

Chapter 9

Supply Chain Risk Management in Sustainable Sourcing

Challenges and Opportunities of Sustainable Requirements in Purchasing

Eric Sucky and Immanuel Zitzmann

Abstract Sustainability requirements are of growing importance and must be considered by companies. Since supply chains ultimately range from raw material suppliers to consumers, all value-adding members must meet social and environmental commitments, which lead to specific sourcing challenges. However, sustainable sourcing faces a variety of risks. The purpose of this paper is to examine these risks and give insights about supply chain risk management in sustainable sourcing.

Keywords Sustainability • Supply chain • Sourcing • Risk management

9.1 Introduction

Value creation, innovation, and competitive advantages are no longer realized at the regional or national level in today's globalized environment. They are forged internationally in networks that run around the world (Selzer 2009). In its 2010 report on general economic and industrial policy, the Federal Ministry for Economic Affairs and Technology of Germany established that industrial production as a whole is now shaped by global value creation networks (BMW 2010). These general conditions apply to the production of virtually all goods – from motor vehicles to children's toys or foodstuffs. Products made and sold with the aim of contributing to sustainable development are also subject to these parameters. The organizational structures and processes that enable global value creation are coordinated within the

E. Sucky (✉) • I. Zitzmann
Lehrstuhl für Betriebswirtschaftslehre insb. Produktion und Logistik, Otto-Friedrich-Universität Bamberg, Bamberg, Germany
e-mail: eric.sucky@uni-bamberg.de; immanuel.zitzmann@uni-bamberg.de

framework of supply chain management (Thomas and Griffin 1996). A supply chain describes the value creation network behind a given product (Sucky 2004). Its elements are linked through flows of goods, information, and money across enterprise boundaries. Such value creation systems begin with the producer of the raw materials and end with the final customer. In recent years, weak points and negative effects of such networks have become increasingly apparent. Supply chains optimized for efficiency are vulnerable to disruption and uncertainties (Jüttner et al. 2003). Negative effects also arise in the environmental and social spheres (Südwind 2012). Securing prosperity in the long term requires solutions that address risks not only to humans and the environment but also to business success. As global supply chains are highly complex, examining them holistically is rarely possible; this explains the emergence of supply chain management as a field focused on analyzing links between value creation elements (Thomas and Griffin 1996). The associated tasks can be allocated to such areas as the enterprise function of sourcing (Bogaschewsky and Kohler 2007).

This paper explores risk management in the area of sourcing in the context of the supply chain. In particular, it sets out to investigate whether sourcing risks associated with sustainable products and their management differ from supply chain risk management in procurement of conventional products. In addition, potential opportunities in managing sustainable sourcing risks are highlighted.

Section 9.2 lays the foundation of this paper by explaining the key terms of supply chain management, sourcing, and sustainability. It also shows what sustainable sourcing means. In Sect. 9.3, risks in the supply chain and especially in sourcing are reviewed. This includes an analysis of differences between risks in sourcing of conventional supply chains to sourcing in value creation networks that are supposed to be sustainable. Section 9.4 presents strategies for supply chain risk management. These strategies will be applied to sourcing. Here again, differences in conventional and sustainable sourcing are analyzed. Suggestions on how risk management in supply chains can profit from sustainability are also presented. Section 9.5 summarizes the insights.

9.2 Sustainable Supply Chain Management and Sourcing

Numerous definitions, conceptions, and views of both supply chain management and sustainability exist. This paper does not set out to add to this already extensive body. Existing definitions will be used as reference points and are presented in the following subsections. Section 9.2.1 starts with the definition and explanation of supply chain management and sourcing. Sustainability and its components are the focus of Sect. 9.2.2. Section 9.2.3 brings both topics together and defines sustainable supply chain management and sustainable sourcing.

9.2.1 Supply Chain Management and Sourcing

According to Christopher (2005) and Lambert and Cooper (2000), supply chain management is tasked with “[...] the integration of key business processes from end user through original suppliers that provides products, services, and information [...] to deliver superior customer value at less cost to the supply chain as a whole [...]” Figure 9.1 shows the potential reach of a supply chain from the perspective of a focal enterprise (Lambert et al. 1998).

From the enterprise perspective, supply chain management is typically limited to the internal or direct supply chain illustrated in Fig. 9.1. Supply chain management tasks are handled by organizational units within individual enterprises (Sucky 2004; Thomas and Griffin 1996). In other words, communication and coordination with other supply chain partners are the responsibility of an enterprise’s functional interfaces with the outside world. From the perspective of the individual enterprise, procurement manages the upstream value chain leading back toward suppliers (Thiemt 2003). The focus of this paper is on this function.

Arnold (1997) views sourcing as including all enterprise- or market-related activities that serve to make objects available that a firm requires but does not produce itself. Such objects include materials, goods for resale, spare parts, and services (Grün and Brunner 2013). The basic goal of sourcing in the narrowest sense of the word is the acquisition of the goods required to manufacture products and render services. These goods must be of suitable quality, and they must reach the right place at the right time and at the lowest cost possible (Porter 1999). Concomitantly, procurement is increasingly expected to assume responsibility for the quality of the goods acquired; as the proportion of components, modules and

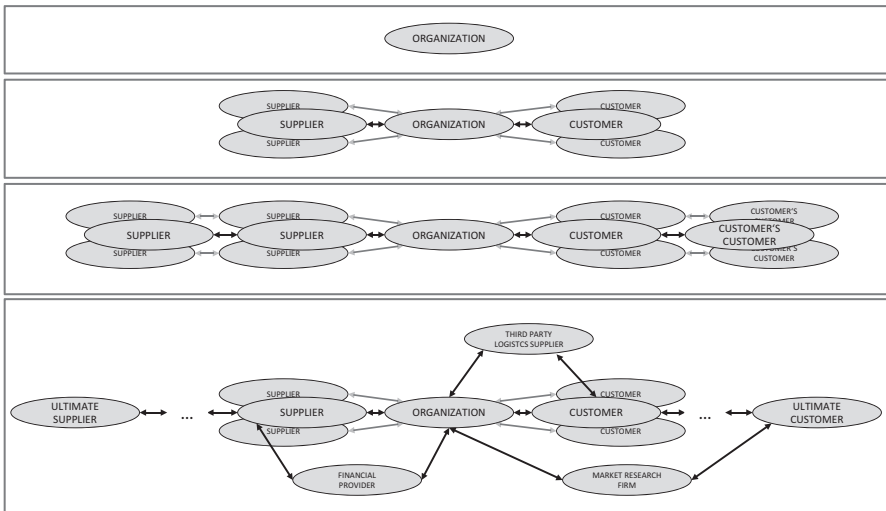


Fig. 9.1 Reach of a supply chain (Mentzer et al. 2001)

systems sourced from outside rather than being produced in-house rises, and the quality of goods procured increasingly determines the quality of a procuring company's own products. Against this background, Hamm (1997) ranks ensuring supply security, reducing costs, and achieving improvements to quality and service quality among the fundamental goals of procurement derived from enterprise objectives.

The responsibilities of procurement at the strategic level also include identifying and securing access to sources of goods that are of present or future relevance. As such, procurement is tasked not only with ensuring the capacity of an enterprise to operate in the short and medium term (through organizing the supply of materials required in a manner commensurate with the immediate goals of the enterprise) but also with ensuring that enterprises become and remain competitive in the long term (Large 2009). Against the background of this comprehensive and strategically significant shift in the perception of procurement and its tasks, the role of suppliers has also evolved dramatically. A short-term perspective of minimizing the costs of purchasing has been replaced by an approach that takes a longer view. Building up long-term relationships makes it possible for procuring enterprises to benefit not only from suppliers' products and materials but also from their efficiency, their improvements in production, and their innovations, flexibility and optimized logistics. The latter aspects can, in the long term, represent a strategic competitive advantage complementing consistently excellent product quality (Arnolds 2010). It follows that building up and maintaining supplier-buyer relationships are a key component in comprehensive, goal-oriented, and systematic supplier management.

Within the framework of modern procurement management, knowing the suppliers of suppliers (together with their suppliers in turn) and making use of their capabilities also matter (Fawcett and Magnan 2002). The importance of this competence in complex and tightly interlinked supply chains has become increasingly obvious in recent years. The structure of global value creation networks can lead to relatively minor disruption at an upstream supplier, thus triggering severe supply shortages in a focal enterprise. Moreover, knowing suppliers is important not only to avert the risk of shortages but also to foster working conditions; suppliers and the environmental impact of upstream production processes are other examples of sources of risk that merit consideration (Südwind 2012).

9.2.2 Sustainability

Sustainable development “[...] meets the needs of the present without compromising the ability of future generations to meet their own needs [...]” (WCED 1987). This statement from the Brundtland report is at the bottom of every discussion of sustainability. However, the definition gives rise to a further question: what are the needs that should be satisfied in the context of the drive for sustainability, and what resources can be drawn on to this end? It has become generally accepted that resources must be viewed in terms of their environmental and – advancing beyond this – their social components as well as in purely economic terms. This is reflected

in triple bottom-line thinking (Elkington 1998). Whether these components can be substituted for one another is the subject of some controversy (Döring and Ott 2001). Weak sustainability concepts assume that trade-offs are possible between the three areas. The opposing approach, i.e., strong sustainability, denies this.¹ Regardless of which approach is advocated, the triple bottom-line approach describes sustainability only in very general terms. The idea of sustainability is, as it were, an umbrella term under which hugely diverse approaches, concepts, products, and ideas can be subsumed (Bretzke 2014). A product that meets customer requirements and demonstrates improved environmental and social qualities can be considered sustainable (Seuring and Müller 2008). Sustainable production pursues the goal of minimizing negative impacts on the environment during both the harvesting of resources and the subsequent processes that add value (Shrivastava 1995). It follows that no sustainable products can exist without sustainable supply chains: only once all processes and their integration meet sustainability criteria a product can be described as sustainable (Miemczyk et al. 2012). Enterprises striving to offer sustainable goods and services must address the challenge from two angles: as well as working to make their own internal processes sustainable, they must also restrict their purchases to goods that can be described as sustainable since these goods ultimately form part of their own products. Achieving this latter aim falls within the responsibility of procurement (Bretzke 2014).

9.2.3 Sustainable Supply Chain Management and Sourcing

Sustainable supply chain management can be defined (Seuring and Müller 2008) as the “[...] management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements. In sustainable supply chains, environmental and social criteria need to be fulfilled by the members to remain within the supply chain, while it is expected that competitiveness would be maintained through meeting customer needs and related economic criteria.” This definition embraces both the component of supply chain management and the three-pillar model of sustainability (Carter and Rogers 2008). Sustainable sourcing can also be understood (with Meehan and Bryde 2011) as “[...] the process used to secure the acquisition of goods and services (products) in a way that ensures the least impact on society and the environment throughout the full life cycle of the product [...]”. As such, sustainable sourcing initially operates

¹A critical discussion of this approach is beyond the scope of this essay. It can be noted, however, that the triple bottom-line concept (environment – economy – society) represents a significant paring back of the five-pillar approach developed at the 1992 Rio Earth Summit. This set sustainable development in the context of environmental, economic, social, cultural, and ethnic development (Flämig 2015).

under the same conditions as traditional purchasing departments, which include sourcing risks. These conditions are supplemented by the environmental and social criteria that are brought to bear on judging the quality of goods and their production and transport. As a rule, this leads to the number of potential suppliers being narrowed down to quite a small number.

Section 9.4 will proceed from these definitions and examine sourcing management, especially with regard to strategies of managing sourcing risks in conventional and sustainable supply chains. Before that, however, the risk categories in conventional and sustainable supply chains must be identified. This will be done in Sect. 9.3.

9.3 Risks in Conventional and Sustainable Sourcing

Risks in sustainable sourcing can be derived from the general risks that supply chains are subject to. This will be explored further in Sect. 9.3.1. Section 9.3.2 will then use the categories of sourcing risks to analyze whether risks differ between conventional and sustainable sourcing. The evaluation will be supported by the case of Fairphone.

9.3.1 Risks in Supply Chains and Procurement

Risks are part of doing business in a world marked by uncertainty (Simangunsong et al. 2012). Supply chain risks, in turn, can be categorized systematically in multiple ways (Sodhi and Tang 2012). The most commonly used approach takes the structure of the supply chain as its departure point. Figure 9.2 visualizes this categorization. The first distinction that is made is between supply chain external and internal risks

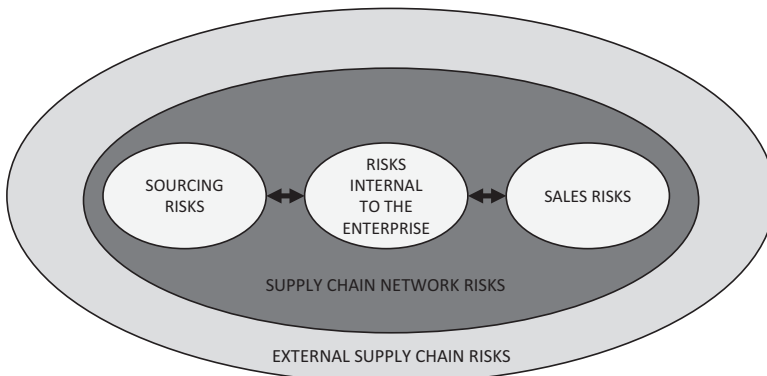


Fig. 9.2 Supply chain risk categories (Christopher and Peck 2004; Jüttner et al. 2003)

(Mason-Jones and Towill 1998; Jüttner et al. 2003; Peck 2005; Christopher and Peck 2004). The former category covers the environmental risks a supply chain is subject to. These can include not only natural catastrophes such as earthquakes and floods but also human-induced events such as terrorism or strikes. Corruption or legal uncertainty can also fall into this latter category. Internal supply chain risks, also called supply chain network risks, can be subdivided into risks internal to an enterprise, as well as into sourcing and sales risks (Christopher and Peck 2004). The focus of this paper are risks in sourcing.

Sourcing relates to the availability and quality of goods required by an enterprise to create its own products or services. They can be subdivided, as shown in Table 9.1, into five categories of quality, quantity, time, price, and transport risks (Thiemt 2003; Rogler 2002).

The types of sourcing risks listed in Table 9.1 are also applicable in the context of sustainable procurement, although they may differ in intensity. The case of Fairphone will be used as an example to analyze risk in sustainable procurement.

The Fairphone supply chain has been forged by the manufacturer bearing the same name (Fairphone 2016). The company founded by Dutchman Bas van Abel has set out (Bernau 2013) to produce a smartphone fairly and sustainably. This means sourcing conflict-free minerals and ensuring fair working conditions in the manufacturing plants (Struller 2014). In addition, the environment should be spared through a long product life span, design that makes repairing or replacing individual modules feasible, and recycling (Schmitt 2013). From the viewpoint of purchasing, the supply chain for tin can be seen in Fig. 9.3. The metal is sourced from conflict-free mines located in the Democratic Republic of the Congo. The manufacturing process takes place in China. Here, only companies that guarantee social and environmental standards are used. One notable feature of the Fairphone business model is that initial production took place on a make-to-order basis: the first generation of Fairphones was only manufactured once 5000 preorders had been received (D’heur 2014).

Table 9.1 Categories of sourcing risks

Type of risk	Description
Quality risk	The quality supplied does not meet requirements
Quantity risk	The required quantities cannot be acquired
Time risk	The delivery date does not conform to the planned delivery time
Price risk	The price to be paid for the goods to be procured is higher than expected
Transport risk	The goods are destroyed or damaged during transport from the supplier to the purchaser

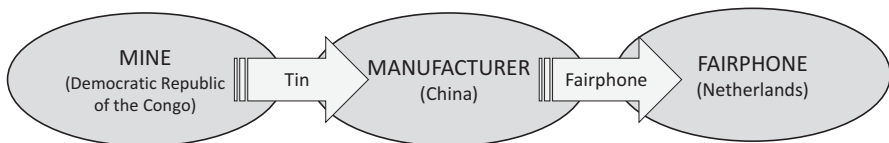


Fig. 9.3 Fairphone supply chain

9.3.2 *Differences in Conventional and Sustainable Sourcing Risks*

With the help of the Fairphone supply chain, this paragraph analyzes differences between conventional and sustainable sourcing risks. It is structured according to the five sourcing risks in Table 9.1:

Quality Risk In both conventional and sustainable procurement, the quality of components and raw materials is measured according to their ability to fulfill the technical purpose for which they are required. On average, a product life cycle of a smartphone is approximately 2 years; thus, materials and components that function as reliably as possible over this timespan are sourced and used (Schmitt 2013). A longer functionality is not necessary from an *economic* point of view. The *environmental* perspective looks quite different: every product that is disposed of and replaced by a new product consumes considerable resources. It follows that the quality standard for materials used in the Fairphone is necessarily a higher one. This in turn means that the risk of these high standards not being met also rises. Direct environmental impacts must also be considered from a quality perspective. The production of smartphones can, for example, lead to the contamination of soil or water during the extraction of raw materials or to the emission of harmful greenhouse gases during the manufacturing process. Procurement is tasked with vetting and monitoring the compliance of suppliers with relevant criteria. In addition to economic and environmental quality requirements and the risks flowing from them, *social* quality risks also arise. As the producer of a sustainable smartphone, Fairphone and its procurement department must oblige suppliers to comply with social standards.

Quantity Risk In a conventional smartphone supply chain, the quantity risk is particularly apparent (Spiegel Online 2012; Handelsblatt 2013) in the period before a new model comes on the market. Demand often exceeds the quantities made available by procurement. This is due to the limited capacity of the manufacturers and the limited supply of raw materials. Quantity risks in this form do not arise in the Fairphone supply chain – the small number of units made to date can be assembled by manufacturers without difficulty. However, small quantities are problematic in another way: they present the risk (D’heur 2014) that suppliers may view the manufacturer of the sustainable smartphone as a minor player of little importance. This introduces the risk that Fairphone will not receive deliveries when it is forced to compete against global players in the sector for production capacity. As such, the quantity risk can be reframed as the risk of Fairphone receiving no units at all because of the low quantities that are ordered.

Time Risk Late deliveries move the point at which enterprise production can begin into the future. In the worst-case scenario, customer requirements cannot be fulfilled. Smartphone supply chains are vulnerable to supply delays (Handelsblatt

2013) because of volatile demand and high cost pressures. Procurement is therefore tasked with ensuring that the required goods are made available in a timely fashion. The Fairphone supply chain is less affected by this risk as it is the only sustainable smartphone on the market, and customers are drawn to it precisely because of this sustainability; they are willing to tolerate longer delivery periods. The first generation of Fairphones did not even go into production until preorders for 5000 units had been received. In this light, it can be said that time risks exist for procurement in the context of the production of the Fairphone but that the quality of goods ranks higher than their availability in this case.

Price Risk In both conventional and sustainable production, all manufacturers are exposed to the risk of rising prices for components to be procured. The raw materials needed for the manufacturing process are particularly subject to price fluctuations (Statistisches Bundesamt 2004). Fairphone may be able to dampen price fluctuation for some raw materials through direct contact with several mines. However, increasing production costs cannot be offloaded onto suppliers in the context of a sustainable business policy. As such, the Fairphone supply chain is vulnerable to price risks.

Transport Risk Both the Fairphone and the devices produced by companies that do not focus on sustainability are manufactured in China. As such, both are subject to identical transport risks on the way to their ultimate markets.

Table 9.2 summarizes the conclusion of the analyses regarding differences in sourcing risks between conventional and sustainable supply chains. The content is based on the case study of the Fairphone.

The case study of Fairphone shows that sourcing risks in sustainable supply chains differ from those in conventional supply chains, but that they still exist and in some areas are even higher. Therefore, the question arises as to whether supply chain risk management tools can still be applied in a sustainable environment or if such a supply chain even provides opportunities in risk management that a conventional supply chain does not.

Table 9.2 Differences in sustainable sourcing risks

Type of risk	Fairphone sourcing risks
Quality risk	Considerably higher, as social and environmental quality requirements must also be adhered to
Quantity risk	Present in another way; being seen as an insignificant bit player may lead to suppliers not prioritizing deliveries
Time risk	Low impact, as products are made to order for delay-tolerant customers
Price risk	Exists, must be borne by focal enterprise to some extent for reasons of sustainability
Transport risk	Identical to risk in conventional smartphone supply chains

9.4 Supply Chain Risk Management Applied in Sustainable Sourcing

This section analyzes the potential of supply chain risk management strategies to address sourcing risks in sustainable supply chains. Section 9.4.1 will therefore introduce seven risk management strategies in supply chain management. Their benefit for sustainable sourcing will then be verified for all sourcing risks in Sect. 9.4.2. Possible opportunities arising from sustainable sourcing for risk management are addressed in Sect. 9.4.3.

9.4.1 Risk Management Strategies in Supply Chains

On a general level, supply chain risk management addresses the management of risks in value creation networks (Jüttner et al. 2003). The process of supply chain risk management can be divided into multiple steps; the precise number of steps suggested varies from author to author (Kouvelis et al. 2012; Manuj and Mentzer 2008; Waters 2007). What all approaches have in common, however, are the three core elements of *identifying risk*, *analyzing risk*, and determining *countermeasures* (e.g., Waters 2007 or Ziegenbein 2007). In the first step, the possible risks the supply chain is exposed to are listed (Kouvelis et al. 2012). These can be described using the categories introduced in Sect. 9.3.1. In the second step, the risk analysis phase, the risks that have been identified are assessed (Kouvelis et al. 2012; Waters 2007; Ziegenbein 2007). As a rule, risks are evaluated on the basis of the likelihood of their occurrence and the potential severity of their impact (March and Shapira 1987). This facilitates prioritization of supply chain risk management measures. Particular emphasis is placed on measures geared toward preventing the materialization or minimizing the impact of risks with high probabilities and a strong impact on the supply chain (Kouvelis et al. 2012). The third step in supply chain risk management involves selecting and implementing the right steps to manage risks (Waters 2007). As with the categorization of risks, different frames of reference can be used (Waters 2007; Faisal et al. 2006). Table 9.3 illustrates a concept utilizing seven types of strategies (Manuj and Mentzer 2008; Jüttner et al. 2003). Section 9.4.2 will investigate whether and to what extent these strategies can also be deployed in a risk management framework in sustainable supply chains and more particularly in sustainable sourcing. Again, the case study of Fairphone will be used for the evaluation.

Table 9.3 Supply chain risk management strategies

Risk management strategies	Description
Avoidance	A conscious decision to refrain from activities (entering new markets, becoming more active in particular countries, new supplier relationships) because of the risks that are present
Postponement	Moving a final decision about performance specifications to the latest possible point in time
Speculation	Creation of competitive advantages through early decision-making on the basis of predicted demand
Hedging	Reduction of risk by spreading risk with the help of dual sourcing or flexible factories
Control	Vertical integration or flexible supply agreements enable capacity management and the balancing of power positions
Transferring	Transferring of risks to suppliers or service providers through outsourcing or offshoring
Security	Deployment of sensor technology to monitor freight and detect disruption at an early stage

9.4.2 Supply Chain Risk Management Strategies in Sustainable Sourcing

The following analysis is structured according to sourcing risks. The use of an application of each strategy will be evaluated for every risk. This includes an analysis of whether the strategy is of any use in general and in sustainable supply chains in particular.

Quality Risk Technical function compliance with environmental and social standards must be ensured in sustainable sourcing. The risk of quality deficits also encompasses deficits relating to these requirements. The risk management strategy of *avoidance* means that collaboration with suppliers who do not meet required quality criteria has to be avoided. This can be achieved through careful supplier selection. However, this has the disadvantage of reducing the number of possible suppliers and reinforcing dependence on the already small supply base of Fairphone. Vertical integration represents an instrument that can be used within the framework of a *control* strategy. If such a strategy is realized, influence can be exerted on quality standards and their implementation. However, this is only an option for selected goods. Integration throughout the entire supply chain is not feasible, nor is it intended by sustainable producers, as their business model is based on fair relationships to supply chain partners rather than on takeovers and control. Opportunities may exist to deploy sensor technologies and freight monitoring to conduct checks on social standards such as driving times or on aspects such as emissions. Such technologies are part of a *security* risk management strategy. The remaining strategies do not relate to quality risks and are consequently of no relevance to reducing them. Postponement and speculation relate to internal decisions on the point in time

when final decisions are to be taken. These are not linked to the quality of goods to be purchased. Hedging leads to the spreading of risk, but quality risks still exist in relation to each individual supplier. As such, multiple sourcing does not reduce these risks, nor can the quality risk be transferred to suppliers.

Quantity Risk The strategy of *speculation* can be used to minimize the risk of shortages. This involves placing long-term orders with suppliers on the basis of demand predictions. That will ensure that companies with small order quantities such as Fairphone will be supplied. Short-term orders may be ignored if they compete with orders of big players. Long-term orders have the additional effect that extra shifts, short-time work, extra journeys, and express deliveries can be avoided. That strengthens the social and ecological pillars of sustainability. *Hedging* can also be deployed to mitigate quantity risks. Dual and multiple sourcing makes it possible to compensate for shortages by drawing on alternative suppliers. This can also be achieved through the flexible supply contracts provided for in the *control* strategy. However, the deployment of both of these strategies is only possible to a limited extent in sustainable procurement as the requirements that sustainable products must meet already impose strict limits on the number of potential suppliers; the application of the suggested instruments is frequently impossible. Avoidance leads to greater dependence on a small number of sources, so it is not a suitable strategic approach toward reducing quantity risks. The same can be said for postponement. The risk of not receiving goods in the necessary quantities is always present in the focal enterprise. As such, a policy of transferring risk cannot be applied. Sensor technology can only be used to establish that the quantity delivered does not correspond to the quantity ordered; quantity risks cannot be reduced with security measures.

Time Risk To reduce time risks, manufacturing processes can be planned in such a way that decisions on product specifications are made at the latest possible point in time. Sourcing is then tasked with making standard goods available, and these are then customized to meet specific customer requirements at a relatively late stage in production. Supplier delays can be compensated more easily in such a system. This is a form of *postponement* as a strategy for reducing time risks. This is applicable in both conventional and sustainable supply chains. The case of Fairphone shows that postponement can be applied in an extreme manner: the production and procurement process was started only after 5,000 phones were sold. If delays arise, other countermeasures are available. Using flexible factories or multiple sourcing within the framework of a *hedging* strategy can make switching to alternative sources of supply on short notice easier. For sustainable goods, however, the restrictions that were relevant to quantity risks also apply here. What was said above about *control* policies is also applicable to delay risks. *Security* systems make it possible to recognize and respond to delay risks early. This is not entirely good, however, since short-term reactive measures such as follow-up orders, extra deliveries, and overtime negatively impact the social and environmental balance sheet of the enterprise. As with quantity risks, avoidance does not reduce the risk of delayed deliveries. A speculation strategy affords suppliers' planning reliability, but if a supplier delivers late in spite of this, alternatives are usually absent. Again, this type of risk is not

transferable. As a general principle, it can be observed that on-time delivery performance ranks below quality in sustainable supply chains. Customers interested in purchasing sustainable products are demonstrably willing to put up with longer delivery periods or even waiting periods, if they can rest assured, in exchange, that social and environmental standards have been adhered to. In consequence, delay risks exist in sustainable procurement, but to some extent, it appears that they are not decisive competitive factors.

Price Risk Three of the risk management strategies can be deployed in the context of price risks. If a policy of *speculation* is used to determine prices as well as quantities at an early stage, this can prevent short-term fluctuations in prices. This can also be achieved with the help of *hedging*. Alternative supply relationships reduce dependence on individual suppliers and make enterprises less vulnerable to price increases affecting specific sources of supply. *Transferring* is a suitable means of risk reduction as it can be deployed, for example, in the form of outsourcing with the goal of eliminating the risks of price fluctuations. Limitations on the deployment of all three strategies within sustainable procurement processes exist. Social criteria mean that passing the risk of rising raw material prices onto suppliers does not constitute fair business practice. Moreover, the limited number of possible suppliers also means that switching to alternative sources of supply is often impossible. The other four strategies do not represent suitable approaches to minimizing price risks in either sustainable or conventional procurement. Avoidance leads to greater dependence as it involves a conscious decision to withhold sourcing material from alternative sources. Postponement has no influence on the price of goods. Since neither flexible supply agreements nor vertical integration can prevent prices from rising, control policies have no effect here. Security also has no impact on prices.

Transport Risk In addition to the risk of goods being lost or damaged, the transport risk in sustainable supply chains also encompasses the risk of the means of transport used causing social or environmental harm. This could relate, for example, to emissions or noise pollution. Consciously rejecting the use of certain transport options such as air freight can reduce these risks in the context of an *avoidance* strategy. Outsourcing transport services to service providers reduces the impact of transport risks that materialize. If attention is paid to the sustainability of service providers in the context of such a *transferring* strategy, this approach can also be deployed in sustainable procurement. *Security* solutions do not reduce the transport risk itself, but they can help to manage its impact at an early stage. Whether it lends itself to use in sustainable procurement or not depends on the specific measures under consideration. Postponement, speculation, hedging, and control strategies have no bearing on transport. As such, they cannot reduce risk in this area.

The remarks on the applicability of risk management strategies to sustainable supply chain management in this section have highlighted two points. It is clear that not all strategies can be applied to every risk. This holds true for both conventional and sustainable procurement. It has also become evident that additional caveats that further reduce the number of suitable instruments apply to sustainable processes. Table 9.4 summarizes where these reductions occur.

Table 9.4 Suitable risk management strategies in conventional and sustainable sourcing

Type of risk	Suitable strategies in	
	Conventional sourcing	Sustainable sourcing
Quality	Avoidance, control, security	Avoidance, security
Quantity	Speculation, hedging, control	Speculation
Delay	Postponement, hedging, control, security	Postponement
Price	Speculation, hedging, transferring	–
Transport	Avoidance, transferring, security	Avoidance, transferring

9.4.3 *Opportunities for Risk Management in Sustainable Sourcing*

The analysis leads to the conclusion that risks in sustainable sourcing differ to some extent in character from risks in conventional supply chains. Paying attention to social and environmental standards impacts quality and transport risks in particular. As a consequence, not all strategies that can be used for particular risks in conventional sourcing can be used in sustainable procurement. New methods have to be developed. Two areas where this is possible can be identified:

The small supply base that a sustainable supply chain such as Fairphone relies on can be used for close cooperation. While managing good relationships with supply chain partners is difficult, it is possible if there are only a small number of partners. It will help to reduce quality and quantity risks. As sustainability is based on fair and trustful relations, such supply chains can use cooperation with partners to reduce risks in sourcing.

Customer expectations on sustainable products differ from expectations of conventional products. As a general principle, it can be observed that fast availability and minimum prices rank below quality in sustainable supply chains. Customers interested in purchasing sustainable products are willing to tolerate longer delivery periods and higher prices if they can be assured that social and environmental standards have been adhered to. Consequently, delay risks exist in sustainable procurement, but to a certain extent, it appears that they are not decisive competitive factors. It may also be possible to transfer price risks to the customer. This will only be possible if it can be shown that the reason for the increase improves sustainability.

9.5 Summary

This paper examines risk management in sustainable supply chains by focusing on sourcing risks and supply chain risk management strategies. Since a good can only be sustainable if both its production processes and resources meet social and environmental standards, sourcing plays a key role in their manufacturing. Therefore, Sect. 9.2 explains the relationship between sustainable supply chain management

and sustainable sourcing. The purchasing department has to ensure that suppliers treat their employees and the environment according to sustainable aspects. This task includes the consideration of risks in sourcing. Section 9.3 identifies different sources of risks in supply chains as well as in sourcing. Differences in the intensity of sourcing risks between conventional and sustainable supply chains could also be recognized. For this analysis, the case of Fairphone was examined. It indicated that differences exist in both quality and time risk. Section 9.4 analyzes whether sustainable sourcing risks can still be addressed with supply chain risk management strategies. This is possible only to a certain degree. In all five categories of sourcing risks, the application of the strategies is limited. The main reason for this limitation is the small number of sustainable suppliers and fair long-term relations that forbid risk transfers to supply chain partners. However, there are also opportunities for risk management in sustainable sourcing. Sustainable supply chains include fair relationships and conditions from which everyone can profit. These circumstances provide an environment that reduces both quality and quantity risks in sourcing. Different customer expectations on sustainable products also help risk management. Consumers buying sustainable goods want social and environmental standards to be met. They are willing to pay more and even wait longer for such products. Sustainable sourcing is therefore able to address time and price risks more easily.

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