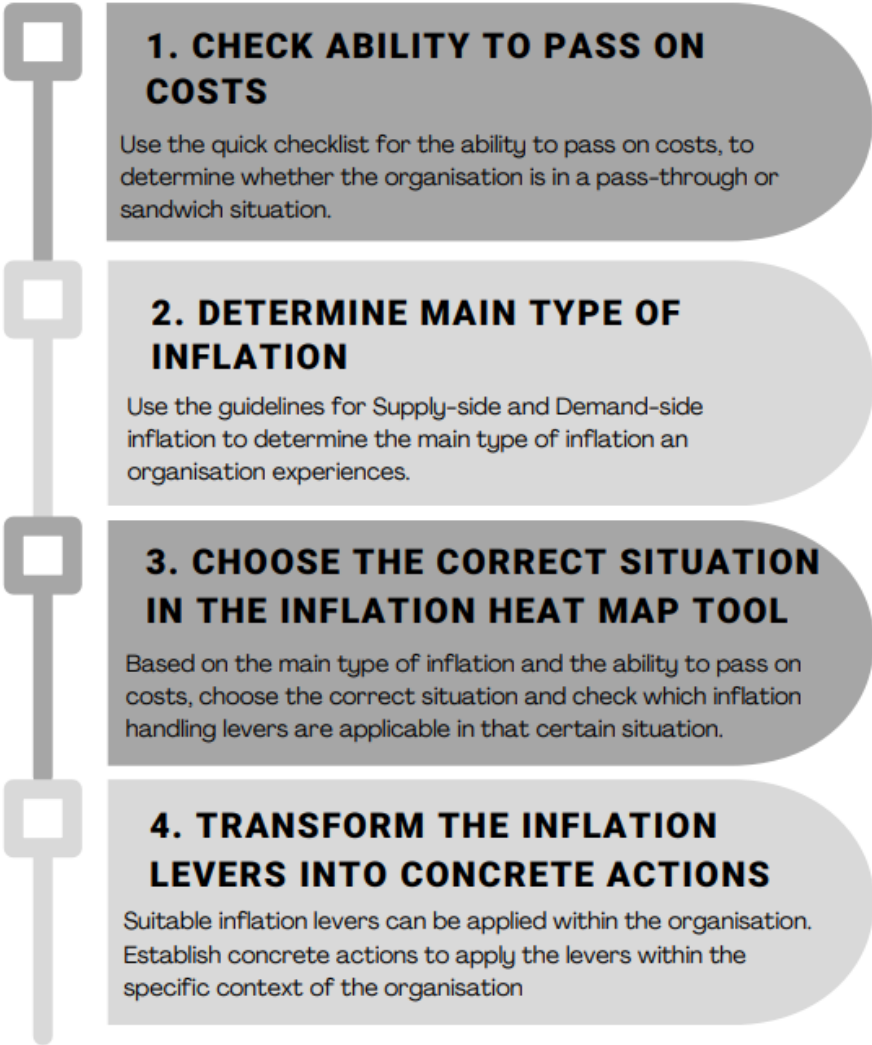


Figure A3- *Implementing the inflation model*

Process model - Inflation model

Step 1. Check the ability to pass on costs

Use the quick checklist to determine whether an organisation is in a pass-through or sandwich situation. Score the organisation on the factors. If the sum of the score is > 13, the organisation can pass on their costs. If the score is ≤ 13 the organisation is in a sandwich situation.

Pass-through or Sandwich Situation Quick Checklist								
			1	2	3	4	5	
Pass-through	Pricing Flexibility	1 = The organisation's pricing is non-flexible, with limited room for adjustments in response to cost increases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The organisation has the flexibility to adjust pricing swiftly to offset rising costs without significant customer resistance
	Customer Relationship and Communication	1 = The organisation has weak customer communication channels, making it challenging to explain and justify price increases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The organisation has strong customer relationships and effective communication strategies to justify and navigate price adjustments.
Sandwich	Market Acceptance of Price Changes	1 = The market is highly sensitive to price changes, making it difficult for the organisation to implement increases successfully.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The market has historically accepted and understood the necessity of price adjustments, allowing the organisation to pass on costs effectively.
	Supplier Negotiation and Collaboration	1 = The organisation has limited negotiation power with suppliers, hindering its ability to manage and pass on increased costs effectively.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = The organisation has strong supplier relationships and agreements that facilitate transparent pass-through of cost increases to customers.
Pass-Through situation: > 13 Sandwich situation: ≤ 13								

Step 2. Determine the main type of inflation

To clearly determine the appropriate inflation levers, an organisation must identify the type of inflation they primarily experience. Using the guidelines in the model, an organisation can check which effects they experience. The type of inflation with the highest score is the main type of inflation an organisation experiences.

Supply side inflation Quick Checklist								
			1	2	3	4	5	
Supply-side inflation	Product Shortages: Primary risk is a shortage of products in the market.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Raw Material Costs: Escalation in the costs of raw materials affecting production.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Global Supply Chain Disruptions: Interruptions in the global supply chain impacting the availability of goods.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Energy Prices: Fluctuations in energy prices affecting production and transportation costs.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Natural Disasters: Disruptions caused by natural disasters impacting the supply of goods.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Geopolitical Factors: Political instability affecting the sourcing and transportation of goods.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
Total score= sum of all scores								

Demand side inflation Quick Checklist								
			1	2	3	4	5	
Demand-side inflation	Monetary and Fiscal Expansion: Both monetary and fiscal policies contribute to the potential for increased demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Deflationary Shock: deflationary shocks impact major currency areas such as the US dollar and Euro which influence the demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Loose Monetary and Fiscal Policies: Loose monetary and fiscal policies, including large-scale fiscal stimulus packages, contributed to boosting demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Consumer spending: Varying consumer spending driving up or down the prices of goods, impacting demand	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Employment dynamics: High employment boosts spending, while unemployment suppresses demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Interest rate impact: Changes in interest rates, driven by central bank policies, can impact overall demand.	1 = Not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 = Highly prevalent
	Total score= sum of all scores							

Step 3. Choose the correct situation in the inflation heat map tool

Based on the main type of inflation and the ability to pass on costs, an organisation can choose the right situation in the inflation heat map tool. Based on the correct situation, the inflation tool shows which methods are appropriate for a certain situation and which are not appropriate.

Types of inflation	Type of business	Proposed actions pros: positive consequences cons: negative consequences									Score 1 = Highly appropriate 10 = Not appropriate	
		Long term contracts with inflation clauses Pros: price stability amid inflation Cons: Reduced flexibility when market changes	Buy according to market opportunities Pros: buy in favourable market conditions Cons: potential missed opportunities	Building strategic inventory Pros: fixed price and security Cons: Tie up capital	Diversify sourcing across multiple suppliers Pros: mitigates supply chain risks Cons: increased complexity supplier management	Utilise dashboards for price developments Pros: real-time insight into price trends Cons: dependence on accurate data	Promote transparency with suppliers Pros: enhances trust and collaboration with suppliers Cons: Sensitive to inaccurate information	Implement product improvements Pros: Less price increases Cons: resource intensive and time to implement	Monitor market trends and price indexes Pros: informed decision-making Cons: dependence on accurate data	Exploring cost-effective alternatives for products or materials Pros: less price increase Cons: time to implement		
Supply-side inflation Main risk: Shortage of products	Pass-through	2	4	1	1	4	3	8	4	4		
	Sandwich	7	6	1	1	3	4	5	2	2		
Demand-side inflation Main risk: Loss of profitability	Pass-through	3	3	8	4	5	3	7	4	3		
	Sandwich	7	5	1	4	2	2	5	2	2		

Step 4. Transform inflation levers into actions

The appropriate inflation levers from the inflation heat map tool can be applied within the organisation. Based on the levers, establish concrete actions to apply the levers within the specific context of the organisation. These actions can be implemented within the certain departments of an organisation.



Figure A4 - Process model - Inflation handling model

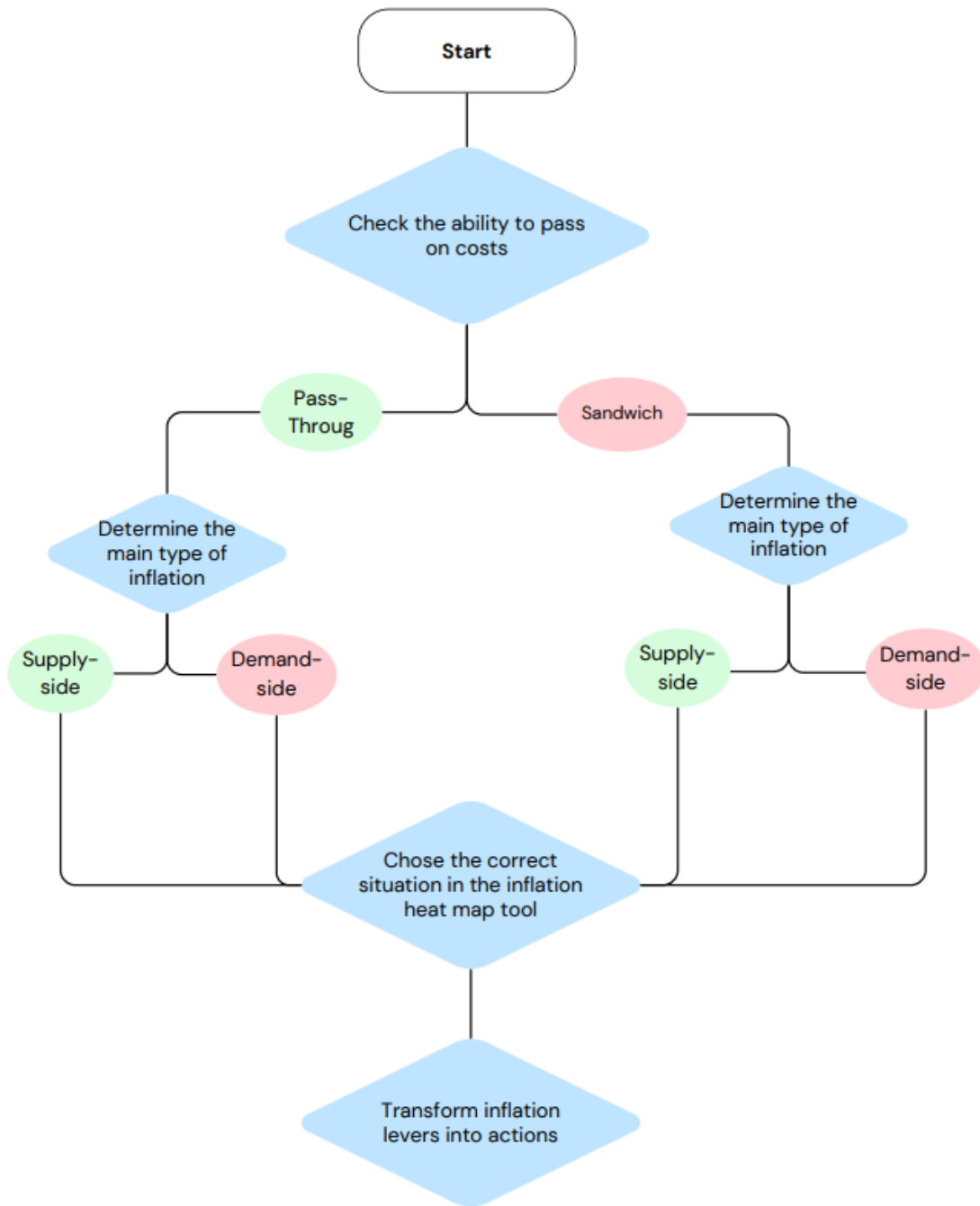


Figure A5 - *Decision tree inflation model*

Appendix 7 – Guidelines factors for assessment of the actions

In collaboration with the participants, guidelines have been established to determine, for instance, when an action has a high profit impact or when it has a low impact. Guidelines have been developed for all three factors: profit impact, implementation time, and potential costs. The guidelines are visible in the table below.

Profit impact	
Low impact	1-2% change in EBIT product category
Medium impact	2-5% change in EBIT product category
High impact	> 5% change in EBIT product category

Implementation time	
Short time	Implemented in a few weeks
Medium time	Implemented in several months
Long time	Implemented in a year or longer

Potential costs	
Low costs	< €10,000
Medium costs	€10,000 - €50,000
High costs	> €50,000

Figure A6 – Guidelines factors

Measuring the profit impact of a specific inflation method on a product category can be achieved by assessing the change in profitability, with EBIT (Earnings Before Interest and Taxes) serving as a suitable financial metric. The following steps need to be taken:

1. Determine current EBIT: Start by calculating the current EBIT for the relevant product category. This represents the profit before interest and taxes.
2. Implement the inflation method: Execute the intended inflation method on the product category. For example, if the method aims for a 3% change in the EBIT, implement necessary adjustments in pricing, cost management, or other relevant factors.
3. Measure the change in EBIT: Compare the EBIT after implementation with the original EBIT. Calculate the percentage difference between the two to determine the impact of the inflation method on profitability.

$$\text{Profit Impact Percentage} = \frac{\text{New EBIT} - \text{Current EBIT}}{\text{Current EBIT}} \times 100\%$$

4. Analyze the results: Evaluate whether the achieved result aligns with expectations.

Appendix 8 – Implementation plan inflation handling levers HP Valves

This chapter discusses the implementations plan for the inflation handling levers with the highest ranking for HP Valves. The departments can follow the plan to implement the method within the organisation.

Implementation plan: Negotiate flexible contracts with favorable terms and conditions	
Step 1. Preparation and analysis	<p>a. Supplier Assessment: Conduct a thorough evaluation of potential steel suppliers, considering factors like reputation, reliability, and capacity.</p> <p>b. Market Research: Stay informed about current market conditions, steel prices, and any factors affecting the steel industry.</p> <p>c. Internal Needs Assessment: Identify HP Valves' specific requirements for steel, including volume, quality standards, and delivery schedules.</p>
Step 2. Define contract terms	<p>a. Key Terms Identification: Clearly define the key terms and conditions, such as pricing, payment terms, delivery schedules, and quality standards.</p> <p>b. Flexibility Provisions: Incorporate flexibility clauses, allowing for adjustments in quantities, pricing, or delivery schedules based on market fluctuations or HP Valves' evolving needs.</p>
Step 3. Engage in open communication	<p>a. Supplier Meetings: Schedule meetings with potential suppliers to discuss HP Valves' requirements, negotiate terms, and understand the supplier's capabilities.</p> <p>b. Transparency: Encourage open communication regarding cost structures, ensuring both parties have a clear understanding of each other's expectations.</p>
Step 4. Leverage Volume and Long-Term Commitments	<p>a. Volume Discounts: Negotiate volume-based discounts to optimize costs, especially if HP Valves can commit to larger quantities over an extended period.</p> <p>b. Long-Term Agreements: Explore the possibility of long-term contracts to provide stability for both HP Valves and the supplier.</p>
Step 5. Negotiation and revision	<p>a. Iterative Negotiations: Engage in iterative negotiations, addressing concerns and revising terms until both parties reach a mutually beneficial agreement.</p> <p>b. Flexibility Check: Ensure that the negotiated terms provide the desired flexibility and adaptability to changing market conditions.</p>

Step 6. Implementation and monitoring	<p>a. Supplier Onboarding: Facilitate a smooth onboarding process for the selected supplier if the relationship is new.</p> <p>b. Performance Metrics: Establish key performance indicators (KPIs) to monitor supplier performance against agreed-upon terms.</p>
Step 7. Continuous improvement	<p>a. Periodic Review: Conduct periodic reviews of the contract's effectiveness and adjust terms as necessary.</p> <p>b. Feedback Mechanism: Establish a feedback mechanism with the supplier to address any issues promptly and identify opportunities for improvement.</p>

Table A1 - *Implementation plan: Negotiate flexible contracts with favorable terms and conditions*

There is also an implementation plan established for the method: Foster open communication channels with suppliers.

Implementation plan: Foster open communication channels with suppliers	
Step 1. Identify supplier relationships	<p>a. Identify Key Suppliers: Create a comprehensive list of key suppliers for commodity steel based on historical performance, reliability, and strategic importance.</p> <p>b. Categorize Suppliers: Categorise suppliers based on their criticality to HP Valves, distinguishing between primary and secondary suppliers.</p>
Step 2. Communication infrastructure	<p>a. Communication Platforms: Select suitable communication platforms, considering factors such as security, accessibility, and ease of use.</p> <p>b. Integration with ERP System: Integrate communication platforms with the Enterprise Resource Planning (ERP) system for seamless data exchange.</p>
Step 3. Establish Regular Communication Protocols	<p>a. Frequency of Meetings: Define a schedule for regular meetings with key suppliers, considering factors such as procurement cycles, market dynamics, and production schedules.</p> <p>b. Meeting Agendas: Establish clear agendas for each meeting, focusing on topics such as performance reviews, upcoming projects, and market insights.</p>
Step 4. Transparency	<p>a. Share Forecasts: Provide suppliers with accurate and timely forecasts of steel requirements to facilitate better production planning.</p>

and Information Sharing	b. Market Intelligence: Share relevant market intelligence with suppliers to foster a mutual understanding of industry trends, pricing, and potential challenges.
Step 5. Performance Evaluation and Feedback	a. Regular Performance Reviews: Conduct regular performance reviews with suppliers, providing constructive feedback on areas of improvement and acknowledgment of achievements. b. Two-Way Feedback: Encourage suppliers to provide feedback on HP Valves' processes, communication, and any areas where improvements can be made.
Step 6. Conflict Resolution Mechanisms	a. Establish Protocols: Define clear protocols for addressing conflicts or disputes that may arise during the procurement process. b. Mediation Resources: Identify external mediation resources or industry associations that can assist in resolving conflicts impartially.
Step 7. Supplier Recognition and Incentives	a. Recognition Programs: Implement recognition programs to acknowledge suppliers' contributions and achievements. b. Incentive Structures: Explore incentive structures that encourage suppliers to exceed performance expectations.

Table A2 - *Implementation plan: foster open communication channels with suppliers*

There is also a implementation plan established for the method: Collaborating with suppliers to identify enhancement opportunities

Implementation plan: Collaborating with suppliers to identify enhancement opportunities	
Step 1. Supplier selection and categorisation	a. Identify Strategic Suppliers: Evaluate and identify key suppliers based on their significance to HP Valves' operations and commodity steel procurement. b. Categorise Suppliers: Categorise suppliers into tiers based on their importance and potential for collaboration.
Step 2. Strategic alignment meetings	a. Hold Alignment Sessions: Initiate strategic alignment meetings with key suppliers to discuss mutual goals, expectations, and potential areas for improvement. b. Share Organizational Objectives: Clearly communicate HP Valves' organizational objectives and its commitment to enhancing collaboration.

Step 3. Performance data sharing	<p>a. Transparent Data Exchange: Establish a system for transparent data exchange, sharing relevant performance metrics, and historical data with suppliers.</p> <p>b. Encourage Supplier Data Sharing: Encourage suppliers to share their insights and data regarding manufacturing processes, lead times, and cost structures.</p>
Step 4. Continuous Improvement Teams	<p>a. Establish Cross-Functional Teams: Form cross-functional improvement teams consisting of HP Valves' and supplier representatives.</p> <p>b. Define Roles and Responsibilities: Clearly define the roles and responsibilities of team members, ensuring representation from relevant departments.</p>
Step 5. Technology Integration	<p>a. Evaluate Technology Solutions: Explore technology solutions that facilitate real-time collaboration, such as cloud-based platforms and collaborative project management tools.</p> <p>b. Invest in Integration: Invest in technology integration to streamline information sharing and enhance collaboration efficiency.</p>
Step 6. Cost Optimization Strategies	<p>a. Conduct Cost Analysis: Collaboratively conduct a comprehensive cost analysis, identifying areas for cost optimization without compromising quality.</p> <p>b. Explore Value Engineering: Explore value engineering opportunities to enhance the value proposition of the commodity steel.</p>
Step 7. Supplier Capacity Building	<p>a. Training and Development: Provide training programs for suppliers to enhance their capabilities in areas aligned with HP Valves' enhancement objectives.</p> <p>b. Encourage Innovation: Encourage suppliers to bring innovative solutions to the table and actively participate in continuous improvement initiatives.</p>
Step 8. Regular Progress Reviews	<p>a. Scheduled Progress Reviews: Conduct regular progress reviews to assess the effectiveness of implemented enhancement initiatives.</p> <p>b. Feedback Mechanism: Establish a feedback mechanism for both parties to provide insights and suggestions for ongoing improvements.</p>

Table A3 - Implementation plan: collaborating with suppliers to identify enhancement opportunities