Critical Incidents in Global Sourcing

The impact of critical incidents in the upper stages of the five-stage model: a case study

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Summary

Problem Statement

Global sourcing (a practice of sourcing globally) continues to develop due to the globalization of organizations, which has been driven by the search for efficiency and more effective operations. The creation of international purchase offices, the spread of production facilities, faster and better communication, and the development of production technologies all over the world are leading to global sourcing. Organizations are adopting their main strategies into their operational strategies for sourcing and marketing, and they are changing their sourcing strategies in reaction to direct and indirect profits.

With the development of global sourcing, various sourcing models have been developed, with the five-stage model of Trent and Monczka (2002a, 2002b and 2005) emerging as one of the most prominent. However, it is not well understood how organizations can change their level of global sourcing in this five-stage model. Recent research suggested that unforeseen incidents (critical incidents), whether positive or negative, affect global sourcing. Moreover, the effect of critical incidents in the five-stage model has been studied, but only in the lower stages of the model. The above summary leads to the following problem statement:

What is the impact of critical incidents on global sourcing in the upper stages of the five-stage model?

Research method

For this study, an embedded single case study is performed regarding the case of Thermo King, a global operating production, sales and service organization for transport refrigeration. With production facilities in the US and Europe and with suppliers all over the world practicing global sourcing, Thermo King has a mature global sourcing process. Thermo King has global competitors and is therefore seen as suitable for this study. Three product ranges (Engines, Metals, and Skins) have been studied through document analyses and semi-structured interviews from different levels. The interviews took approximately two hours each. Based on the information provided by the respondents, the current levels of global sourcing in the stage model were determined. In addition, respondents discussed and reflected upon the drivers and critical incidents that might have induced the transition to another level of global sourcing. The respondents were asked to indicate the influence of critical incidents on the sourcing strategy and the level of global sourcing. The respondents have checked the written reports of the interviews in order to prevent incomplete or incorrect interpretations of the answers given.

Results

All interviewees reported critical incidents. Not all reported critical incidents had an impact on the global sourcing strategy or the level of global sourcing. The critical incidents are reported and displayed per product range rather than per incident. Some critical incidents occurred in two product ranges independently from each other.
The following critical incidents were reported:

- Engine dimensions, miscommunication with engineering
- Environmental issues
- Shipping disruptions
- Geographical issues
- Currency fluctuations
- Import fees
- Change of strategy
- Bankruptcy
- The UK leaving the European Union (Brexit)

Four of the mentioned Critical incidents had an impact on the global sourcing strategy and three reported critical incidents had an impact on the level of global sourcing in the five-stage model.

Reported currency fluctuations in both the Skins and the Metals product ranges had an impact on the sourcing strategy. Due to fluctuating prices, the organization decided to change from US supplier to European supplier. This caused lesser or no fluctuations in prices, causing a more stable sourcing price. This meant more stable production costs. The bankruptcy of a supplier also had an impact on the sourcing strategy of Skins. Due this bankruptcy, Thermo King shifted the production over different suppliers, spreading the risk of production disruption.

Conclusion

Critical incidents do have an impact on the level of global sourcing. Also the global sourcing strategy is influenced by critical incidents. The level of global sourcing can also be influenced by critical incidents as a main reason or as a trigger. Although it is beyond the scope of this study, the effect of critical incidents on the sourcing strategy seems to be influenced by the level of buyer–supplier relationship (level of partnership).

Besides a proactive sourcing strategy, critical incidents also have an active influence on global sourcing within different product ranges. This research also implies that critical incidents can influence the level of global sourcing. Even in the upper stages of the five-stage model, critical incidents affect both the global sourcing strategy and the level of global sourcing.

Recommendations

This study was limited to direct spend product ranges. Future research could include indirect spend in order to complement the outcome of this study. In addition, this study was done within a company that has been operating in the upper stages of the five-stage model for several decades. Future research could be focused on a company that has not in the upper stages for a long time in order to produce more insight into stages IV or V. Some critical incidents occurred in a certain level of partnership, so that although no influence was reported, if these should occur in a product range with more suppliers, they would likely have an impact. Future research could be performed on the level of buyer–supplier relationship and the effect of critical incidents.

Key words:  global sourcing, critical incidents, global sourcing strategy, sourcing level, Five-stage model, purchasing, case study
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1.1 Problem statement

Many companies have been forced by globalization to focus on the processes that can enable them to operate more efficiently and effectively in the integration of their worldwide organization (Yeniyurt et al. (2012)). The focus on lowering costs and increasing their competitive position globally also affects their sourcing organization. To be able to manage their international procurement activities, many companies began to establish international purchasing offices (IPOs). These offices are established in key markets in order to defend the strategy of becoming and remaining globally competitive (Glock (2011)).

The globalization of organizations is characterized by the reduction of trading barriers which may occur. Other characteristics include the spread and connectedness of production, communication, and other technologies worldwide (Hanna (2015)). Global changes require a great deal of flexibility from companies and their managers, especially regarding the processes that should be followed or even designed (Chang (2012)). Although gaining benefits from lower costs is the main (Christopher et al. (2011)) and perhaps the most important motivation, other reasons and motivations for global sourcing should not be overlooked. While some benefits are related to quality and service, others are in favor of gaining better competitive strength (Quintens et al. (2006)). Flexibility is another benefit of improving competitive strength and should not be ignored (Gunasekaran et al. (2015)).

Trent and Monczka (2003a and 2005) have developed their well-known five-stage model for creating a more strategic approach to the procurement activities of an organization. The five-stage model is a model designed for describing and developing the global sourcing activities of organizations. The model implies that companies should adopt a strategically consistent approach and should attempt reach more advanced stages. However, there are serious questions and doubts regarding the deliberate nature of decision-making in global sourcing (e.g. Hultman et al. (2012)).

Agndal (2006) discovered in his study that the attitude of small- and medium-sized enterprises practicing foreign sourcing are primarily need-driven. In an explorative case study, Gelderman et al. (2016) found that global sourcing decisions were mainly an opportunistic response to unforeseen events. They concluded that reactive strategies appear to govern global sourcing despite their stated intended strategies. The critical incidents technique (CIT) is an effective method in explorative studies aimed at gaining an understanding of the perceived impact of incidents, events, and occurrences (e.g. Chell & Pittaway (1998)). Still, CIT is not a commonly used method in research on purchasing and supply management (Bakker & Kamann (2007), Oldenburger et al. (2008)).

The five-stage model of global sourcing is normative in the sense that it prescribes a linear pathway from one stage to another. It attempts to provide a steady roadmap for global purchasing sophistication. The model suggests that the ultimate goal for every company should be reaching the final level of global sourcing strategies which are integrated across global or worldwide locations or function groups.

However, the model says little about why and how to reach higher stages of global sourcing and what the role of critical incidents is in the advancements to stages IV and V of the model (cf. Gelderman et al. (2016)). The present study investigates the role of critical incidents in the advancements within the five-stage model, especially to its upper levels.

The purpose of this research is to get more understanding in the impact of critical incidents in global sourcing. The impact of critical incidents on the implementation of global sourcing and the level of global sourcing that is practiced will be investigated in this research. Where the impact of critical incidents is researched by Gelderman et al. (2016) in the lower stages of the five-stage sourcing model, this research will investigate the impact of critical
incidents in the higher stages of the five-stage model. With this research we will give an answer to the following problem statement:

**What is the impact of critical incidents on global sourcing in the upper stages of the five-stage model?**

Following to the research of Gelderman et al. (2016) this research can give more insight in the proactivity or reactivity of the global sourcing strategy and the effect critical incidents have on this and it will complement earlier studies.

1.2 Research method

The study is set up in two stages. The first stage is a theoretical study of global sourcing that is carried out with all available scientific sources, such as scientific publications and available data. The second stage is an embedded single case study. Given that the quantity of data on critical incidents in global sourcing is limited, especially on organizations that are in the upper stages of the five-stage model, a case study is considered the best research method. This case study will give more information on the critical incidents in global sourcing in the upper stages of the five-stage model.

Eisenhardt (1989, p. 534) defines a case study as “a research strategy, which focuses on understanding the dynamics present within single settings”. The purpose of a case study is to generate evidence (Eisenhardt (1989)). The single case study is particularly suitable for research topics on which not very much data is available or not much research has been conducted (Ghauri (2004) and Eisenhardt (1989)). The critical incidents theory in the five-stage model has not been studied in great depth, so the single case study is the best research method.

This research will show the role of critical incidents in advancing to the fourth and fifth stages of the five-stage model (cf. Gelderman et al. (2016)) in global sourcing. The case study is conducted on Thermo King, a brand of Ingersoll Rand. Thermo King is a world leader in delivering transport temperature controlled systems for a large variety of transportation systems, such as trailers and trucks. Thermo King also delivers solutions for the rail and shipping industry. With nine factories in seven countries and service locations all over the world, Thermo King can be typified as a multinational (a company with several locations worldwide).

The study will focus on the following product ranges: Engines, skins and metals sourced by the company. The products in these product ranges are sourced at a global supplier in Japan (engines) and several suppliers in Europe and the US (skins and metals). The products are sourced for the Thermo King factories in Galway (Ireland), Essen (Germany), Barcelona (Spain), Kolín (Czech Republic), Hastings (United States of America) and Arecibo (Puerto Rico). These suppliers also delivers to Thermo King warehouses in Ireland and the United States. For this case study, interviews have been conducted with several (Senior) Commodity Managers and the Vice President Procurement.

The interviews have been performed face-to-face or via video conferencing. During the interviews open questions have been asked. The interview guide is presented in Appendix 1.
2. Literature review

2.1 Sourcing or procurement?

Global sourcing and global purchasing are well known terms in literature. In their study, Benders and Vos (1998) note that Hefler (1980) was one of the first researchers to use the term global sourcing.

Other terms are also used to denote sourcing on a global level. Terms such as global, international, and offshore are used interchangeably to indicate the international character of sourcing.

Kotabe (1998) describes global sourcing as a combination of domestic and international sourcing with the main goal of obtaining competitive advantages. Monczka and Trent (1991) use the terms worldwide sourcing and global sourcing.

Motwani and Ahuja (2000) use the term international purchasing to describe an attempt at competitiveness by purchasing new products of high quality. Quintens et al. (2006, pp. 171) define global purchasing as “the activity of searching and obtaining goods, services and other resources on a possible worldwide scale, to comply with the needs of the company and with a view to continuing and enhancing the current competitive position of the company”.

In their research, Kotabe and Swan (1994) describe offshore sourcing as a phenomenon wherein US companies trade products and components between affiliated companies overseas and foreign companies that export components and products to their US parent firms.

Whatever term is used to indicate products, services, or components bought from countries all over the world, the goal is to obtain profits from commercial transactions, technological or organizational advantages, or process technology and quality (Trent and Monczka (2003a)).

The main difference between the terminologies used is the strategic view. International purchasing is used in an opportunistic way without a strategic view (Gelderman et al. (2016)). Global sourcing is recognized as an activity with integrated and coordinated purchasing strategies (Gelderman and Semeijn (2006)). The most frequently used definition of global sourcing is that given by Monczka and Trent (1991) as they describe global sourcing as a proactive process involving integration and coordination of often used items, materials, processes, designs, technologies, and suppliers across worldwide purchasing, engineering, and operation locations.

The present study focuses on global sourcing as an integration and coordination of purchasing strategies (Gelderman et al. (2016)) and as a part of the corporate strategy.
2.2 Why global sourcing?

Kotabe and Murray (2004) describe that many organizations consider not only price, but also quality, technology, and reliability for their global sourcing decisions. They also mention the availability of limited sources (Cho and Kang (2001)) as a possible advantage of global sourcing. This chapter will review the possible advantages of global sourcing. Table 2.1 shows a summary of this chapter.

2.2.1 Costs advantages

Cost or pricing advantages are one of the most common advantages of global sourcing (Arnold (1989). This argument for global sourcing could be outdated because this study is more than 25 years old. However, more recent studies have also mentioned the costs saving aspect as a reason for companies to commit to global sourcing (Alguire et al. (1994), Quintens et al. (2006), Steinle and Schiele (2008) and Kotabe and Mudambi (2009)).

2.2.2 Quality advantages

Whether an organization decides to source abroad used to be a matter of price (Kotabe (1998)). Pricing and cost saving issues were outpaced by quality concerns in the 1990s (Kotabe and Murray (2004)). Producing abroad or sourcing products from foreign suppliers can ensure access to higher quality products (Alguire (1994)). Quintens et al. (2006) define product quality as one of the main drivers for global sourcing. In the specific case of US products in the high-tech industry, quality is the most frequently cited reason to source from Asia (Handfield (1994)).

2.2.3 Access to (new) markets

Bozarth et al. (1998) mention in their research that companies might consider a partnership with foreign producers of high-tech manufacturers in Asia or source from these companies to gain access to new markets. This benefit may occur via other better production methods or other technologies used in production. It is much easier for an organization to establish itself in a market abroad when it has entered that market as a purchasing organization (Kotabe and Mudambi (2009), Bozarth et al. (1998), and Nassimbeni and Sartor (2006)).

2.2.4 Availability of limited resources

Cho and Kang (2001) mention that availability of sources is a critical factor for global sourcing. Nassimbeni (2006) and Monczka and Giunipero (1994) also mention the possibility of access to specific limited resources as a factor for global sourcing. Furthermore, although the factor of availability was mentioned more than twenty years ago by Monczka and Giunipero, this suggests that the rationale for global sourcing has changed very little in the past decades (Holweg et al. (2011)).
2.2.5 Other advantages

Modern communication technologies have made it almost impossible for organizations to introduce new products in their home markets. As a result, they simultaneously introduce products in domestic as well as international markets (Bozarth et al. (1998)). This requires the sourcing of components in local markets (Bozarth et al. (1998)).

To encourage international organizations to enter foreign markets, governments can set requirements for these organizations to use local materials (Bozarth (1998)). Sometimes countertrade is demanded by governments for doing business; even when countertrade is not required, organizations often build up relationships with suppliers in specific countries in order to support sales in the countries they source from (Alguire et al. (1994)).

Nassimbeni (2006) and Kotabe and Murray (2004) also give tax advantages as an indirect advantage of global sourcing. Finally, Nassimbeni (2006) gives the presence of plants in foreign countries and the global attitude of the company as an advantage of global sourcing.

Table 2.1
Direct and indirect benefits of Global Sourcing

<table>
<thead>
<tr>
<th>Direct Benefits</th>
<th>Research by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs advantage</td>
<td>Alguire (1994)</td>
</tr>
<tr>
<td></td>
<td>Arnold (1998)</td>
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<tr>
<td></td>
<td>Quintens et al. (2006)</td>
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<tr>
<td></td>
<td>Steinle and Schiele (2008)</td>
</tr>
<tr>
<td></td>
<td>Kotabe and Mudambi (2009)</td>
</tr>
<tr>
<td>Quality advantage</td>
<td>Alguire (1994)</td>
</tr>
<tr>
<td></td>
<td>Handfield (1994)</td>
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<td></td>
<td>Kotabe (1998)</td>
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<td></td>
<td>Kotabe and Murray (2004)</td>
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<td></td>
<td>Quintens et al. (2006)</td>
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<tr>
<td>Access to (new) markets</td>
<td>Bozarth et al. (1998)</td>
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<tr>
<td></td>
<td>Nassimbeni and Sartor (2006)</td>
</tr>
<tr>
<td></td>
<td>Kotabe and Mudambi (2009)</td>
</tr>
<tr>
<td>Availability of limited resources</td>
<td>Monczka and Giunipero (1994)</td>
</tr>
<tr>
<td></td>
<td>Cho and Kang (2001)</td>
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<tr>
<td></td>
<td>Nassimbeni and Sartor (2006)</td>
</tr>
<tr>
<td></td>
<td>Holweg et al. (2011)</td>
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<tr>
<td>Indirect Benefits</td>
<td>Bozarth et al. (1998)</td>
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<tr>
<td></td>
<td>Alguire et al. (1994)</td>
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<td>Kotabe and Murray (2004)</td>
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<td></td>
<td>Nassimbeni (2006)</td>
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<td>Nassimbeni (2006)</td>
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<td></td>
<td>Nassimbeni (2006)</td>
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</table>
2.3 Disadvantages of global sourcing

Of course global sourcing also has its disadvantages. This section will provide a closer examination of the disadvantages or problems that may occur when organizations participate or would like to participate in global sourcing. This section culminates in Chapter 2.2, which provides a summary of the findings.

In Section 2.2 the possible advantages of global sourcing have been described. However, these advantages described cannot be guaranteed for organizations practicing global sourcing (Christopher et al. (2011)).

2.3.1 Costs of global sourcing

Research has focused on the risk and costs of global sourcing (Holweg et al. (2011)); and Steinle and Schiele (2008) have also questioned whether the costs advantages could be absorbed by the additional costs of global sourcing. Holweg et al. (2011) classify the costs of global sourcing into three categories: static, dynamic, and hidden costs.

Static costs are the most obvious costs and are the costs Ex Works (EXW). Static costs include unit costs, transportation costs, additional customs clearance, handling, and insurance costs.

Dynamic costs are the additional costs that arise when sourcing globally, while additional costs are the costs occur because of fluctuations in demand. However these costs also occur when not sourcing globally; the dynamic costs are higher because the stock levels are higher when sourcing globally. This is because of increasing lead times in global sourcing. Furthermore, the costs of stock-out, loss of sales, and the costs of obsolete inventory caused by longer transportation time and lead times are dynamic costs.

Hidden costs are the costs that cannot be described by the supply chain actions: they are the costs that occur in the greater business environment, such as exchange rate fluctuations, changing energy costs, and costs occurring due to changes in the political or regulatory framework. Changes in transportation costs due to changing oil prices are also hidden costs.

While Holweg et al. (2011) divide costs into three categories, Fagan (1991) divides the costs of global sourcing into direct and indirect costs. Direct costs are more or less all static costs, while indirect costs are dynamic and hidden costs.

Fagan (1991) mentions the costs of rework as an indirect cost. The costs of rework can have a potentially high impact because rework costs are the costs of making a product suitable for the foreign market. Sometimes the domestic market has different requirements for a product than the market where the products are sold (e.g. different tolerances in measurement and differences in safety regulations).
2.3.2 Risks of Global Sourcing

Global sourcing requires a solid coordination of marketing, Research and Development (R&D), and production activities for organizations that have these departments geographically separated (Kotabe and Murray (2004)). Organizations could face difficulties with the integration of their departments and their suppliers due to various cultural, legal, and political differences.

They warn against neglecting manufacturing in the value chain by separating manufacturing activities. Involvement in manufacturing can easily result in innovation over a certain period of time and neglecting it could very well imply high rebuilding costs. Continuous monitoring and steering of manufacturing is therefore necessary in a global sourcing strategy while also accounting for marketing (Kotabe and Murray (2004)).

Christopher (2011) has categorized the risks of global sourcing. He divides the risk into four categories: supply risk (e.g. supply disruptions or unreliable suppliers), process and control risk (e.g. fluctuations in interest rates, quota restrictions, or carbon footprint changes), environmental and sustainability risk (e.g. inefficient supply teams in organizations), and demand risk (e.g. variations in demand or uncertainties in the demand market).

Gunasekaran et al. (2015) note that there is an endless list of potential risks associated with global sourcing, which are mostly manageable from an operational perspective. Such risks could consist of quality issues, delivery delays, and stock increases. However, risks from a higher level may also be present; these are more difficult to assess, implying uncertainty (e.g. natural disaster, terrorist attack, or labor unrest) (Gunasekaran et al. (2015)).

Golini and Kalchschmidt (2010 and 2015) note that sourcing from less developed foreign countries may cause challenges because of infrastructural deficiencies (e.g. telecommunications, inadequate worker skills, and supplier availability).

The previous mentioned risks of global sourcing on a long term can cause a step back in the global sourcing process (backshoring or reshoring), as backshoring and reshoring are not only meant to occur in production or service outsourced to international organizations (Stanczyk et al. (2016)).

Table 2.2 gives an overview of the categorization of costs of global sourcing by Holweg et al. (2011) and the categorization of the outcome of its risks into costs.
### Table 2.2
Risks of global sourcing valued as costs

<table>
<thead>
<tr>
<th>Research by</th>
<th>Risk of global sourcing</th>
<th>Costs categorization (Holweg et al. (2011))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kotabe and Murray (2004)</td>
<td>• Neglecting manufacturing</td>
<td>• Dynamic costs</td>
</tr>
<tr>
<td>Christopher (2011)</td>
<td>• Supply risk</td>
<td>• Dynamic costs</td>
</tr>
<tr>
<td></td>
<td>• Process and control risk</td>
<td>• Hidden costs</td>
</tr>
<tr>
<td></td>
<td>• Environmental and sustainability risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Demand risk</td>
<td></td>
</tr>
<tr>
<td>Gunasekaran et al. (2015)</td>
<td>• Risk manageable from an operational perspective (e.g. quality, delivery, and stock)</td>
<td>• Dynamic costs</td>
</tr>
<tr>
<td></td>
<td>• Uncertainty</td>
<td></td>
</tr>
<tr>
<td>Golini and Kalchschmidt (2010 and 2015)</td>
<td>• Infrastructural deficiencies</td>
<td>• Hidden costs</td>
</tr>
</tbody>
</table>
2.4 Global Sourcing and governance

Transaction costs economics (TCE) is an established method of analyzing economic organizations and their performance (Schneider et al. (2013)). The TCE theory is based on a study on firm and market (Williamson (2010)) organization by Coase (1937), who notes that a firms’ employees act on two functions: initiative and management. Initiative means forecasting on price mechanisms by creating new contracts, and management reacts to these price changes. Williamson (1975) advanced this theory and other researchers later adopted and critiqued it (Schneider et Al. (2013)). An organizations’ daily operational content, viewed from a governance perspective, would entail looking at its operations through the lens of contracts. This differs from the neoclassical view of looking through the lens of choice (Williamson (2010)).

Transaction costs economics in global sourcing can be considered critical because the assumption that transaction costs are a significant fraction of the total costs in sourcing or any other word chosen for a transaction where a particular product is transferred between two organizations (Schneider et al. (2013)).

Within the scope of TCE, the choice between contracts and governance mechanism can be used to complete a set of transactions (Garfami (2012)) (e.g. Williamson (1989), Schneider et al. (2013)). Garfami (2012) describe that the kind of governance used is determined by the following three transaction dimensions: frequency, asset specificity, and environmental and behavioral ambiguity or uncertainty.

Transaction frequency refers to the rate of reoccurrence of a transaction (Garfami (2012)). Frequency is relevant in two aspects: reputation aspects and setup costs. These vary with the participants (Williamson (2008)).

Asset specificity is when assets used in a specific situation (uses and users) can also be redeployed in other transactions (Williamson (2008)). Garfami (2012) divides asset specificity into three ways of appearance: site specificity (also known as resource immobility), physical asset specificity (also known as technology advantages), and human asset specificity (also known as know-how advantages). Uncertainty is the source of disturbance to which adaptation is needed (Williamson (2008)). Uncertainty can be both environmental as well as behavioral (Garfami (2012)).

For transactions (modes) or product markets to perform efficiently, three different structures occur: market, hybrid, and hierarchy (Garfami (2012)). The hybrid mode is the compromised mode between market and hierarchy (e.g. Williamson (2008)), Garfami (2012), Williamson (2010)); market refers to the short-term while hierarchy is especially for the long-term and features high incentives. Especially for market modes, there are few administrative rules and a legal contract law regime (Williamson (2008)).
2.5 The five-stage model

The work of Trent and Monczka (1991) initially resulted in a four-stage model consisting of:

1. Domestic sourcing only
2. Foreign buying based upon need
3. Foreign buying as a part of a procurement strategy
4. Integration of a global procurement strategy

Later this model was revised into a five-stage model in which the fourth stage was split into two stages. This five-stage model developed by Trent and Monczka (2003a, 2003b, 2005) (Fig. 2.1) is well known and often supported in academic research on global sourcing. The model describes an organization’s achieved level of implementation of global sourcing in five purchasing stages. Hultman (2012), Bozarth et al. (1998) and others have supported the five-stage model. Although other models have been designed and developed (e.g. Reichel (1988), Fagan (1991) and Nassimbeni (2006)), these models are similar to the five-stage model designed by Trent and Monczka (Quintens et al. (2006)). However, the five-stage model has had a great deal of recognition in academic studies, the five-stage model has also had some critics. Stages models of global purchasing represent the stages models of internationalization that were very popular in international academic studies in the 1980s (Quintens (2006)). Moreover, other studies (e.g. Andersen (1993)) report a lack of external validity and that objections to models that emerged more than 10 years ago may arise.

2.5.1 Level 1 Purchasing

The first level of the five-stage model classifies companies that are not involved in worldwide purchasing activities. This is either because they do not need to because domestic sources fulfill their purchasing needs or because they do not have the expertise to commit to global purchasing.

Not purchasing globally does not mean companies do not use foreign products. Many companies use foreign product but choose to buy these products from domestic suppliers. These suppliers source the products from abroad or purchase the products from distributors that are committed to global purchasing. (Trent and Monczka (2002)).

2.5.2 Level 2 Purchasing

Companies that move towards basic international purchasing are described in the second level of the five-stage model. Usually these companies progress toward basic international purchasing because they are confronted with a requirement which domestic suppliers are not suitable for or because competitors are gaining an advantage due to global sourcing (Trent and Monczka (2002)). These companies only purchase on a global scale when needed (Gelderman et al. (2016)).

Companies from the first level may also find themselves driven to the second stage by triggering events in the supply market, such as supply disruption, rapidly changing currency exchange, inflation within the domestic market, a declining domestic supply base, or worldwide competition (Trent and Monczka (2002)).
2.5.3 Level 3 Purchasing

Level 3 companies are companies that have added international purchasing strategies to their sourcing strategies (Gelderma et al. (2016)). By recognizing that the supply market is global and executing a proper international purchasing strategy, companies can obtain major performance improvements. Companies in the third stage are characterized by having a poorly developed sourcing strategy and the sourcing strategy is also poorly integrated throughout the company. Level 3 companies are those that are in the first maturing process of global purchasing, which enables them to evolve to true global sourcing (Trent and Monczka (2002)).

2.5.4 Level 4 Purchasing

Level 4 organizations are distinguished by the integrated and coordinated requirements of materials, services, and other needs. This integration is done through central coordination across worldwide divisions or business units. Worldwide information systems are required, as are advanced skilled and educated people, worldwide coordination and communication mechanisms, an organizational structure that features the central coordination of global activities, and executive leadership that endorses globally integrated sourcing. Thus global sourcing strategies are integrated across worldwide locations. Organizations in the fourth stage of this model resemble a matrix approach, where buying personnel report directly to their buying centers. They also have a dotted line reporting line to a central coordinating group (Trent and Monczka (2002)).

2.5.5 Level 5 Purchasing

The highest level of the model is achieved by entering the fifth stage. The organizations operating on this level of purchasing have achieved cross-locational purchasing integration of the fourth stage, combined with integration across the functional groups. The difference with organizations operating in the fourth stage is that those operating in the fifth stage have integrated and coordinated various processes and designs across worldwide purchasing centers and other functional groups. Furthermore, level five organizations have their sourcing strategies linked horizontally with the strategy of other functional groups. Organizations that operate on the fifth level of the model are not very common; they are limited to those that have worldwide design, development, production, and global procurement capabilities (Trent and Monczka (2002)).

![Figure 2.1 The five-stage purchasing model. (Source: Trent and Monczka (2002)).]
2.6 Critical incidents

Although very little is known regarding the role of critical incidents in global sourcing, there is still a consensus that critical incidents and their effects can be of importance in decisions regarding global sourcing.

Critical incidents play a role in explaining how people manage their supplier relationships and in influencing perception and behavior (Bakker and Kamann (2007)). Critical incidents that may damage the supply change organization include the sudden bankruptcy of a supplier, natural disaster, and the failure of a partnership, among other (Gelderman et al. (2016) and Bakker and Kamann (2007)).

One of the most cited reasons why people manage their supply chain in a certain way are critical incidents (Bakker and Kamann (2007)).

Bakker and Kamann (2007) distinguish between the following kinds of critical incidents: positive critical incidents (exceeding expectations) or negative critical incidents (disappointment); sudden calamities or a series of minor (almost unnoticeable) disruptions that add up until a certain threshold is passed; and incidents that disturb fulfilling the buying need or those that disturb someone’s involvement in purchasing decisions.

Bakker and Kamann (2007) are convinced that the way critical incidents are responded to affects the supply chain relationship of the organization. This applies to positive and negative critical incidents alike.

2.7 Critical incidents and strategy

Most commonly, an organizations’ sourcing strategy is embedded in its general business strategy on internationalization (Gelderman et al. (2016)). Although the sourcing strategy and general business strategy of an organization are linked, the deployment of a sourcing strategy is still at a deployment level (Bozarth et al. (1998)).

Regarding an organization’s functions, e.g. engineering, production, or sourcing, and their most optimal strategic scope, the organization’s strategy is the basis for developing functional strategies. Purchasing employees may set a functional sourcing strategy that may be operationalized along other guidelines and gives overall sourcing policies and capabilities as guidance for the organization’s sourcing activities (Hesping and Schiele (2015)). Both historically defined business practices and current corporate strategies and the organizational structure may influence the global sourcing strategy (Quintens et al. (2006)).

Bakker and Kamann (2007) state that critical incidents can effect and become a part of the organizational belief system. However, economic actions can be the trigger for contracting a supplier or stopping a contract with a supplier; behavior and other actions can also influence this (Bakker and Kamann (2007)). Critical incidents do have an impact (Gelderman et al. (2016)).

The present study investigates the influence of critical incidents on the sourcing strategy.
3. Research method

3.1 The case company

Eisenhardt (1989, pp. 534) describes a case study as “a research strategy which focuses on understanding the dynamics present within single settings”. A case study is particularly appropriate when a study has serendipitous findings or when little is known about a subject and there is little empirical substantiation (Eisenhardt (1989)). Given that little is known of the impact of critical incidents and their influence on global purchasing by organizations operating in the upper stages of the five-stage model, a single embedded case study has been chosen for this study.

The case study company should have passed the international purchasing steps and should have entered the upper stages of the five-stage model and therefore should meet the differences between international purchasing and global sourcing given by Trent and Monczka (2003) because this study regards the impact of critical incidents on global sourcing.

Hence the case company practicing global sourcing should meet the following requirements:

1. Global sourcing is executed by larger companies and are more likely to have competitors in certain regions or even globally.
2. The organizations have a more mature global sourcing process compared to other companies.
3. Organizations are pursuing global sourcing.

Thermo King, part of Ingersoll Rand, is a globally operating company with a sourcing organization organized in a regional structure. The regions are North and South America, EMEA (Europe, Middle East and Africa), CIS (Commonwealth of Independent States, which includes Russia, Ukraine, the Baltic States, etc.), and Asia. The Thermo King organization pursues global sourcing to profit from advantages gained from different global suppliers, whether they are pricing, knowledge, quality, or availability.

The organization is considered to be mature in global sourcing because its strategies are aligned in a global strategy. The global strategy is spread out over all regions. Therefore Thermo King is an organization suitable for this study.

This case study focuses on three product ranges in the direct spend (spend directly related to a product). The ratio direct and indirect spend (spend not directly related to a product) is approximately 95:5. Table 3.1 shows the total direct spend of Thermo King for all production locations and warehouses.
Table 3.1
Direct spend Thermo King per location in millions of dollars (2014 – 2016)

As mentioned above, Thermo King has several production and warehousing locations. Not all locations produce the same units, and production facilities are divided in regions. To give a clear view on the facilities purpose, Table 3.2 shows which facility produces for which region. The types of units are also displayed.

Table 3.2
Locations Thermo King and their purpose and unit production per region

<table>
<thead>
<tr>
<th>Location</th>
<th>Ability</th>
<th>Production of</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kolin (CZR)</td>
<td></td>
<td>Bus and rail units</td>
<td>Global</td>
</tr>
<tr>
<td>Hastings (USA)</td>
<td></td>
<td>Truck and bus units</td>
<td>North America</td>
</tr>
<tr>
<td>Galway (IRL)</td>
<td></td>
<td>Truck and trailer units</td>
<td>EMEA</td>
</tr>
<tr>
<td>Essen (GER)</td>
<td></td>
<td>Truck and trailer units</td>
<td>Europe</td>
</tr>
<tr>
<td>Barcelona (ESP)</td>
<td></td>
<td>Vehicle-powered units</td>
<td>EMEA</td>
</tr>
<tr>
<td>Arecibo (PRI)</td>
<td></td>
<td>Trailer units</td>
<td>North America</td>
</tr>
<tr>
<td><strong>Warehousing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minneapolis (USA)</td>
<td>None</td>
<td></td>
<td>North America</td>
</tr>
<tr>
<td>Shannon (IRL)</td>
<td>None</td>
<td></td>
<td>EMEA</td>
</tr>
</tbody>
</table>


3.2 Research method

3.2.1 The critical incidents technique

The critical incidents technique (CIT) has been developed for studies on work behaviors (Gelderman et al. (2016)). CIT is often used to investigate significant occurrences (e.g. events, incidents, issues, or processes) that are identified by respondents. The CIT also includes the way these occurrences are managed and their perceived effects (Gelderman et al. (2016)).

Flanagan (1954) is the researcher that first used and advanced the CIT (Bott and Tourish (2016)). The CIT is a technique or procedure that identifies outcomes, whether positive or negative, by the observation of actions (Flanagan (1954), Bitner et al. (1994), Gremler (2004)). In later stages of research, the CIT method moved towards an interviewing method as well (Gelderman et al. (2016)). Ronan and Latham (1974) describe CIT as a systematic interview procedure used for recording behavior that has been observed and leads to success or failure of a specific procedure.

Although the CIT was originally designed as a quantitative method (Bott and Tourish (2016), Gremler (2004)), it can be used in qualitative research as well (Gremler (2004)).

Because the present study focuses on the impact of critical incidents on global sourcing and not the critical incident itself, it attempts to look beyond the critical incident. The effect that the critical incident has on the decision-making process and the strategy of global sourcing in the upper levels of the five-stage model is studied.

The CIT has its roots in the aviation industry. The United States Army Air Forces used CIT in studies in its Aviation Psychology Program. After World War II, CIT was used in psychology research on describing and understanding human (Gelderman et al. (2016)).

Although CIT is not often used in research on sourcing or supply management, Bakker and Kamann (2007) and Gelderman et al. (2016) have used CIT in these disciplines. Gelderman et al. (2016) used CIT in Global Sourcing and looked beyond CIT in order to study the impact of critical incidents on developing and implementing global sourcing strategies.

This study, like the study of Gelderman et al. (2016), aims to acquire insight into the effect of critical incidents on the global sourcing activities of an organization. Where Gelderman et al. (2016) focused on level II and III companies, this study will focus on a level IV or V company in the five-stage purchasing model.
3.2.2 Critical incidents

The main goal is to study events, incidents, and processes that took place at a certain time and changed a sourcing decision. Why these decisions have been taken, what was the main goal, and what was the outcome are questions to be asked.

This study defines an incident as critical when:

1. The incident has a substantial impact on the organization
2. No action has been taken before the incident occurred.

Ad 1. Critical incidents with such an impact that the organization, or a part of the organization, has to take action.
Example: A local supplier goes bankrupt and the only new supplier is a foreign supplier. Action is taken to move from stage one to stage two in the five-stage model.

Ad 2. Critical incidents that can be foreseen, but the action to prevent the critical incident has not been taken. Because no action has been taken, the critical incident takes place and has an impact on the organization or a part of the organization.
Example: A new supplier in a foreign country can supply a product needed. The foreign government requires having local customers as well in order to export this product.
When the sourcing department is not informed, this is a critical incident.

3.3 Data collection

For this case study, semi-structured interviews were conducted. The interviews were held with the Vice President of Procurement, Senior Commodity Managers from different product ranges and their team members if they had any impact on the decision-making process of global sourcing.
The product ranges are all direct spend ranges. This means that the spending on these products refers to products that are directly used in manufacturing a new product.

For this study interviews are held with the Vice President of Procurement, (Senior) Commodity Managers from different product ranges, and the Procurement Operations Manager in EMEA. Moreover, three product ranges are examined and within these product ranges, three people are interviewed to prevent bias. The people interviewed are given in Table 3.3.
The interviews are semi-structured, meaning that an interview scheme is made with open questions. These questions are general and may be deviated from to gain more information from the interviewees. This is done depending on the answers given.
Before the interview starts, the interviewees receive a letter describing what to expect. The stages of global sourcing are also explained so that the interviewees have some knowledge of the five-stage model. The letter can be found in Appendix 2.
Table 3.3
Interviewed persons and their function and the product range they are interviewed on

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
<th>Product Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Engines</td>
</tr>
<tr>
<td>Mr. M. Schiphorst</td>
<td>VP Procurement EMEA</td>
<td>X</td>
</tr>
<tr>
<td>Mr. S. Micciche</td>
<td>Sr. Commodity Manager</td>
<td></td>
</tr>
<tr>
<td>Mr. C. Gurioli</td>
<td>Commodity Manager EMEA</td>
<td></td>
</tr>
<tr>
<td>Mr. J. Hofenk</td>
<td>Procurement operations Manager EMEA</td>
<td>X</td>
</tr>
<tr>
<td>Mr. N. O’Sullivan</td>
<td>Sr. Procurement Program Manager</td>
<td>X</td>
</tr>
<tr>
<td>Mr. R. Danciu</td>
<td>Commodity Manager</td>
<td></td>
</tr>
</tbody>
</table>

3.4 Operationalization

The basis for this case study is the five-stage purchasing model. The first part of the operationalization is to determine the level of purchasing per product range, considering the differences between the stages (indicators). Therefore the type of supplier was determined for every product range in every interview after the purpose of the interview was explained. This was evaluated also with the interviewee.

The second part was to determine the sourcing strategy. This was also validated with the interviewee and, if possible, proven in writing.

The third part was to determine whether critical incidents had appeared and how they influenced the strategy. What happened, what was the reaction of the company, and did it change the strategy are questions that are asked.

The last part of the interview was to check whether the organization was able to reach a higher level in the five-stage model. However, although this does not fall within the scope of this study, it can give information on whether the organization is working with this model and has ambitions of reaching a different purchasing level or not.
4. Results

4.1 Sourcing levels

The product ranges studied for this research all operate on level four or five of the five-stage purchasing model designed. Below the results per product range are described and summarized in Table 4.1.

Sourcing is a large part of the Thermo King business. All components of the manufactured units are sourced in a certain way whether via partnerships or based upon need. For the product ranges investigated it was concluded that the sourcing department is very mature.

Table 4.1: Summary sourcing stages per product range.

<table>
<thead>
<tr>
<th>Product range</th>
<th>Global sourcing strategy</th>
<th>Number of suppliers</th>
<th>Type of supplier</th>
<th>Integration across worldwide</th>
<th>Global sourcing level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Locations</td>
<td>Function groups</td>
</tr>
<tr>
<td>Engines</td>
<td>Part of strategy</td>
<td>1</td>
<td>Global</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Metals</td>
<td>Part of strategy, region for region</td>
<td>11+</td>
<td>Global</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Skins</td>
<td>Part of strategy, region for region</td>
<td>11+</td>
<td>Global</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

The global sourcing strategy for most product ranges of Thermo King is region for region, based on the lowest total costs of ownership (TCO). Although this strategy is not printed in a corporate standard, the Senior Management of Thermo King has expressed this strategy and it is shown in presentations to managers and employees in lower levels through the entire company.

All parts that are sourced are private labels. The parts are packed and labeled regarding Thermo King standards and regulations and within the Thermo King corporate identity. As mentioned in Table 3.2, Thermo King has locations for production and warehousing worldwide. Figure 4.1 shows these locations on a world map. The Galway (IRL) and Shannon (IRL) locations are shown as one location.
Figure 4.1
Thermo King production plants for truck, trailer, and vehicle-powered units
4.1.1 Engines

The engines product range consists of a range of diesel-driven engines used in truck and trailer units. In 2017 the spend on engines was US$164.4 million. The spend was divided over two suppliers: Supplier B was only for the US, while Supplier A supplied engines for all factories. Figure 4.2 shows the spend and how it was divided.

The sourcing department for engines is located in the US. This department works closely together with product management, engineering, and sourcing departments located at the plants to deliver the right product to the right plant on time. The factories using engines are located in Hastings (Nebraska, US), Galway (Ireland), and Arecibo (Puerto Rico). All engines are produced in Japan by one supplier.

Kotabe and Aulakh (1996) describe sourcing partnership as a situation in which two or more organizations contribute their superior technology with the know-how to use this technology to make it possible what otherwise would not be. Despite the sourcing partnership Thermo King has with its engine supplier and the fact that it is not very easy to change supplier as all units are designed for this type of engine, it is not impossible to change. The impact, however, is considered to be enormous.

Figure 4.2
Spend on engines and how it has been divided in 2016 (x US$1 million)
4.1.2 Metals

The metal product range consists of all metals used for frames and brackets. The process of sourcing metals is divided into two. The first part is the negotiation of prices for raw materials. This is done by the Commodity Manager for raw materials who is based in the US. In each period the price of raw steel is negotiated by the Commodity Manager for raw materials. The material is not purchased, but prices are locked in for a certain quantity. The manufacturers can use the negotiated prices for the production of the required materials. The sourcing of the manufactured products is done by the Commodity Manager for metal fabrication. Because of the known prices for raw materials, the Commodity Manager for metal fabrications negotiates manufacturing costs, sales volumes, and quality. The metals product range is sourced at the lowest total cost of ownership (TCO). When sourcing with the TCO method, the organization attempts to qualify all costs of the sourcing process (Degraeve and Roodhooft (1997)). Costs included in the TCO method are those related to the sourcing activities, such as costs for ordering, logistics, and quality control, as well as costs related to quality issues (Wouters et al. (2005)). Thermo King also includes exchange rate fluctuations in the TCO if possible. The spend on metals for 2016 was US$87.8 million. Figure 4.3 shows the spend on engines and the division over the top 11 suppliers.

Figure 4.3
Spend on metals and how it is divided in 2016 (x US$ 1 million)
4.1.3 Skins

The skins product range consists of plastic parts covering the unit or parts of the unit, both inside and outside of the unit. The panels on the outside of the unit are white; all other plastic parts are called black parts because they are inside the unit. Plastic parts are sourced as complete parts without locking prices of the plastic granulates. This is mainly because the different parts require different production processes and granulates. Some parts are molded while others are extruded or injection-molded. Because of the shape and dimension of many skins, a large part of the TCO consists of transport costs.

To lower costs, Thermo King invests in molds for the production of the plastic skins. Together with engineering and the manufacturer of the skins, molds are developed to keep this part of the sourcing price under control.

The total spend on skins was US$43 million in 2016. Thermo King has many suppliers in this product range. The extraction of data out of the Enterprise Resource Planning (ERP) system (data dump) shows 79 suppliers; however, this number also shows suppliers of products related to this product range. For skins, the top 11 suppliers deliver almost 90% of the products. The present study focuses on the top 11 suppliers. The division is shown in Figure 4.4.

**Figure 4.4**
Spend on Skins and how it is divided in 2016 (x US$ 1 million)
4.2 Critical incidents

All interviewees reported critical incidents in the engines, metals, and skins product ranges that had an impact on global sourcing. Critical Incidents that had no impact on a change of stage in the global sourcing model were also reported in all product ranges. In the engines product range, one critical incident was reported that had an impact on global sourcing; and a few incidents were reported that had no impact. Although these incidents had no impact on the strategy, they easily could have because they had an effect on production volume. In the sections below, the critical incidents and the outcomes of the interviews are described by product range.

4.2.1 Engines

As mentioned in Section 4.1.1. Thermo King has a sourcing partnership with its current engine supplier. This sole supplier delivers engines for all production plants all over the world. Another supplier delivered engines in the US. Thermo King did not deliver these engines in Europe. One critical incident was reported with this supplier. The current supplier delivers for decades and no critical Incidents that had an impact on the sourcing level have occurred according to the interviewees. Although some critical incidents occurred, but these had no impact on the sourcing levels. The interviewees responded that if these critical Incidents occurred in other product ranges, they could have had an impact in the strategy or supply base.

4.2.1.1 Engine dimensions

In the US, engines were also used for some unit types delivered by another supplier. At one moment Thermo King wanted to use these engines for European units as well. Because of different regulations in the US and Europe for tractor combinations (US regulations give a maximum length for the trailer, while Europe has length regulations on the total combination length), the distance between US tractor and trailer is larger than the distance between tractor and trailer in Europe. As a result of this, US units (figure 4.5) are deeper than European units (figure 4.6).

Figure 4.5
US trailer unit 219 x 207 x 61 cm

Figure 4.6
European trailer unit 229 x 2076 x 430 cm

1" ≈ 2.54 cm
The project ended with no result. Actions were taken for preventing future miscommunications and engineering was integrated within the engines sourcing activities. A center of excellence was also begun wherein sourcing, engineering, production, and service activities are integrated into one division. This moved the sourcing level from stage IV to stage V. The sourcing strategy was already global, but with the center of excellence the integration in different function groups has been established.

4.2.1.2 Environmental issues

At the moment, environmental issues can have an enormous influence on the relationship with the current supplier. Governments, as well local authorities are implementing rules and regulations to reduce CO₂ and other emissions. This is a critical incident that can be foreseen, but the impact is not measurable at this moment. All self-powered engines used by Thermo King are diesel-driven. Global warming is an important topic globally, and Thermo King is also aware of the impact they have on it. New types of engines are developed, including cleaner diesel, hydrogen cell, or electricity-driven engines. Thermo King and the supplier of the engines work with product development, engineering, environmental organizations, and logistics and food transportation organizations to prepare future actions on this topic. Global warming will impact the relationship, product, customers, and every other party involved. As mentioned before, changing suppliers where there is little possibility to change because the sourced product is developed according to the demands of the sourcing organization has an enormous impact because it takes approximately five to six years due to development and testing.

4.2.1.3 Shipping disruptions

A major strike took place in the transport company that shipped the engines from Japan to Puerto Rico. This had an impact on the production capacity of this factory and eventually caused a production stop for some unit types. The shipping company also suffered a vessel incident, causing a vessel to sink. This also had an enormous impact on production and led to a production stop. Although these two incidents caused a production stop and led to postponed deliveries, the incidents did not impact the sourcing strategy or lead to a change of supplier.

4.2.1.4 Geographical issue

The supplier of the engines used in the Thermo King units is located in Japan, near Okuma. In 2011 an earthquake near the Pacific coast of Japan struck and caused a tsunami that damaged large parts of the Japanese industry. The engine supplier was also struck, but production was still possible. Due to the tsunami, production of the engines slowed down, causing a delay in Thermo King’s own unit production. The production of engines declined because parts of the engine’s production line were damaged, but the tsunami caused production losses all over the Japanese region. Suppliers of the engine manufacturer were also struck by the tsunami. Overall the damage caused by the tsunami was noticeable for almost half a year. This is also a critical incident, but it had no impact on the buyer–supplier relationship or the strategy.
4.2.2 Metals

In the metals product range, only one Critical Incident was reported by the interviewees. The critical incidents all impacted or were impacted by the suppliers of the manufactured material rather than the raw material suppliers. This is because the raw material is not sourced, but the prices are locked so these can be used by the manufacturer of the material.

4.2.2.1 Currency fluctuations

In the past, metal parts like frames and brackets for the units were produced in the US because Thermo King is a US company. With the creation of production plants in Europe, the parts were transported to Europe as well. Due to currency changes, the metal parts had an extremely variable purchase price. This caused an unstable cost price. Fluctuating or unstable cost prices can cause fluctuating revenues, which is not desirable for organizations. Currency changes caused Thermo King to search for European suppliers of metals. This changed the strategy for all factories to a region for region strategy. Combined with the lowest TCO, this strategy searches for the lowest price of products, including purchase price, costs for transportation, handling, and ordering.

The Commodity Manager is still responsible for the global metals product range and has a team of sourcing specialists. Engineering and product development are also represented in this team.

4.2.3 Skins

Skins in this product range are all plastic skins used for covering and protecting the unit. The truck and vehicle-powered units only have plastic skins, while the trailer units have both plastic and metal skins. The metal skins used for trailer units are part of the metals product range. In the skins product range, several critical incidents were mentioned. Some of these had an impact on the global sourcing level and others did not. The critical incidents reported had influence on currency changes, import fees, change of strategy of suppliers, bankruptcy, and engineering issues. The critical incidents reported are described in the sections below.

4.2.3.1 Currency fluctuations

In the past years, the value of the US Dollar has changed a great deal. At times the dollar has been valued over 30% more than it is now. This changed the strategy for Thermo King because a part of the supply for polymer skins was produced in the US. For this reason, Thermo King decided to move from suppliers for European production facilities to European suppliers. This changed the sourcing strategy to a region for region strategy, where a specific region is responsible for its own regional sourcing. Suppliers were sought as close as possible to the production facility in Ireland; however, transport costs and handling. Were also taken in account (lowest TCO) before contracting a supplier. This led to suppliers in the United Kingdom, France, and Germany. The search for new suppliers was performed with help from engineering and product development in order to source the correct product with the required qualifications.
4.2.3.2 Import fees

Exporting units to Saudi Arabia is a part of Thermo King’s business. Import duties are paid to introduce units into this country. These fees are lower because a certain part of the imported unit has European origin. As a part of this, a part of the skins production was sourced in Europe instead of the US. Larger skin parts were produced in the US and are more expensive than smaller skin parts. The sourcing division of Thermo King developed a plan to source larger skin parts from Europe. After contacting several European suppliers, eventually two suppliers were contracted. From this stage on, the sourcing team developed to a team and integrated engineering for construction knowledge. This incident in fact lead to the EMEA team that operates today.

4.2.3.3 Change of strategy

Approximately three years ago a supplier changed its strategy and Thermo King went from a key account to a more regular account. With a price increase of more than 25% at stake, Thermo King designed an exit plan to leave this supplier. This exit plan included a phasing out period of almost a year. Changing molds ready to be used by another supplier were also part of this plan. A part of the sourced goods was placed to other suppliers. The supplier, however, made good efforts to keep Thermo King as a customer. Thermo King stayed at this supplier due to long negotiations, but with lower volumes. This incident made it unavoidable for Thermo King to spread risk and source products from multiple suppliers.

4.2.3.4 Bankruptcy

A few years ago a supplier of injection-molded skins went bankrupt. Although this was foreseen by the Thermo King sourcing organization through a financial rating and reporting system, this bankruptcy had a significant impact on the organization. This supplier was responsible for a very specific skin for European units. This specific part was produced by only one supplier. The special molds could not be used by other supplier. New molds were produced that could be used by various suppliers, making it less vulnerable for Thermo King. Production was also spread over more suppliers. This had an impact on the sourcing strategy because from that point on, the strategy across all global buying locations changed to a more spread (region for region) strategy. Before this incident, all buying locations sourced from suppliers as needed rather than considering the spread of risk. This critical incident helped moving from sourcing level III to sourcing level IV because it pointed out Thermo King’s vulnerability in depending on a supplier for a large part of its production. This critical incident also led to an investment plan in molds that can be used for different suppliers.

4.2.3.5 Brexit

The most recent critical incident for the skins product range is Brexit (the UK leaving the European Union). Although this has not had any consequences yet, a large supplier for the Irish factory is located in the UK. Although the consequences cannot be foreseen, Thermo King is seeking a backup plan if Brexit causes higher prices or import fees raises for Ireland. Various scenarios are possible when Brexit is final and negotiated with the European Union.
4.3 Strategy changes

Table 4.2 shows the impact of critical incidents in the global sourcing strategy for Thermo King. Currency changes are a critical incident that had a special impact on the sourcing strategy. Combined with the critical incident of a strategy change of a supplier, it not only changed the product ranges studied, but it also had an impact on the overall sourcing strategy.

This combination was a trigger for the senior management to consider more product ranges to change that strategy as well to a region for region strategy with the lowest TCO.

The way in which the critical incidents affected the sourcing strategy varies somewhat. While currency changes in two out of three product ranges had in impact on the sourcing strategy, the impact of currency changes took almost a year to be implemented. Thermo King has a solid and detailed process when it comes to doing business with suppliers. Suppliers are asked for quotes, visited, and checked on their financial figures before they are marked as a supplier. Within the range of supplier, Thermo King also rates suppliers, e.g. as a preferred supplier or a new supplier. Suppliers are rated on a yearly base on financial figures, production, delivery, and errors per x products, depending on the total quantity delivered. Moreover, for changing production in Europe due to import fees, this process was followed. When a bankruptcy occurs, it could be different when this incident is not foreseen. In this particular critical incident it was foreseen and the search for a new supplier was performed with all steps taken and no production loss. When a bankruptcy occurs and is not foreseen, the steps are also followed, but a production stop can occur.
<table>
<thead>
<tr>
<th>Product Range</th>
<th>Incident</th>
<th>Effect on Strategy</th>
<th>Outcome</th>
<th>Effect on sourcing level</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engines</td>
<td>• Strike of logistics company that caused production issues</td>
<td>N</td>
<td>• No action was taken</td>
<td>N</td>
<td>• none</td>
</tr>
<tr>
<td></td>
<td>• Engineering problems</td>
<td>N</td>
<td>• Engineering is involved in sourcing (worldwide function group)</td>
<td>Y</td>
<td>• Move from Level IV to level V</td>
</tr>
<tr>
<td></td>
<td>• Earthquake caused tsunami that disrupted production at supplier</td>
<td>N</td>
<td>• No action was taken</td>
<td>N</td>
<td>• none</td>
</tr>
<tr>
<td>Metals</td>
<td>• Currency fluctuations caused higher and unstable prices</td>
<td>Y</td>
<td>• Global strategy changed to region for region with lowest TCO</td>
<td>N</td>
<td>• Still level V</td>
</tr>
<tr>
<td>Skins</td>
<td>• Currency fluctuations caused higher and unstable prices</td>
<td>Y</td>
<td>• Global strategy changed to region for region with lowest TCO</td>
<td>N</td>
<td>• Still Level IV</td>
</tr>
<tr>
<td></td>
<td>• Import fees for Saudi Arabia caused higher prices</td>
<td>Y</td>
<td>• Large part of skins product range products moved to European production</td>
<td>Y</td>
<td>• Move from Level III to Level IV</td>
</tr>
<tr>
<td></td>
<td>• A supplier changed its strategy and caused price increase</td>
<td>N</td>
<td>• Spread of production over other suppliers</td>
<td>N</td>
<td>• Still Level IV</td>
</tr>
<tr>
<td></td>
<td>• Bankruptcy of a supplier caused a change of supply base and movement of sourced products over various suppliers</td>
<td>Y</td>
<td>• Spread of production over different suppliers</td>
<td>Y</td>
<td>• Move from Level III to Level IV</td>
</tr>
<tr>
<td></td>
<td>• The United Kingdom voted for Brexit</td>
<td>N</td>
<td>• Still not known</td>
<td>N</td>
<td>• Still Level IV</td>
</tr>
</tbody>
</table>
5. Conclusion, discussion and recommendations

5.1 Conclusion

The goal of this study is to investigate the influence of critical incidents on Global Sourcing and on the sourcing strategy measured in the change of level in the five-stage purchasing model.

The literature is not very clear on how to change levels in the five-stage model, nor is it clear on whether a sourcing strategy should emerge due to proactive or reactive actions (Monczka and Trent (1991)).

The literature also shows that global sourcing is practiced for various reasons, with profiting price advantages the main reason.

This single embedded case study shows that in some cases critical incidents can change the sourcing strategy and move an organization to another level of the five-stage model.

The subject of the study is a company operating in the upper stages of the five-stage purchasing model, one of whose main suppliers is in a sourcing partnership (Kotabe and Aulakh (1996)). In this partnership some large critical incidents occurred; however, these had no impact on the sourcing strategy. These critical incidents could likely have had an impact if they occurred in another product range.

The following conclusions can be drawn, based on the results of this study:

1. Critical incidents did have an impact on the sourcing strategy.
2. Critical incidents can influence the organization’s sourcing level in the five-stage model.
3. The effect of critical incidents on the sourcing strategy can be influenced by the level of partnership.

5.2 Discussion

The results of this study indicate that critical incidents do have an impact on an organization's level of operation in the five-stage purchasing model by Monczka and Trent (2003a, 2003b, 2005). While Monczka and Trent (1991, 2003a, 2003b, 2005) mention motives for global sourcing such as competitive advantage, also other direct motives are named such as costs advantage (e.g. Alguire (1984)), quality advantage (e.g. Kotabe (1998)), and access to new markets (e.g. Nassimbeni and Sartor (2006)). Critical incidents may be the main reason for organizations to participate in global sourcing for organizations in levels II or III in the five-stage model (Gelderman et Al. (2016)). This study emphasizes Gelderman et al. (2016) and shows that critical incidents have an impact on the purchasing level.

However, in the upper stages of the five-stage model, the influence of critical incidents seems to be lesser as only four of ten reported critical incidents had an impact on sourcing strategy.
This study shows that critical incidents are not required to participate in global sourcing, but critical incidents can be seen as a possible trigger for global sourcing. This is in line with the research of Gelderman et al. (2016) who also concluded that critical incidents can trigger an organization to act. The case company has as a main driver cost reduction as a main driver to participate in global sourcing. Sometimes the sourcing strategy is set up to participate in global sourcing, or global sourcing is required because the manufacturer of a product cannot easily be replaced for a regional supplier. This is especially relevant to the engines product range. The engines used are produced by one supplier with only one production facility. However, a few critical incidents occurred with production delays; this supplier cannot be replaced.

The fact that critical incidents can influence the global sourcing strategy is in line with Hultman et al. (2012), who also noted that critical incidents have an impact on the development of global sourcing.

In their research, Trent and Monczka (2002a) propose the five-stage model as a model for an entire organization. In this study, the critical incidents occurred per product range and the influence on global strategy or strategy per product range was mentioned. Hultman et al. (2012) also studied global sourcing levels per product range; their findings are congruent with the present study.

This study has been executed with an organization that is very mature in global sourcing. The three product ranges studied were in the 5th stage, or almost transferring from the 4th to the 5th stage. How the transformation from stage 1 to 2 and higher was made was not known to the interviewees. The movement from level 4 to 5 was partly because of critical Incidents that occurred.

Trent and Monzcka (2002) suggest that when moving from a certain level to a higher sourcing level, proactive sourcing is required. This study shows that a reactive approach can also help an organization move to a higher sourcing level.

The five-stage model is one that has been developed in its recent form in 2003. The accuracy of this model can be questioned as we see that the case company has set her first steps to reshoring. Global sourcing has developed throughout the years and reshoring in service, production and also sourcing has had its appearance. Within the case company we have noticed a change in suppliers to region for region, meaning that the suppliers were sought more and more in the production facility region. This change can be seen as a first step of reshoring. Although the case company meets all requirements of the fifth stage in the five-stage model on some product ranges, for the interviewees it is not certain this is the final and best possible way of (global) sourcing. However out of scope of this research, the case company puts a lot efforts in sourcing the best product, at lowest costs and best suitable for the units Thermo King produces. Therefore managers in the case company may choose different then global sourcing. This is in line with Stanszyk et al. (2017) who also concluded that sometimes managers may choose different than expected in global sourcing.

The critical incident technique is a technique with acceptance in service research (Gremler (2002)), but this technique is also used in global sourcing research (e.g. Oldenburger et al. (2008), Hultman et al. (2012) and Gelderman et al (2016)). Discussion on CIT is not on the technique itself, but more on the interpretation of the incident by the interviewee (Gremler (2002)). For this study we have asked for critical incidents that had an impact on the level of global sourcing or the global sourcing strategy. Some interviewees mentioned incidents that were more memorable for them (e.g. closing a good deal). These incidents were left out of this research.
5.3 Recommendations for further research

5.3.1 Recommendations for practitioners

This research shows the impact of critical incidents on the global sourcing strategy and the level of global sourcing. Although the impact of critical incidents is proven in this case study, other incidents could also have an impact on the sourcing strategy and should therefore not be ruled out. Critical incidents and their impact do not make global sourcing a proactive science or a reactive one; nor do other incidents. Dealing with critical incidents in the proper way can influence global sourcing and have an effect on the level of global sourcing. However, waiting for critical incidents to occur is not recommended because they do not always have an influence on the level of global sourcing. The level of global sourcing within the case company is at a high level. Developing to a higher level is not only due to critical incidents, but they do have a triggering role in it. The awareness of the sourcing organization that critical incidents can have an impact on the organization's sourcing strategy should not be underestimated. While a great deal of research shows that global sourcing is a proactive science, critical incidents with their reactive response can also positively influence global sourcing.

5.3.2 Limitations

This research has considered three product ranges of the case company. Although it has examined the largest product ranges, covering almost a third of the total direct spend, other product ranges were not included in this study. Moreover, the indirect spend was not included in this research. As indirect spend is commonly not strongly related to a manufactured product, the impact of critical incidents on indirect spend strategy could be different.

Due to changes in the sourcing organization and the fact that an organization operates for many decades in the higher levels of global sourcing, the changes from domestic sourcing to international sourcing and further to global sourcing have not been investigated because the reasons for these changes were not known by the people interviewed.

Monczka and Trent (2003a, 2003b and 2005) mention in their studies that the sourcing strategy should be a part of the organizations strategy. Because this is not always entirely true, it allows space for subjectivity. In the case company, the global sourcing strategy is part of the sourcing strategy; however, this is not in writing. Therefore, there is room for discussion regarding the level of global sourcing.

5.3.3 Future research

This research has been performed in a company with a very mature level global sourcing. Because global sourcing has been part of the organization for decades, the reasons for developing the global strategy and the capability to achieve the highest levels of the five-stage model are not all known. Future research in a company with a high level of global sourcing in the five-stage model that has reached this level more recently could give a more precise view of the changes the organization has been through.

The researched product ranges in this study are all direct spend categories. Future research on global sourcing on indirect spend could very well complement the outcome on this research and the impact of critical incidents on global sourcing.
In this study critical incidents occurred in a product range with a buyer–supplier relationship identified as a sourcing partnership (Kotabe and Aulakh (1996)). The incidents reported did not have any influence on the sourcing strategy. Some interviewees mentioned that if these incidents occurred in one of the other product ranges, it would somehow change the sourcing strategy. Further research on the effect of critical incidents in a sourcing partnership could give more insight on this topic.

It could be possible that the effect of critical incidents in the upper stages of the five-stage model is lesser than in the lower stages. A comparison could give more insight in the effect of critical incidents and the differences in effect at different levels of the five-stage model.

This research show that although the case company has reached the highest level of global sourcing. However this level is reached, management is still looking at better ways to source their products. It looks like the highest stage of global sourcing is not “the holy grail” in sourcing. The case company has taken the first steps in reshoring. Further research could be done on reshoring as the next level in global sourcing.
References


Hanna, V., Jackson, J., 2015. An examination of the strategic and operational impact of global sourcing on UK small firms, Production Planning & Control, 26:10, 786 - 798


Appendices
Appendix 1. Interview guide

General sourcing activities

During the first part of the interview, general questions are asked on sourcing in general. Questions that could be asked are the following:

1. What product range do you source?
2. What products are included?
3. Can you give an explanation of the sourcing activities?
4. Are all products sourced globally? Or locally? Or mixed?
5. How can global suppliers meet local specifications?

The main goal of this first part of the interview is to acquire more information on the activities that take place and how many global supplier they deal with, among other topics.

This first part of the interview is general and also explains the purpose of the rest of the interview.

Sourcing strategy

The second part of the interview is about the sourcing strategy. The information received in this part should aid in assigning the organization a specific level of global sourcing within the five-stage model.

For this purpose, knowledge of the sourcing strategy, the process of designing the sourcing strategy, and strategy for particular product groups is very important. Inquiries regarding the integration of worldwide sites are made as well.

Questions that could be asked are:

6. How is the sourcing organization organized?
7. Can you give an introduction to the global sourcing activities of Thermo King?
8. How is the sourcing organization organized?
9. Which locations do you source materials for?
10. Can you give an explanation on the sourcing strategy?
11. How is this strategy made?
12. Who decides whether a strategy is consistent with the company’s strategy? Why have you chosen this solution?
13. Can you give more information about the sourced materials?
14. What is the purchasing strategy these products?
15. Does the strategy of the materials coincide with the strategy of the underlying business?
Critical Incidents

The third part of the interview is regarding critical incidents and the effect they have on global sourcing.

This part of the interview is mainly on critical incidents that have occurred or could occur and how the organization reacts to this. Questions on possible means of prevention are asked.

16. What critical incidents have occurred in your global sourcing activities?
17. In which stage of the five-stage model were you operating at that time?
18. Why did these incidents occur?
19. How do you react on these incidents?
20. Does this influence you choice for a supplier?
21. What else does this influence?
22. Do you try to prevent critical incidents? Can you prevent critical incidents?
23. How do critical incidents influence global sourcing?
24. Is the organization capable of timely reaction in the wake of a critical incident?
25. Is there a back-up plan for cases when critical incidents occur?
26. What is the main driver for global sourcing?
27. Did some events influence the global sourcing strategy for MRO materials? If so, can you explain? If not, do you expect this to happen?
28. Why have you chosen for global sourcing for MRO?
29. Is the strategy influenced by critical incidents?
30. Do you discuss critical incidents that occurred with the team and/or manager?
31. If so, what do you discuss? Do you react to this and how?
32. Before you contract a supplier, do you simulate critical incidents and their risks?
What level of global sourcing has been achieved?

Along with the second part of the interview, the fourth part of the interview is about the level of global sourcing. The fourth part is more specific to the product range and examines the current level more specifically. In this part of the interview, questions are asked about how the market is entered, why this is done, and how expectations are met. Skills, lessons learned, and expectations for the future will be asked about as well.

A link between critical incidents and the sourcing strategy can be made according to the answers to these questions.

33. How is the MRO market approached: globally, locally?
34. What is the sourcing strategy of the MRO product group?
35. Is global sourcing included in this strategy?
36. How is the strategy executed?
37. Do you have global sourcing knowledge, or does the team?
38. Do you or a team member have the skills necessary to coordinate global sourcing?
39. Is the coordination and execution for MRO performed from one point, or do you use purchasing offices or other functional groups?
40. Did the outcomes meet the expectations?
41. Regarding the five-stage model, in what stage do you think you are operating at the moment with MRO sourcing?
42. If you are not in stage five, what is the ultimate goal?
43. How did you get to the stage you operate in?

Achieving the next level of global sourcing

In this section, questions are asked to see whether and how the sourcing organization thinks they can achieve the next level of global sourcing. The impact of critical incidents can also be checked.

44. How has MRO sourcing developed to the level it is at the moment?
45. What particular events or steps have been taken in order to grow to the next level?
46. What events helped or stagnated growth to the next level?
47. Do critical incidents influence the sourcing strategy?
48. If you are at the fifth level, what do you do to maintain this level?
49. What difficulties do you face in growing to the next level?
50. What is the influence of the sourcing strategy on your level in the five-stage model?
51. Did you chose for global sourcing because of the sourcing strategy, or is there another reason to practice global sourcing?
Closing

The closing will also be a point of summary. Besides questions on what the interviewee thinks will be the outcome, this is the time to check whether all questions and answers have been well understood.

52. What do you think the outcome of this study will be?
53. What do you think has the biggest impact on global sourcing?
54. What do you think the next steps for global sourcing are?
Appendix 2. Letter to interviewees

Dear….,

I was given your name by Mark Schiphorst.

At the moment I am writing a thesis for my Masters’ degree in Supply Chain Management, on the subject Global Sourcing.

The thesis is a case study on the effect of critical incidents in the changes of levels in the 5-stage Global Sourcing model by Trend and Monczka.

Let me explain the model:

The 5 stage model is a sourcing model on Global Sourcing, consisting of the following 5 stages:

1. No Global Sourcing, only domestic sourcing
2. International Sourcing when needed
3. International Sourcing as a part of the sourcing strategy
4. Global Sourcing strategy integrated across worldwide locations
5. Global Sourcing strategy integrated across worldwide locations and function groups

In the first part of the interview, questions will be asked to determine in which stage the organization is operating.

In the second part we will focus on critical incidents. Critical incidents are incidents that may occur in the sourcing process and that will affect the sourcing decision. Critical incidents play a role in influencing and perception in Global Sourcing and can damage the Supply Chain organization. Examples of critical incidents can be: (sudden) bankruptcy of a supplier, natural disaster or failure of partnership.

Critical incidents can be both positive (exceeding expectations) as well as negative (disappointment) and can sometimes even been foreseen (e.g. bankruptcy).

The focus will be on the incidents that made a change to the level of Global Sourcing, or had a contribution to that change.

I would like to focus on the following product ranges:
- Metals
- Skins
- Engines

Would you be able to have an interview on the above?
This will take approximately 2 hrs?

I have attached the first version of my thesis. As a preparation for the interview, you could read paragraph 2.5 and 2.6.

Many thanks in advance for your cooperation.

Kind regards,