

The effect of social capital theory attributes in a purchaser's supplier selection process

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ABSTRACT,

Companies are increasingly moving towards sourcing their products from all over the world. Global sourcing comprises continental and transcontinental sourcing. The supplier selection process becomes increasingly complicated. Social capital theory has been proven to be able to improve this process and the performance of the relationship with a supplier, while sourcing from that supplier. A previously designed discrete choice experiment (DCE) continued. The DCE explores the weight of different supplier-related attributes during the supplier selection process. The set of attributes consists of location, widely used and social capital related attributes. The experiment is conducted with several purchasing experts employed by a company in the European Union that engages in global sourcing. The results show a relevance of social capital theory within the supplier selection process. Furthermore, an increasing importance of purchaser-supplier relationships is identified. The study concludes that attributes derived from social capital theory could incentivize the decision to engage in transcontinental sourcing.

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Keywords

Discrete choice experiment, supplier selection, social capital theory, local sourcing, European sourcing, transcontinental sourcing.

1. INTRODUCTION: A PURCHASER'S SOURCING DECISION: LOCAL, EUROPEAN OR TRANSCONTINENTAL?

More and more companies have been discovering the benefits of sourcing from a different country over the past decades (Cho & Kang, 2001, p. 544; Horn et al., 2013, p. 27). This results in companies increasingly moving towards sourcing their supplies from countries all across the world (Horn et al., 2013, p. 27; Kandil et al., 2020, p. 277). This trend exposes these companies to new challenges. Companies encounter challenges such as differences in legal systems, logistic challenges and cultural barriers (Cho & Kang, 2001, p. 546). On the contrary, benefits for companies that globalize their supply chains are cost reduction, improved quality and improved supplier availability (Cho & Kang, 2001, p. 544).

This study will focus on purchasing experts from companies located within the European Union (EU) that practice either continental sourcing, transcontinental sourcing or both. We can distinguish three different sourcing categories. The first category is local sourcing. Local sourcing, also known as domestic sourcing, refers to the sourcing from a supplier that is located in the same country as the purchasing company (Bohnenkamp et al., 2020, p. 87).

The second and third category are continental and transcontinental sourcing. These are both distinct forms of global sourcing (Koerber & Schiele, 2022, p. 219): sourcing goods from a supplier that is located outside the country of the purchasing company (Bohnenkamp et al., 2020, p. 84; Schiele et al., 2011). Continental sourcing is the sourcing from a supplier outside the country of the purchasing company, but still within the same continent as the purchasing company. In this paper's European perspective, continental sourcing refers to European sourcing (Koerber & Schiele, 2022, p. 223). Transcontinental sourcing is the sourcing from a supplier outside the continent of the purchasing company. In this paper's European perspective, transcontinental sourcing refers to sourcing outside of Europe. Transcontinental sourcing involves considerable time-zone differences and a difference in legal frameworks (Koerber & Schiele, 2022, p. 223).

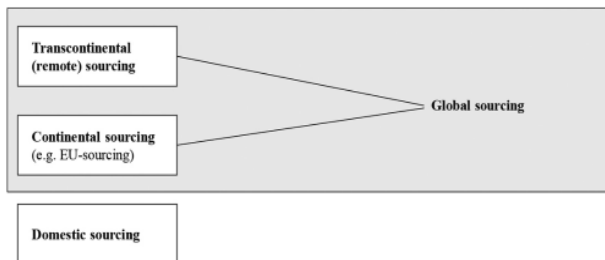


Figure 1: Global sourcing comprising continental and transcontinental sourcing (Koerber & Schiele, 2022, p. 223).

Different sourcing approaches come with different benefits. Companies should identify the approach that brings them their preferred advantages. (Kotabe & Murray, 2004, p. 11). Companies can derive a competitive advantage by making certain choices in their supplier selection process (Ghodsypour & O'Brien, 2001, p. 15; Verma & Pullman, 1998, p. 739). Certain theories have been identified to play a role in the supplier selection process and the relationship between purchasing firms and their suppliers (Bohnenkamp et al., 2020, pp. 103–104; Steinle et al., 2019, p. 372). Social capital theory is a theory that can allegedly be used to ensure a smooth occurrence of sourcing projects (Bohnenkamp et al., 2020, pp. 103–104).

In order to get a better understanding of exactly which attributes are important for a company when selecting a supplier, a discrete choice experiment (DCE) will be conducted. Attributes connected to the social capital theory, as well as the attributes 'price' and 'quality' will be implemented in the experiment. Many supplier selection process studies have previously used the attributes 'price' and 'quality' (e.g. Abratt, 1986; Billesbach et al., 1991; Mummalaneni et al., 1996; Perreault & Russ, 1976; Verma & Pullman, 1998). 'Price' and 'Quality' have been identified as critical attributes in the supplier selection process (Mummalaneni et al., 1996, p. 119; Verma & Pullman, 1998, p. 741).

A very significant paradigm shift in modern business management is the change that organizations no longer exist as stand-alone entities, but as supply chains (Lambert & Cooper, 2000, p. 65). This new vision has increased the interest in the supplier selection process and has therefore resulted in multiple different researches on the subject, including researches with DCE's (e.g. Mummalaneni et al., 1996; Verma & Pullman, 1998). No DCE's have been that included attributes from social capital theory have previously been performed until 2021 by de Vries. This paper will expand on the social capital theory DCE conducted by de Vries (de Vries, 2021) by conducting a similar DCE experiment as de Vries to increase the available data. This paper aims to further explore the decision making process of purchasing experts between local, EU and transcontinental suppliers by addressing the social capital theory.

This results in the following research question:

"How do widely used supplier attributes and attributes from the social capital theory explain the purchaser's choice between local, EU and transcontinental sourcing?"

The answering of this main research question is supported by answering the sub-question:

"How do purchasers trade-off between widely used supplier attributes and attributes obtained from the social capital theory when choosing from local, EU, and transcontinental suppliers that possess varying levels of these attributes?"

And the sub-question:

"What is the perceived importance of widely used supplier attributes and attributes obtained from the social capital theory during the supplier selection process?"

In order to answer the research questions systematically, the distinction between the three different sourcing categories will be explored in the form of a literature review in section two. In section three the literature review will be extended to the relatedness of social capital theory to the supplier selection process. The literature review will be continued to analyse how previous studies have used stated preference experiments (SPE's). Special attention is given to the different types of SPE's. Finally, purchasing with regard to DCE's is further explored.

The information in the literature review will clarify the choice for the DCE and the construction of the DCE. The fourth section addresses the research methodology, including the sampling methods, design and the analysis of the DCE. The paper ends with a presentation and analysis of the results in section five followed by a conclusion and discussion in the sixth section.

The outcome of this study will strengthen the outcome of the study conducted by de Vries (de Vries, 2021) and will contribute to the current research on the supplier selection process by filling a gap in the literature. Little studies have actually have actually

analysed the decision making process of purchasers (Verna & Pullman, 1998, p. 740), especially while also including the social capital theory (de Vries, 2021, p. 1).

The results of the experiment can be used for further research on this topic in the academic field and is also practically relevant because the insights obtained can be utilized by purchasers to improve their supplier selection process. The results allow purchasers to become more aware of the challenges and benefits related to the three different types of sourcing and of which knowledge on supplier attributes is critical to possess when selecting a supplier (de Vries, 2021, p. 1).

The following section will start with the literature review on local, EU and transcontinental sourcing.

2. THE DIFFERENT TYPES OF SUPPLIERS: LOCAL, EU AND TRANSCONTINENTAL

The difference between local sourcing, EU sourcing and transcontinental sourcing are characterized by their differences in advantages and disadvantages. Local sourcing is the most straightforward sourcing approach (Bohnenkamp et al., 2020, p. 84). An advantage of local sourcing is that it helps to support the local economy, which indirectly benefits the purchasing company (Wei et al., 2012, p. 365). Another advantage is that the distance to the supplier is low which increases delivery reliability and flexibility, reduces lead times and lowers transport costs (Wei et al., 2012, p. 367).

Companies often make the decision to start sourcing outside of their domestic country due to the greater availability of certain products at European or transcontinental suppliers (Cho & Kang, 2001, p. 545). Benefits of European sourcing are the usually similar legislations and policies between countries due to standardization by the European Union. These similarities allow for easy collaboration between purchasers and suppliers (Hanf & Soetendorp, 2014, p. 2; Koerber & Schiele, 2022, p. 223). The formation of the European Union increased the trade between European countries that are members with almost 70% over their years of membership (Glick, 2017, p. 197). Furthermore, an advantage of EU sourcing is a high similarity in legal systems (Koerber & Schiele, 2022, p. 223). Quality and price can be better compared to domestic sourcing as well (Cho & Kang, 2001, p. 544). West Germany is an example of a sourcing location within the European Union that is known for its suppliers that offer high quality products (Cho & Kang, 2001, p. 544). It has become increasingly important for suppliers to be able to deliver high quality products due to an increased risk of being substituted due to globalization (Solomon et al., 2019, p. 86).

While missing the benefits of the similar legislations, policies and legal systems of countries within the European Union, transcontinental sourcing provides companies with an even bigger range of products compared to companies in the European Union (Koerber & Schiele, 2022, p. 227). Transcontinental sourcing can sometimes provide purchasing companies with an even better price and quality than within the European Union. Japan is a country with transcontinental suppliers that are known for their high quality (Cho & Kang, 2001, p. 544).

Saving costs, indirectly or directly, can actually be achieved through local sourcing as well as EU sourcing as well as transcontinental sourcing. To identify these cost saving possibilities, the supplier attributes should carefully be considered during the supplier selection process (Bohnenkamp et al., 2020, p. 85; Cho & Kang, 2001, p. 544; Horn et al., 2013, p. 27; Wei et al., 2012, p. 367). But how can different attributes

exactly benefit towards decreasing costs? When looking at EU sourcing and transcontinental sourcing, lower wages are the main reason for the lower costs (Horn et al., 2013, p. 27; Wu & Zhang, 2014, p. 1223). The benefits of lower wages are especially relevant for companies in developed countries, such as in the European Union, where this study focusses on. This can be explained by the relatively large wage gap between Europe and other continents (Kotabe & Mudambi, 2009, p. 122).

However, the labour costs in other continents are not as low as they have been anymore. Labour costs have started to rise in Asian countries such as China (Wu & Zhang, 2014, pp. 1223–1224; Yang et al., 2010, p. 483). China has become a trade giant thanks to its historically well-known low wages (Yang et al., 2010, p. 483). This increase in wages results in companies finding larger cost savings elsewhere, for example in local sourcing instead of in global sourcing (Wu & Zhang, 2014, p. 1234). Also not unimportant are the uncertainties of possible currency exchange rate fluctuations and transport delays, which can lead to higher costs. These are uncertainties that are a lot smaller when sourcing locally, which can thus contribute to cost savings in local sourcing. (Bohnenkamp et al., 2020, p. 87).

We can conclude that there are no exact guidelines in which attributes are most important for a successful sourcing strategy to create the largest competitive advantage (Bohnenkamp et al., 2020, p. 85; Horn et al., 2013, p. 27). Each type of sourcing comes with its own attributes that all have their advantages and disadvantages. A sourcing decision is made differently for every company its specific challenges and preferences (Cho & Kang, 2001, p. 544).

3. THEORETICAL FRAMEWORK

3.1 Social capital theory and the supplier selection process

Social capital theory can provide companies with assistance when having to make decisions between different sourcing possibilities, while also providing them with a framework that can be used to maintain a smooth relationship with a supplier (Bohnenkamp et al., 2020, pp. 103–104; Steinle et al., 2014, p. 135, 2019, p. 372). The following section dives deeper into the social capital theory and its effect on the supplier selection process.

Social capital theory defines relationships as a resource that can be used to increase and sustain a competitive advantage (Bohnenkamp et al., 2020, p. 88; Steinle et al., 2019, p. 365). The conjoint generation and exchange of resources are enabled through three different types of capital (Steinle et al., 2019, p. 365): cognitive, relational, and structural (Bohnenkamp et al., 2020, p. 88; Steinle et al., 2019, p. 365). Cognitive capital refers to firms having shared values, meanings and interpretations of a relationship. Examples are operating in a similar culture or communicating in a shared language (Bohnenkamp et al., 2020, p. 88; Steinle et al., 2019, p. 365). Relational capital refers to firms having a well-developed relationship that is built on mutual trust and respect (Bohnenkamp et al., 2020, p. 88; Steinle et al., 2019, p. 365; Yim & Leem, 2013, p. 325). Structural capital refers to relational linkages and social ties between firms (Bohnenkamp et al., 2020, p. 88; Steinle et al., 2019, p. 365; Yim & Leem, 2013, p. 325). Often through systems that increase communication possibilities (Bohnenkamp et al., 2020, p. 89). The three dimensions are interconnected with each other (Yim & Leem, 2013, p. 325).

The ability of social capital theory to increase supplier performance during a relationship, makes its attributes interesting to consider during a supplier selection process. Steinle et al. (2014, p. 136) state that the supplier opportunism and the

information asymmetry should be taken into account during a supplier selection process. Hidden intention and hidden action are types of information asymmetry that can function as a tool to predict opportunistic behaviour in a supplier relationship (Steinke et al., 2014, p. 135). Social capital theory has a significant positive effect on the outcomes of sourcing projects (Bohnenkamp et al., 2020, pp. 103–104). The application of social capital theory on relationships between firms positively affects the performance of those relationships (Bohnenkamp et al., 2020, p. 104).

3.2 An overview of stated preference experiments in science

Stated preference experiments (SPEs) have increased in popularity among researchers over the past decades (Aizaki et al., 2015, p. 15). This trend was initiated in the field of marketing (Sanko, 2001, p. 5).

In an SPE, the respondent is tasked to indicate their preferred choice from a set of choices. (Hensher, 1994, p. 109). The choices consist of multiple attributes that can differ in value between choices. (Hensher, 1994, p. 109; Sanko, 2001, p. 1). The values of attributes can be numerical, ordinal, or nominal. (Wind et al., 1968, p. 31). Having too many attributes may decrease the accuracy of the results of the experiment, due to the risk of respondents losing a clear overview of the attributes and their values. Therefore it is recommended to use no more than ten attributes per choice (Mangham et al., 2009, p. 153).

SPEs create an artificial choice situation where respondents are asked to make a choice (Ben-Akiva et al., 1992, p. 253). The artificiality of SPEs provide several advantages when the aim of the research is to create an idea what individuals would choose. (Ben-Akiva et al., 1992, p. 253). The artificiality creates benefits which makes SPEs often preferred over traditional revealed preference experiments, where a respondent is monitored during a real situation (Ben-Akiva et al., 1992, p. 253).

The artificiality provides the possibility to research attributes that have not been proven to play a role in real market situations (Ben-Akiva et al., 1992, p. 254; Mangham et al., 2009, p. 152). The results can provide insights into the potential of new attributes and how they compare with existing attributes (Sanko, 2001, p. 9). SPEs allow researchers to get multiple responses from every respondent, which gives the possibility to gather a relatively large amount of data in a small time compared to analysing real-world situations (Sanko, 2001, p. 9). A disadvantage of SPE's is that the choices are made in a hypothetical situation, which can result in a different behaviour of the respondent than in a real situation (Sanko, 2001, p. 9).

There are three types of SPEs: ranking the alternatives, rating the alternatives, and making a choice among several alternatives (Mangham et al., 2009, p. 152).

A DCE is an experiment where the respondents get the task to make a choice among several alternatives (Mangham et al., 2009, p. 152). DCEs are a quantitative research approach to obtain preferences of participants in specific situations (de Bekker-Grob et al., 2015, p. 373; Mangham et al., 2009, p. 152). Ranking- and rating-based SPEs provide researchers with richer data than DCEs (Hensher, 1994, p. 110). However, it is argued that humans are more capable of choosing alternatives than ranking or rating them, which makes a DCE more reliable (Hensher, 1994, p. 110).

When designing the SPE, it is important to pick orthogonal attributes (Bech et al., 2011, p. 273; Hensher, 1994, p. 117). Orthogonality allows the researcher to compute the main effects between attributes after varying the attributes independently from each other in the choice sets (Hensher, 1994, p. 117; Sanko,

2001, p. 15). Orthogonal attributes are statistically independent of each other (Mangham et al., 2009, p. 154).

Full factorial and fractional factorial design can be used to create orthogonality between the main effects. (Mangham et al., 2009, p. 154; Sanko, 2001, pp. 15–17; Verma & Pullman, 1998, p. 745). Full factorial design implements every possible combination of every attribute value into the research. (Mangham et al., 2009, p. 154; Sanko, 2001, p. 15). Full factorial design provides a lot of data and often statistically significant results. However, it is often impossible to implement full factorial design due to a very large amount of possible combinations (Fowkes, 1998, p. 17; Hensher, 1994, p. 115; Sanko, 2001, p. 17). Fractional factorial design does not have this problem (Fowkes, 1998, p. 17; Hensher, 1994, p. 115; Sanko, 2001, p. 17). At the cost of statistical power, a fractional factorial designed experiment can eliminate a lot of combinations by using the main effects plan, which is the most commonly used fractional factorial design plan (Hensher, 1994, pp. 115–116; Sanko, 2001, p. 17). The assumption on which the main effects plan is based, is that “individuals process information in a strictly additive way, such that there are no significant interactions between attributes” (Hensher, 1994, p. 116). In most cases, the main effects can explain at least 80% of the variance in data (Sanko, 2001, p. 18).

3.3 Types of stated preference experiments

3.3.1 Ranking-based experiments

Ranking-based experiments task a respondent with ranking a set of alternatives from most- to least-preferred. (Hensher, 1994, p. 110). Respondents tend to be more capable of ordering different options than rating them. Hence, ranking-based experiments are more popular than rating-based experiments among researchers (Hensher, 1994, p. 110). Ranking-based experiments provide researchers with rich data, but data on lower ranks tends to be not as reliable as data on higher ranks (Hensher, 1994, pp. 110–111). This makes the main argument to use a ranking-based experiment over a DCE, that a ranking-based experiment produces richer data, less powerful. (Hensher, 1994, p. 111).

3.3.2 Rating-based experiments

A rating-based experiment, tasks the respondent with rating different choice options on a predetermined scale (Hensher & Truong, 1985, p. 239). Rating-based experiments provide researchers with richer data than both ranking-based experiments as well as DCEs. Ranking-based experiments provide the researcher with additional information on the intensity of preference (Hensher, 1994, p. 111). The analysis of rating-based experiment results can be difficult due to different rating scales that can be used (Ortúzar & Garrido, 1994, p. 185). In combination with the abovementioned argument that respondents tend to be better at ranking than rating, ranking-based experiments are often preferred by researchers (Hensher, 1994, p. 110).

3.3.3 Discrete choice experiments

A DCE tasks the respondent with only stating their first preference from a set of options. That makes the data that can be derived from DCEs not as rich as that from the other SPEs. (Hensher, 1994, p. 112). Previous studies have proven that DCEs are an effective tool for analysing more complex decision making processes (Verma & Pullman, 1998, p. 741). DCEs are good to use for a supplier selection process. Its characteristic where it allows the respondent to pick only one option, corresponds to the real-life decision making process when selecting a supplier (Hensher, 1994, p. 112).

DCEs are based on the random utility theory, which explains the behaviour of human beings (Louviere et al., 2010, p. 62).

Random utility theory is the most commonly used behavioural theory in research, (Cascetta, 2009, p. 89). Random utility theory states that human beings always want to maximise the utility they can achieve and therefore always make their decisions on a rational basis. (Cascetta, 2009, p. 90). The perceived achievable utility from a certain option is derived from the attribute values corresponding to that option (Cascetta, 2009, p. 90). Analysis of DCEs provides researchers with data on how different attributes contribute to the perceived utility of an option (Mangham et al., 2009, p. 153). The formula used to compute the utility U of choice option j for participant p is:

$$U_{jp} = \sum_{a=1}^A \beta_{ap} \gamma_{aj}$$

Figure 2: perceived utility formula for DCE results (Watson et al., 2020, p. 79).

β indicates the weight factor that shows the importance of the attribute a to respondent p . γ denotes the level of the attribute a . To obtain the value of β for each attribute, the results of the DCEs need to be analysed. In order to analyse DCEs, regression models that have a dichotomous or polychotomous categorical dependent variable should be used (Berendsen, 2015, p. 18). Three commonly used regression models are: conditional, multinomial, and mixed logit models (Berendsen, 2015, p. 18). Conditional logit models are used to analyse attributes that have a different value for each choice set (Berendsen, 2015, p. 18). Multinomial logit models are used to analyse attributes that have a fixed value during the experiment (Berendsen, 2015, p. 18). Mixed logit models are used to analyse experiments that contain both fixed attributes and differentiating attributes (Berendsen, 2015, p. 18).

3.4 Discrete choice experiments in previous research

Multiple studies in various sectors have previously conducted DCEs. There is enough literature available on successful DCEs. (Haghani et al., 2021, p. 5). An example of a previously used DCE is an orthogonal DCE to get an indication of the perceived utility of entrepreneurs for different attributes of start-up incubators (van Rijnsoever & Eveleens, 2021, p. 6). Almost all DCEs conducted across different sectors, such as the agricultural sector (Nie et al., 2021) or ecological sector (Wang et al., 2021), use a fractional factorial design in order to minimize the experiment size while ensuring orthogonality (de Bekker-Grob et al., 2015; Elrod et al., 1992; Hanley et al., 1998; Kim & Leung, 2021; Mangham et al., 2009; Nie et al., 2021; van Rijnsoever & Eveleens, 2021; Wang et al., 2021). SPSS is a program that can be used to create an orthogonal design (Wang et al., 2021, p. 3).

While other SPEs are widely applied, the application of DCEs in the sourcing sector is rather scarce. One of the first applied SPEs is a rating-based experiment to explore the behaviours of purchasers (Wind et al., 1968, p. 34). The experiment attempts to explain the supplier selection decisions of purchasers, by gaining an increased understanding on the determinants that influence that decision and their relative importance (Wind et al., 1968, p. 29).

Mummalaneni et al. (1996, p. 118) composed an overview of previously conducted studies on the importance of different supplier attributes. All of the mentioned studies used a rating-based experiment. Mummalaneni et al. (1996, p. 122) also conducted a rating-based experiment. Verma and Pullman (1998) are one of the few that use DCEs to analyse the influence of different characteristics of suppliers on the perceived utility during the supplier selection process. The choice for a DCE is

made because it closely mimics the actual supplier selection process, where purchasers are supposed to select only one supplier from multiple candidates (Verma & Pullman, 1998, p. 740). This allows for an analysis of the actual relative importance of different attributes, and on how respondents trade-off between these attributes (Verma & Pullman, 1998, p. 741).

4. RESEARCH METHODOLOGY: QUANTITATIVE DATA COLLECTION

4.1 Data collection methods and sample selection: literature review and discrete choice experiments with purchasers

First of all there was a literature review conducted where a trend of companies moving towards global sourcing was identified. Then the need for a clear distinction between two different forms of global sourcing, EU sourcing and Transcontinental sourcing was identified. The different types of sourcing: local, EU and transcontinental were defined. Our literature review followed with explaining social capital theory and its relatedness to the supplier selection process. Finally, multiple different forms and adaptations of SPE's were reviewed and the possible design and analysis methods of DCE's were explored.

The upcoming part of this study will consist of designing the experiment, conducting the experiment, the analysis of the results, the interpretation of the results and the comparison of the results with the outcomes of de Vries (2021, pp. 7-9). The aforementioned research questions will be answered by conducting a discrete choice experiment in which the respondent will be asked nine times to pick a preferred supplier out of three different options. The experiment will then provide us with numerical, quantitative data (Antonius, 2003, p. 2). The supplier selection process is a complex decision making process (Verma & Pullman, 1998, p. 741). A discrete choice experiment helps us to analyse such a complex process. DCE's do provide less rich information than other SPE's, due to its simplified ranking character (Hensher, 1994, p. 112). Even with this disadvantage, it is still the preferred choice of experiment. A large number of options to choose from greatly decreases the consistency of decision makers (DeShazo & Fermo, 2002, p. 138), which should be avoided for a reliable result. Because of the many different attributes related to local, EU and transcontinental sourcing in a supplier selection process, a discrete choice experiment is the preferred experiment for this study.

Twenty-five respondents, who are all purchasing experts within their companies, have conducted this experiment. The respondents all worked at companies that engage in either EU sourcing, transcontinental sourcing or both. Two companies provided multiple purchasing experts from different departments to conduct the experiment. The locations of the companies that employed the purchasing experts were:

Company location	Amount
The Netherlands	15
Germany	8

Figure 3: Interviewed companies locations.

This distribution of responding company locations is similar to the responding company locations distribution for the similar experiment conducted by de Vries (2021) (de Vries, 2021, p. 9).

The operating industries of the companies that employed the purchasing experts were:

Operating industry	Amount
Plastics	4
Building	2
Mining	1
EM tyre re-treading	1
Food	2
Automotive	4
Packaging	1
Software and technology	1
Interlining	1
Rubber and silicone	1
Engineering	1
Chemicals	1
Enrichment technology	1
Pharma	2
Telecommunication	2

Figure 4: Interviewed companies operating industries.

The experiment has been conducted online via digital communication platforms as well as physically. The participating purchasers were told that all suppliers passed the threshold to in order to be seriously considered as a partner and that the suppliers are all at least of a sufficient level for each attribute. However, the scores on each attribute differ per supplier. A supplier pick was always done from three different suppliers. Three different picks were presented nine times which resulted in nine preferred suppliers.

4.2 Research design: operationalisation of the discrete choice experiment

We are using only three social capital attributes and three general attributes per supplier in our discrete choice experiment. This is because too many attributes in your experiment could lead to respondents not taking some attributes into consideration (Mangham et al., 2009, p. 153; Sanko, 2001, p. 22). There is no hard maximum on the amount of attributes that should be used, but most studies do not use more than ten (Mangham et al., 2009, p. 153). Other studies on the supplier selection have used six attributes (Mummalaneni et al., 1996) and five attributes (Verma & Pullman, 1998). In this experiment, a seventh attribute 'are we attractive for the supplier?' is added on the supplier cards. This is not a social capital theory nor a general attribute. This attribute is derived from the agency theory. This attribute is implemented because this attribute was used by the experiment of de Vries (2021). In order to compare the results with a previous experiment, the choice cards presented should have the same attributes as in the previous experiment.

The relatedness of social capital theory and the supplier selection process has been explored. Three different types of capital have been defined for social capital theory: cognitive capital, relational capital and structural capital. An attribute for each of

these definitions can be defined using the theory behind them. An overview of the created attributes that will be shown on the supplier selection cards with their respective possible values:

Theory	Attribute	Levels
General	Sourcing location	Local/EU/ Transcontinental
	Price	Poor/Ideal
	Quality	Poor/Ideal
Social capital	Cultural barriers	No/Yes
	Relationship with the supplier	Poor/Ideal
	Joint IT platform for communication	No/Yes
Agency	Are we attractive for the supplier?	No/Yes

Figure 5: Supplier selection card attributes and levels.

Cognitive capital can be defined by two different parties sharing a similar culture or language (Bohnenkamp et al., 2020, p. 88; Steinle et al., 2019, p. 365; Yim & Leem, 2013, p. 325). This is converted into the attribute 'cultural barriers', which are either present ('yes') or absent ('no'). For relational capital, 'relationship with the supplier' has been created as an attribute. This defines whether the relationship is well-developed ('ideal') or not ('poor'). Finally, structural capital can be strengthened through communication platforms (Bohnenkamp et al., 2020, p. 89), which is why the attribute has been defined as the presence of a 'joint IT platform for communication'. The attribute levels, which indicate the presence, are 'yes' and 'no'." (de Vries, 2021, p. 6).

The 'are we attractive for the supplier' attribute gives an indication of how likely it is that a supplier will take advantage of information asymmetry. A beneficial buyer-supplier relationship is likely to emerge if the buyer is an attractive collaborator for the supplier. Aspects of a beneficial relationship, such as mutuality and solidarity, can reduce opportunism (Steinle et al., 2014, p. 127). (de Vries, 2021, p. 6). The 'are we attractive?' attribute has two levels: 'yes', which indicates that the attribute is present and 'no', which indicates the absence of that attribute. (de Vries, 2021, p. 6).

Choice cards can be created using the aforementioned social capital attributes, the agency attribute and the general attributes 'sourcing location', 'price' and 'quality'. SPSS, a data-analysis program, can be used to produce these choice cards. The SPSS command 'ORTHOPLAN' can produce choice cards using fractional factorial design. This creates the minimum amount of cards necessary for the experiment to be orthogonal and allows for analysis of the main effects (Sanko, 2001, p. 17). ORTHOPLAN produced 27 cards total with 9 choice cards for each different sourcing location level.

The SPSS code used to create the choice cards:

```
SET SEED 3000.
ORTHOPLAN
/FACTORS=
Location 'Location of the supplier'
(1 'Local' 2 'E.U.' 3 'Transcontinental')
Price 'The price of the supplier'
(1 'Ideal' 2 'Poor')
Quality 'The quality of prod provided by supplier'
(1 'Ideal' 2 'Poor')
Joint_platform 'Joint IT platform for comm'
(1 'Yes' 2 'No')
Relationship 'Definition of the relationship with supp'
(1 'Ideal' 2 'Poor')
Culture 'Cultural barriers' (1 'Yes' 2 'No')
Buyer_attractiveness 'Are we attractive for the supplier'
(1 'Yes' 2 'No')
/REPLACE
/MINIMUM 24.
```

The created choice cards were matched into 9 choice sets of three different 'sourcing location' cards using a random number generator. In total (25 respondents * 9 choice questions) = 225 choice questions were presented to the respondents. The choice cards clearly depict the supplier location and below that the supplier attributes with their respective levels. The choice cards are presented three at a time to allow for an easy comparison for the respondent. For all supplier card attribute values see Table 1 and for the supplier card attribute values used by de Vries (2021) see Table 2 (appendix).

A set of three choice cards presented to a respondent looks like the following:

ID: 4	Choice 1 Local supplier	ID: 1	Choice 2 EU supplier
	Location: Local		Location: Different country, but in the EU
	Price: Ideal		Price: Ideal
	Quality: Ideal		Quality: Ideal
	Joint IT platform: Yes		Joint IT platform: No
	Relationship with supplier: Poor		Relationship with supplier: Ideal
	Cultural barriers: No		Cultural barriers: Yes
	Are we attractive: No		Are we attractive: Yes

ID: 3	Choice 3 Transcontinental supplier
	Location: Outside of the EU
	Price: Ideal
	Quality: Ideal
	Joint IT platform: No
	Relationship with supplier: Ideal
	Cultural barriers: No
	Are we attractive: No

Figure 6: An example of a set of suppliers to choose from.

4.3 Analysis method: conditional logit models using SPSS

Regression models are the best method when analysing choice data (Berendsen, 2015, p. 18; Mangham et al., 2009, p. 156; Verma & Pullman, 1998, p. 743). The DCE in this experiment contains attributes with different values for each question. Using conditional logit models is the best method to analyse these (Berendsen, 2015, p. 18). Conditional logit models assume that respondents assign a utility to choice options (Steckel & Vanhonor, 1988, p. 391), which then corresponds with the random utility theory on which DCE's are based (Louviere et al., 2010, p. 62). An alpha α of 0,05 is used for the analysis phase.

SPSS can execute a Cox regression analysis to be able to apply conditional logit models on the data. Every respondent was assigned (9 * 3 options) = 27 rows. Three rows per choice question. Two respondents did not correctly complete the experiment. This means (23 respondents * 27 rows) = 621 rows of data. De Vries (2021) collected (11 respondents * 27 rows) = 297 rows of data. Both experiments combined account for a total of (621 + 297) = 918 rows of data. First of all, each row consists of a respondent 'ID' ranging from 1-23 (or 1-34 including the 2021 experiment data), corresponding to a purchasing expert that completed the experiment. Then each row has every attribute mentioned on the supplier cards, where 'supplier location' has the possible levels of 1 = 'Local' 2 = 'EU' and 3 = 'Transcontinental'. All the other attributes have the values 0 = 'poor' / 'no' or 1 = 'ideal' / 'yes'. Local sourcing has been chosen as the reference category in order to be able to obtain data on EU and transcontinental sourcing. Each row also consists of the variable 'Choice' which indicates whether a supplier card (the row) was a preferred card. 'Choice' can have the levels 0 = 'not preferred' or 1 = 'preferred'.

Lastly, each row has the variable 't'. This variable is necessary to compute for the survival analysis of the Cox regression. The value of 't' = 2 - Choice, which means that its value is 2 when a card is not preferred and 1 when a card is preferred. The following SPSS coding is required to compute variable 't':

```
COMPUTE t=2 - Choice.
EXECUTE.
```

The Cox regression can be executed once the dataset is filled. 't' Should be taken as the time variable. 'Choice' should be taken as the status variable. 'ID' should be the stata variable. All other attributes should be entered in the block. 'Sourcing_location' should be set as a categorical indicator in order to get data on EU and transcontinental sourcing locations. Single value should be set to 1 for 'Choice' as well as 'Sourcing_location' to indicate the reference values.

This resulted in the following SPSS code:

```
COXREG t
/STATUS=Choice(1)
/STRATA=ID
/CONTRAST
(Sourcing_location)=Indicator(1)
/METHOD=ENTER
Price Quality
Joint_IT_pltfrm
Relationship_w_spplr
Cultural_barriers
Are_we_attractive
Sourcing_location
/CRITERIA=PIN(.05) POUT(.10)
ITERATE(20).
```


The SPSS code above resulted in the following output for this research (2022 experiment):

	B	SE	Wald	df	Sig.	Exp(B)
EU_sourcing	-,368	,163	5,117	1	,024	,692
Transcontinental_Sourcing	-,758	,190	15,960	1	,000	,469
Price	,384	,168	5,227	1	,022	1,467
Quality	,953	,195	23,793	1	,000	2,593
Joint_IT_platform	,160	,157	1,033	1	,310	1,173
Relationship_with_supplier	1,486	,234	40,495	1	,000	4,419
Cultural_barriers	,196	,158	1,540	1	,215	1,217
Are_we_attractive	,163	,160	1,038	1	,308	1,177

Figure 7: SPSS Cox regression output (2022).

The SPSS code above resulted in the following output for the research by de Vries (2021) (2021 experiment):

	B	SE	Wald	df	Sig.	Exp(B)
EU_sourcing	,186	,234	,629	1	,428	1,204
Transcontinental_Sourcing	-,821	,304	7,278	1	,007	,440
Price	,862	,278	9,587	1	,002	2,367
Quality	1,111	,303	13,423	1	,000	3,036
Joint_IT_platform	,586	,240	5,954	1	,015	1,797
Relationship_with_supplier	,832	,290	8,233	1	,004	2,299
Cultural_barriers	-,171	,235	,533	1	,465	,842
Are_we_attractive	,585	,251	5,435	1	,020	1,795

Figure 8: SPSS Cox regression output (2021).

The SPSS code above resulted in the following output for the combined data of the 2021 and 2022 research (2021 + 2022 experiments):

	B	SE	Wald	df	Sig.	Exp(B)
EU_sourcing	-,196	,132	2,191	1	,139	,822
Transcontinental_Sourcing	-,773	,161	23,061	1	,000	,462
Price	,503	,143	12,435	1	,000	1,653
Quality	,973	,164	35,288	1	,000	2,646
Joint_IT_platform	,286	,131	4,765	1	,029	1,331
Relationship_with_supplier	1,265	,181	49,093	1	,000	3,543
Cultural_barriers	,095	,130	,534	1	,465	1,100
Are_we_attractive	,282	,134	4,384	1	,036	1,325

Figure 9: SPSS Cox regression output (2021 + 2022).

5. RESULTS: ANALYSIS OF THE DISCRETE CHOICE EXPERIMENT

5.1 Effect of the social capital theory on the supplier selection process

The outcomes of the attribute weights in the social capital theory DCEs conducted in 2021 and in 2022 and their combined outcome presented in a bar chart including a table containing all exact weight values:

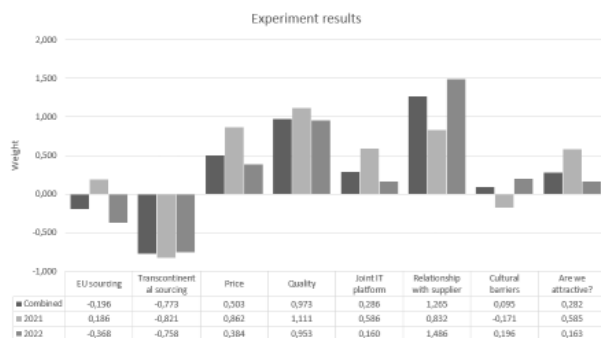


Figure 10: Cox regression attribute weight results of the 2021 and 2022 DCE and their combined results.

The aim is for results that are statistically significant at a significance level of $\alpha < 0,05$.

The significant outcomes for $\alpha < 0,05$ of the attribute weights in the social capital theory DCEs conducted in 2021 and in 2022 and their combined outcome presented in a bar chart including a table containing all exact weight values:

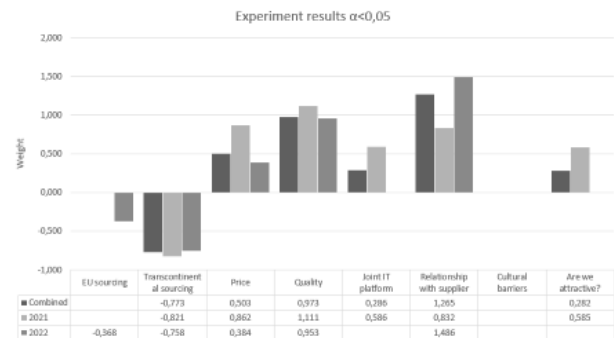


Figure 11: Significant for $\alpha < 0,05$ cox regression attribute weight results of the 2021 and 2022 DCE and their combined results.

The significance levels of the attributes in the social capital theory DCEs conducted in 2021 and in 2022 and their combined outcome:

	EU sourcing	Transcontinental sourcing	Price	Quality	Joint IT platform	Relationship with supplier	Cultural barriers	Are we attractive?
Combined	0,139	0,000	0,000	0,000	0,029	0,000	0,465	0,036
2021	0,428	0,007	0,002	0,000	0,015	0,004	0,465	0,020
2022	0,024	0,000	0,022	0,000	0,310	0,000	0,215	0,308

Figure 12: The significance levels of the attributes in the 2021, 2022 and combined results.

The survival analysis of the cox regression of the discrete choice experiment conducted in this research has been able to identify only one statistically significant attribute related to social capital theory. The attribute 'Relationship with the supplier' appears to be a very important factor when selecting a supplier. Other statistically significant attributes are 'Price' and 'Quality'. A high quality appears to be very important for purchaser, a lot more important than the price actually. However, not as important as the relationship with the supplier. The last two identified statistically significant factors are the transcontinental and EU supplier locations. It appears that when a supplier is located transcontinental, it makes that supplier a lot less attractive for purchasers. If a supplier is located within the EU, but outside of the domestic country of the purchaser, that is also considered as a negative attribute compared to a local sourcing. However, EU sourcing only carries half the negative weight of transcontinental sourcing.

A supplier is proven to be more attractive when they can offer a high price, quality and when its relationship with the purchasing company is well developed. Transcontinental suppliers and EU suppliers are less attractive than a local supplier in terms of location.

5.2 Comparison with previous research

The comparison with results from de Vries (2021, p.8) indicates some interesting differences. First of all, the DCE in 2021 resulted in a statistically significant result for the attributes 'Joint IT platform for communication' and 'Are we attractive for the supplier?' where the 2022 DCE did not. These attributes are respectively social capital theory and agency theory attributes. However, the 2022 DCE has found a statistically significant result for "EU sourcing" where the 2021 DCE did not. This attribute is a location attribute. Within the overlapping significant attributes between both DCE's; 'Relationship with the supplier', 'Quality', 'Price' and 'Transcontinental sourcing' some slight differences can be observed. The impact on perceived supplier utility from 'Quality' and 'transcontinental sourcing' has only slightly declined in 2022 compared to 2021. However,

'Relationship with the supplier' has seen a significant increase and 'price' has seen a significant decrease in perceived supplier utility. Perceived supplier utility has almost doubled for the former and has almost halved for the latter compared to the 2021 DCE.

5.3 Combined data

A cox regression on the combined data of both the 2021 and 2022 experiments resulted in the attributes 'Transcontinental sourcing', 'Price', 'Quality', 'Joint IT platform', 'Relationship with supplier' and 'Are we attractive?' being statistically significant for $\alpha < 0,05$. Also, 'EU sourcing' is significant for $\alpha < 0,15$. Due to the merging of the data, and therefore increasing the amount of data, all attributes except 'Cultural barriers' are statistically significant.

6. CONCLUSION AND DISCUSSION

6.1 Social capital theory can partly explain the supplier selection process

The conducted discrete choice experiment has identified the importance of several supplier attributes in a supplier selection process. Among these attributes is a social capital attribute as well as a widely used attribute. The importance is measured in a purchaser's perceived utility. The obtained insights in how purchases trade-off between the different attributes and in the perceived importance of different attributes provide an answer for our main research question:

"How do widely used supplier attributes and attributes from the social capital theory explain the purchaser's choice between local, EU and transcontinental sourcing?"

To begin with the regular, widely used, supplier attributes that were found to be statistically significant during the supplier selection process: 'EU sourcing', 'Transcontinental sourcing', 'Price' and 'Quality'. 'Transcontinental sourcing' and 'EU sourcing' carry a negative weight. This means that for purchasers a transcontinental supplier or EU supplier has a lower perceived utility compared to a local supplier. This indicates that sourcing within the purchaser's domestic country within the EU is preferred over sourcing from outside of the EU or from within EU but not in the purchaser's domestic country. Sourcing within the EU is preferred over sourcing outside of the EU.

The 'Price' and 'Quality' attributes carry a positive weight. This indicates that a supplier's quality and price play an important role for a purchaser's perceived utility of that supplier in the supplier selection process. The positive weight means that a higher quality or a lower price means a higher perceived utility. Quality has more weight than price, which means that quality is deemed to be more important than price when selecting a supplier.

The only social capital attribute that shows statistically significant data is the 'Relationship with supplier' attribute. Relationship with the supplier shows a highly positive weight on a purchaser's perceived supplier utility. This means that a well-developed relationship with a supplier is important for purchasers. The other social capital attributes show no statistically significant data. Therefore, no conclusion on the attributes 'Cultural barriers' and 'Joint IT platform for communication' can be drawn. The agency theory attribute 'Are we attractive?' also does not show statistically significant data.

The statistically significant supplier attributes: 'Relationship with the supplier', 'Quality', 'Price', 'EU sourcing' and 'Transcontinental sourcing' carry the weight of respectively 1,486; 0,953; 0,384; -0,368 and -0,729. Even though not all social capital attributes provided statistically significant results, social capital attribute 'Relationship with the supplier' carries the

most weight of all attributes identified as statistically significant. Therefore we can argue that social capital theory is, at least to a certain extent, important for a purchaser's perceived utility of a supplier in the supplier selection process.

The negative weight of transcontinental sourcing or EU sourcing can be outweighed by just the 'Relationship with a supplier' attribute or the 'Quality' of a supplier attribute on its own, which explains why European companies do engage in continental or transcontinental sourcing despite their negative weights.

In conclusion, purchasers prefer sourcing domestically over sourcing transcontinental. However, certain attributes that have a positive weight on the purchasers perceived supplier utility can outweigh the disadvantages of continental or transcontinental sourcing.

6.2 An increased importance of supplier relationships

When comparing the results found in this study with the results found by de Vries (2021, p.8), who conducted a similar experiment, there are some significant differences in attribute weights. The attribute 'Relationship with supplier' has almost doubled in positive weight. Also, all other statistically significant overlapping attributes have decreased in positive weight. Especially 'Price' has more than halved in weight. This indicates that over the past year, purchasers have started to worry more about a solid relationship with their supplier. Cost has become less important. So it seems like an important goal to have a strong relationship with your supplier, even when it goes at a cost of other attributes, especially price.

Purchasing and supply management has faced unprecedented disruption over the past two years due to the COVID-19 pandemic, input shortages, extended supplier lead times, record international transportation costs and commodity price increases (Miller & Kulpa, 2022, p. 1). If a consumer has experienced supply shortages in the past, that consumer is more likely to engage in panic-buying when they anticipate future supply shortages (Yoon et al., 2018, Chapter 6). This anxious behaviour could have been playing a role during the experiments. The war between Ukraine and Russia was just upcoming during the period of interviewing and caused a lot of uncertainty around the world. A war can, e.g. through cyber-attacks, easily disrupt a supply chain (Lim et al., 2022, p. 7).

A way to mitigate supply uncertainty is by becoming a preferred customer of your supplier. Preferred customers are awarded preferential resource allocation (Steinle & Schiele, 2008, p. 11). Privileged treatment by a supplier can contribute to a firm's competitive advantage (Steinle & Schiele, 2008, p. 11). This combination of mitigating risk through building a strong relationship while deriving an indirect competitive advantage rather than directly through price negotiations could explain why purchasers are focussing less on price and other attributes.

In terms of locational attributes, despite only having a significance level of $\alpha=0,428$ in 2021, the popularity of EU sourcing appears to have plummeted in 2022. Where there was a positive perceived utility of 0,186; $\alpha=0,428$ there is now a negative perceived utility of -0,368; $\alpha=0,024$. However, transcontinental sourcing has seen a slight decrease in negative weight, from -0,821; $\alpha=0,007$ to -0,758; $\alpha<0,001$. Research shows that intra-EU trade is indeed in decline with an average change of -6,7% in EURO countries between 2003 and 2019 (Eurostat, 2021; Koerber & Schiele, 2022, p. 5). Costs can be a strong motive to choose a transcontinental supplier, whereas operative challenges tend to be obstacles. Factors supportive of

as well as detrimental to transcontinental sourcing tend to outweigh each other (Koerber & Schiele, 2022, p. 11).

Combining the data of the 2021 and 2022 experiments caused most attributes to be more statistically significant. Compared to the 2022 experiment, the combined data produced two new statistically significant attributes for $\alpha < 0,05$. These attributes are 'Joint IT platform' and 'Are we attractive?'. The former is a social capital attribute and the latter is an agency attribute. Both attributes carry a relatively small positive weight with respectively 0,286 and 0,282. The positive weight of 'Joint IT platform' supports the claim made in 6.1 that social capital theory partly explains the supplier selection process. The positive weight of 'Are we attractive?' indicates that agency theory somewhat explains the supplier selection process.

Combining the data gathered by de Vries (2021) and the collected data in this research has helped to reduce the significance levels of most attributes. This made the computed weights more representative for the total purchasing population and therefore the results more reliable.

6.3 Limitations of the research

In order to keep the experiment straightforward and not over-complicated for the respondents, all attributes consisted only of two extreme values. In reality, attribute levels would occur more moderately. The simplification of the attribute levels has made the suppliers in the experiment less representative for a real-world situation.

The ORTHOPLAN command in SPSS creates an orthogonal plan. An orthogonal plan only analyses the main effect between the attributes and the utility level, which causes the interactions among the attributes to not be analysed. This causes approximately 20% of the explanation of the variance in our data to be missing (de Vries, 2021, p. 9)

There is a small gap in the locational attribute within this research. The locational attributes consist of local, EU and transcontinental. There are however countries in Europe but not in the European Union, such as the United Kingdom. This causes these countries to be excluded from this research while they could have brought new insights.

The sample size of 23 (or 34) respondents is rather small and likely not representative for the entire purchasing population. With a larger sample size the possibility of finding even more statistically significant attributes would have been higher. Also, in the comparison with the previous experiment conducted by de Vries (2021) it was a limitation that little statistically significant attributes were overlapping due to a small sample size of 11 companies in that paper.

6.4 Possible future research

As mentioned in the limitations, a larger sample size could provide an even more realistic insight in different attributes and their respective weights. The DCE can be reproduced for future research to be conducted with more purchasing experts to create a larger sample size. This will provide more representative results for the entire purchasing population. It could prove to be interesting to observe different trends in weight shifts between attributes as the world keeps changing.

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9. APPENDIX

Choice question	Local sourcing						EU sourcing						Transcontinental sourcing					
Attribute ->	A1	A2	A3	A4	A5	A6	A1	A2	A3	A4	A5	A6	A1	A2	A3	A4	A5	A6
1	1	1	1	0	0	0	1	1	0	1	1	1	1	1	0	1	0	0
2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1
3	0	1	1	0	1	1	0	1	1	1	0	0	1	1	1	1	1	1
4	1	1	0	1	0	1	1	0	1	0	1	1	0	1	1	1	1	1
5	0	0	0	1	1	1	1	0	1	0	1	0	1	0	1	1	1	1
6	1	0	1	1	0	1	1	1	1	1	1	0	1	1	0	0	1	0
7	0	1	1	1	1	0	0	0	0	0	0	1	0	0	0	1	1	0
8	1	0	1	1	1	0	0	1	1	1	0	1	0	1	1	0	1	1
9	1	1	0	0	1	1	1	1	0	1	1	1	1	1	1	0	0	1

Table 1: Experiment 2022 choice card attribute levels: 0 = ‘no’/‘poor’, 1 = ‘yes’/‘ideal’. A1=‘Price’, A2=‘Quality’, A3=‘Joint IT platform for communication’, A4=‘Relationship with supplier’, A5=‘Cultural barriers’, A6=‘Are we attractive?’.

Choice question	Local supplier						EU supplier						Transcontinental supplier					
	A1	A2	A3	A4	A5	A6	A1	A2	A3	A4	A5	A6	A1	A2	A3	A4	A5	A6
1	0	0	0	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0
2	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	0	1
3	1	1	1	0	0	0	0	1	1	1	0	0	0	1	1	1	1	1
4	0	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	0
5	0	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1
6	1	0	1	1	0	1	0	1	1	1	0	1	0	0	0	1	1	0
7	1	1	1	1	1	1	1	0	1	0	1	0	1	1	1	0	0	1
8	1	1	0	1	0	1	0	0	0	0	0	1	1	0	1	1	1	1
9	1	0	1	1	1	0	1	0	1	0	1	1	0	1	1	0	1	1

Table 2: Experiment 2021 choice card attribute levels: 0 = ‘no’/‘poor’, 1 = ‘yes’/‘ideal’. A1=‘Price’, A2=‘Quality’, A3=‘Joint IT platform for communication’, A4=‘Relationship with supplier’, A5=‘Cultural barriers’, A6=‘Are we attractive?’ (de Vries, 2021, p. 12).