

SUPPORTING PURCHASING PROFESSIONALS WITH AN AI SIMULATION TOOL IN DECISION MAKING

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ABSTRACT

The existing literature and ongoing debate about bounded rationality argues that self-interest, power and politics influence the decision maker. The purpose of this study is to build and propose a simulation model that helps decision makers in the purchasing & supply management field to cope with bounded rationality in taking the most advantageous sourcing decision regarding the Brexit. This study is designed to take interviews with two purchasing professionals to assess the degree to which bounded rationality is relevant and to identify variables to include in the model. The findings of the interview show that uncertainty about the type of Brexit and the contextual factors of an organization make decision making complex. The proposed model has therefore included uncertainty and major contextual factors. Finally, the model takes away bounded rationality of a decision maker, to a certain degree.

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Keywords

Brexit, Procurement, Bounded Rationality, AI, Sourcing, sensitivity analysis, decision making

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1. INTRODUCTION

June 23, 2016; the participating UK electorate voted to leave the EU. The process of leaving the European Union can be paired with a potential trade deal. The official withdrawal process began when Article 50 was triggered on 29 March 2017. This gave the UK two years' time until 29 March 2019. However, with no trade deal in place, EU leaders have granted an initial extension of the article 50 process until 31 October 2019. The potential forms of a Brexit trade deal are categorised under the terms "Hard" and "Soft". According to the Greater London Authority, there are five possible outcomes of the Brexit ranging from a soft to a hard Brexit¹. Therefore, the economic impact of the Brexit depends largely on the type of Brexit. Given the fact that out of UK its total export, the export to the EU counts in 2017 for almost 50%.² Particularly, organizations applying a global sourcing strategy with suppliers from the UK are facing questions whether to phase out suppliers from the UK or not. The question to phase out suppliers or not is a strategic business decision.

This paper is practically relevant because it will study, if conducting a Vensim sensitivity analysis on the effect of the different types of Brexit scenarios, on the procurement cost of European companies supplying from the UK, will decrease the probability of decision making biases due to limitations of bounded rationality. The use of VENSIM could support purchasing professionals in taking the most advantageous sourcing decision. Besides that, this study will also contribute to the ongoing debate about the Brexit. VENSIM, is a simulation software tool that allows to create models to analyze a range of scenarios. This simulation tool will be used to implement the Brexit scenarios into the steps of procurement processes. VENSIM is used in a wide variety of domains; Transportation and Energy (Goldner and Borener 2006, Struben and Sterman 2008), Business Strategy (Sterman, Henderson et al. 2007), Health (Marshall, Burgos-Liz et al. 2015), Security and Terrorism (Pruyt and Kwakkel 2014), Project Management (Rahmandad and Hu 2010), Marketing science³ and logistics (Anderson Jr, Fine et al. 2000). This paper argues that the view that the strategic decision-making process to phase-out a supplier located in the UK or not clearly reflects a rational model of choice, which will be further discussed in the literature review.

Therefore, the research question is as follows: "How can VENSIM support purchasing professionals in EU in taking the most advantageous sourcing decision considering the Brexit?"

The most advantageous sourcing decision will follow a rational decision-making process. This approach poses certain organizational problems because a normative rational approach of decision making requires a clear problem definition, criteria definition, consideration of all alternative options and understanding the solution (Williams 2002). As opposed to rational decision making, the notion of bounded rationality implies that rationality is limited when individuals make decisions (Simon 1955). This paper holds the view that some limitations to human rationality can be mitigated using AI-tools such as VENSIM.

2. THE LITERATURE REVIEW

This chapter will review the existing literature to define the concepts and theories that are required to answer the research question; "How can VENSIM support purchasing professionals in EU in taking the most advantageous sourcing decision considering the Brexit?". First, the concept sourcing decision will be defined. Second, the concept "most advantageous" will be defined using the purchasing and supply management literature. Third, the theories that strengthen the view of this paper that limitations to human rationality can be mitigated using VENSIM will be described. Then, I will describe the 5 forms of Brexit and their consequences. Finally, I will propose how the most advantageous sourcing decision is limited by the bounded rationality of decision makers, and that Vensim could partially mitigate for this constraint in decision making.

2.1 The most advantageous sourcing decision

The sourcing decision that the purchaser must take with regards to the Brexit event goes beyond a domestic decision and reflects a global sourcing decision. Global Sourcing is defined as; "proactively integrating and coordinating common items and materials, processes, designs, technologies, and suppliers across worldwide purchasing, engineering, and operating locations" (Monczka and Trent 2002). Thus, Global sourcing decisions can be seen as strategic decisions because strategic decisions are "important, in terms of the actions taken, the resources committed, or the precedent set" (Mintzberg, Raisinghani et al. 1976). Continuing from the view that global sourcing decisions are strategic business decisions, raises the question of what the most advantageous sourcing decision is. The optimal sourcing decision is one that saves most costs and creates the most value to an organization. In addition to the cost-saving and value creating perspectives, the most commonly known and applied methods for effective strategic sourcing are the Kraljic Matrix (Kraljic 1983) and Cox Power Analysis (Cox 2001, Cox 2015). The former advises to consider supply market complexity and importance of a purchased item whereas the latter approach advises to consider the supplier and buyer power. Therefore, I state that the most advantageous sourcing decision is the one that saves cost, adds value to an organization and considers, market complexity, importance of a purchased item and buyer power & supplier power.

2.2. Bounded Rationality theories

A well-known approach in decision making is the rational model of choice. This approach is characterized by a real identifiable problem (1), relevant identifiable criteria that are weighted appropriately (2), all options and considerations are understandable and taken into consideration (3) and all participants understand and support the solution (4) (Williams 2002). In contrary, bounded rationality scholars argue that the problem definition reflects the decision maker's interest, understanding and needs (1a), the identifiable criteria and options are limited to the self-interest of the decision maker (2a), consideration stops when a "good enough" solution is found (3a) and politics, power and self interest play an important role in the commitment to a final decision (4a) (Williams 2002). The concept of bounded rationality is advanced by Simon (Simon 1957), he argued that "decision-makers can rarely obtain and evaluate all the information which could be relevant to the making of a decision. Instead, they work with limited and simplified knowledge, to reach acceptable, compromise choices ('satisficing'), rather than pursue 'maximizing' or 'optimizing' strategies in which on particular objective is fully achieved." I believe that the increase in computing and networking power enabled the development of AI, which is known to have huge cost-saving potential and faster time-to-market. Particularly, I

believe that AI tools also decrease the costs related to finding the best solution and taking the best possible decision.

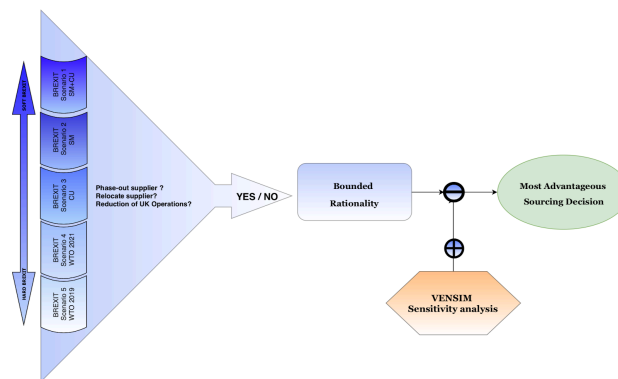
2.3. Brexit Scenarios and their impact on the purchasing function

As mentioned before, there are five forms of a Brexit, which can be placed on a sequence ranging from soft to hard. The five scenarios are conceptualised as follows:

1. Continued single market and customs union membership from march 2019.
2. Two-year transition period followed by single market membership, without custom union membership.
3. Two-year transition period followed by customs union membership, without a single market membership.
4. Two-year transition period followed by no membership of the single market and customs union and falling back to WTO-rules
5. No transition period, no single market or customs union membership, and no preferential EU/UK trade agreement.

Basically, a transition period, the membership to the single market and/or customs union, and a potential trade agreement define how hard the Brexit will be. If the UK and EU do not agree on a potential trade deal, the trade between the single market and UK will be regulated by WTO rules. This is the case with the fourth and fifth scenario. Therefore, with respect to the most advantageous sourcing decision, which I have defined as value adding and cost saving, the additional WTO-tariffs will be included in the sensitivity analysis. The additional costs are calculated by Dinghra et al 2016. Another important issue are the so-called non-tariff barriers. These barriers apply from scenario 2 to 5 (GLA). Considering that those barriers will limit the value adding potential of a trade, and increase costs of a trade, they will be included in the sensitivity model. The Cambridge econometrics have calculated the additional costs in percentages based on the assumptions of Berden et al 2009. Within international trade, INCOTERMS are relevant, hence the type of INCOTERM agreement decides which party bears the costs of transportation/tariffs. This becomes interesting within the context of the Brexit, since leaving the customs union will potentially result in an extension of lead times (2017 pwc report). Yet, one of the most anticipated concepts within the Brexit is the development of the pound. So far, the GBP has lost its value tremendously. However, this does not exclude future depreciations of the pound. According to Gregory Thwaites, research director at WorldRemit, and previous Head of International Research at the Bank of England, "The pound will react to the extent and manner of the government's likely defeat in the vote, with a heavier defeat more likely to push down on an exchange rate that has already depreciated a great deal". As of today, 22nd of may 2019, still no trade deal has been placed. The proposed trade agreement by Theresa May has been voted down already twice by the British parliament. Moreover, the value of the pound is subject to speculations and potential Brexit scenarios. According to Daniel Trum, a currency strategist at UBS, and Dean Turner, UBS' chief UK economist; "At current levels, the currency is still pricing in a benign outcome. A hard Brexit could easily see sterling loose another 10%, in our view."

2.4. Proposing a model; Mitigating bounded rationality within decision making.



Model 1: The mitigation of bounded rationality through VENSIM, in taking the most advantageous sourcing decision

Model 1 illustrates that the bounded rationality in decision making can be mitigated through a VENSIM sensitivity analysis. Usually, the most advantageous sourcing decision follows a rational decision-making process. In this paper, I argue that rationality is limited when individuals make decisions (Simon 1955). The potential Brexit scenarios can be resembled as limited and simplified knowledge since the outcome of the Brexit event is not certain and the extent information about the Brexit only provides macro-level and industry specific consequences. Therefore, I argue that the available general information that the decision maker could collect regarding the consequences of the Brexit, is limited and simplified because it does not include contextual factors of a specified firm.

Proposition 1: Purchasing professional make 'satisficing' decisions instead of 'maximizing' decisions, mainly because those professionals would rely on limited and simplified knowledge.

Given that 'decision-makers can rarely obtain and evaluate all the information which could be relevant to the planning of a decision' (Simon 1955), I argue that the use of VENSIM could mitigate this effect because "it enables firms to do analysis that lead to suitable planning decision making where various operational alternatives are evaluated" (Mula, Campuzano-Bolarin, Díaz-Madroñero, & Carpio, 2013). Moreover, simulations help firms in raising awareness about contextual supply chain processes (Biswas & Narahari, 2004). Nevertheless, the final decision whether to phase out suppliers located in the UK or not is still dependent on the bounded rationality of the purchasing professional. Using a vensim sensitivity could support the purchasing professional in taking the most advantageous decision by providing the responsible professional with effective simulations, in which all the relevant variables will be included. Thus, drawing further on the rational decision making approach

Proposition 2: The use of a scenario analysis could support the decision planning party, subject to bounded rationality, by mitigating the 'satisficing' effect in the decision making process through transferring the data evaluation to VENSIM.

3.METHODOLOGY

3.1 Interviews

To answer my research question “How can VENSIM support purchasing professionals in EU in taking the most advantageous sourcing decision considering the Brexit?” Qualitative data will be collected through interviews with purchasing and production process professionals in various industries, to gain more insights for the variables to include in the vensim sensitivity analysis. I will serve the professionals with the Brexit case and assess their level of rationality in decision making regarding the case about phasing out suppliers or not, by asking them open-ended questions. Besides that, I will also discuss the applicability of simulation tools such as VENSIM and their added value in terms of leading to the most advantageous decision (UT MscSCM Students and more interviewees are to be connected). According to Yin (2010) a case study can be considered as an important methodology in human sciences that allows a deepening of the knowledge about a phenomenon. A case study makes it possible to shed light on knowledge that could not be perceived by quantitative analysis. Case studies are appropriate when “[...] a "how" or "why" question is asked in a contemporary set of events over which the researcher has little or no control”(Yin 2003, Yin 2014). Basic knowledge about decision making, benefits of simulation models and stepwise strategic sourcing decision are already well-documented. However, I am interested in thoughts and motivations of purchasing professionals, which are often not documented. Those elements beyond the scope of documentation are the ones causing complex problems. Therefore, I have decided to conduct interviews. According to King (King 2004) a set of pre-defined questions is elaborated in semi-structured interviews, but there is freedom for other interests arising during the interview. The type of interview that this paper uses is Semi-Structured interview because the interviewees should be able to express their vision, motives and opinions using their own terms. The interviewees will vary between business purchasing professionals from at least two different companies and/or purchasing professional in the educational field. Other Public but credible sources will be used when additional quantitative data is needed for my thesis.

3.2 Interview design

The interviewees for this study are selected carefully. I have selected two contestants based on the following criteria. (1) A master's degree in purchasing & supply management (2) Recently graduated. This criteria is important because recent graduates possess the most recent information in the field. This criteria is even more important than the experience (3) 1+ years purchasing experience.

The interview questions are divided in four domains.

- Brexit
- Variable / Vensim
- Bounded rationality
- Most Advantageous Sourcing Decision

The aim of the interviews is to gain in depth information about the brexit. Also, to gain insights into the feasibility of a vensim model that will support decision making. On top of that, the interview is designed to indirectly observe the degree to which decision makers are taking decisions under self-interest and are influenced by power and politics. Finally, the interviews will confirm or give more insights about the pre-defined Most Advantageous Sourcing Decision for an organization.

4.RESULTS

4.1 Interview results

The obtained information from the interviews is used to test the model throughout the development. They show that the impact of the Brexit will vary from the type of Brexit to the context in which the organization is operating in. Besides that, the interviewees underlined that the impact differs, according to the context of the organization. The two interviewees are asked about 4 topics that are important for this research; Brexit, Vensim, Bounded rationality and the Most Advantageous Sourcing Decision. I have gained valuable information about these topics. Regarding the Brexit, it became clear that the biggest struggle for organizations is that the outcome is uncertain. Purchasers follow the news and are exposed to speculation. Both interviewees expect a hard Brexit. When it comes to meaningful variables to include in the model, the purchasers suggest the EUR/GBP currency, since this may impact the price. The outcome of the interview also shows that it is worth including the INCOTERMS in the vensim model. The buying company should review existing contracts with suppliers because INCOTERMS define which party bears the responsibility from packaging till the import duty and taxes. Regarding bounded rationality, both interviewees highlight that decisions are taken in the best interest of the company. Both suppliers believe that their decision-making process is not influenced by self-interest. But the interviewees also mention that good buyer-supplier relationships can indirectly lead to a sourcing decision that stems from self-interest. Basically, a relationship consists of at least two parties. This implies that deciding for a supplier because of positive experience from the existing relationship shows an act which stems partially from self-interest. On top of that, upper management seems to directly and indirectly influence the decision-making process of functional buyers. Thus, self-interests, politics and power play an important role in the decision-making process of purchasing professional. A “good enough” solution is considered as one matching the specified organizational need. This solution supports acquisition for the best price and is adding value to the organization. In best case, a good purchasing solution could bring competitive advantage to the organization.

4.2 Variable explanation

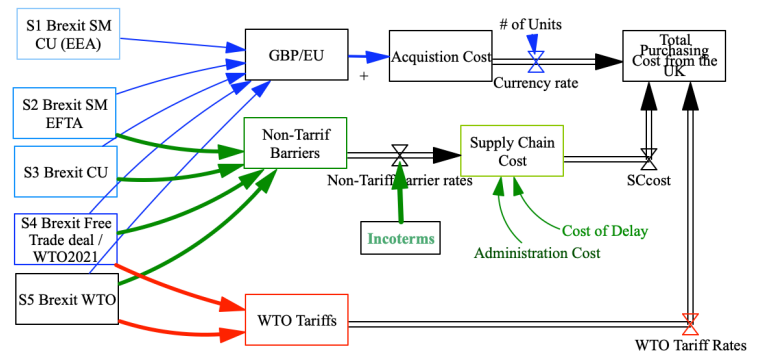
As a result of the interviews I conducted, the variables identified, were implemented in the Vensim model. In the table below (Table 1) I provided a specified overview, of the values and the Relevance of all variables implemented to the model.

Variable	Value	Relevance
Brexit	Brexit Scenarios 1-5 ranging from a soft to a hard Brexit	As the independent variable of our research, every Brexit scenario, impacts each of the following Variables
GBP/EURO	Assumption: Scenario 1 : -1% Scenario 2 : -2% Scenario 3 : -3% Scenario 4 : -5% Scenario 5 : -6%	This variable has a direct impact on the variable Acquisition cost, which flows into the total purchasing cost from the UK. My research did not aim for finding the right values, hence this research is based on assumptions. Also, the expectations of industries according to their context, differs about the impact of the Brexit. Based on my assumptions, I speculate that even in an event of the worst case Brexit (Hard Brexit/ No trade agreement, WTO rules), which will result in increased Transportation/Tariff costs, competitive advantage will still be possible. Even with the increased costs of operations for the transportation of goods, if the Pound weakens the purchaser will benefit from the stronger Euro and can then compensate for the potential additional costs occurred. On the other hand, a weakening Euro could result in the contrary, which might lead to the decision to reduce UK operations.
Non-Tariff Barriers	Scenario 2: increase of ¼ Scenario 3: increase of ½ Scenario 4 / 5: increase of ¾ <i>Non-Tariff barriers related assumptions for UK-EU trade are based on the results of Berden et al (2009) on tariff equivalents of barriers between the USA -EU.</i>	The Variable Non-Tariff Barriers in my model, represents the Import/Export costs at customs, product standards, safety controls. Non-Tariff Barriers which are expected to increase in cost once the Brexit takes place. However, Rates of custom duty/tariffs depend on the type of Industry/ goods exported and that will lead to different Model outcomes based on different input.
Tariff - Barriers	Scenario 4 / 5 : WTO Tariffs	Product list of tariffs, taxes on imports of goods and quotas limiting the number of goods, that apply differently on type of Industry. These costs that can not be covered through INCOTERM agreements.
INCOTERMS	Extreme terms EXW and DDP	EXW = This term places the maximum obligation on the buyer, meaning that a buyer incurs the risks for bringing the goods to their final destination. So to speak, the buyer arranges the collection of the freight from the designated location, and is responsible for clearing the goods through Customs. This INCOTERM is relevant, hence if this term is in place, the buyer will become acquainted with price fluctuations of transportation and tariff costs, due to the impact of the Brexit. However, the other extreme form of INCOTERM, DDP - Delivered Duty Paid, states that the Seller is responsible for delivering the goods to the buyer, and pays all costs in bringing the goods to the destination including import duties/taxes covering insurance, administration and Non-Tariff barriers costs. This term, is in favour of European Purchasers, importing from the UK. If DDP is in place, we assume that UK-EU operations will not be highly effected in a negative context.
Supply Chain Cost:	Cost of Delay Administration Cost Non-Tariff Barriers:	Downtime/Delay cost - is a risk for the importing company, they have to take into account after the new trade regulations take place. Due to the event of a hard Brexit, stricter custom controls on export products from the UK to the Eu will emerge. Which will effect the overall delivery time. Administration cost - are all costs that occur in relation to the purchasing paper work. I assume that the Brexit will be followed by additional steps in the custom control and inspections, which will be accompanied by additional bureaucracy (tariff, tax,...)
Total Cost of UK Operation	Acquisition Cost Supply Chain Cost WTO Tariffs	Acquisition Cost - can be relevant. Even if the purchasing price of goods is fixed, currency fluctuations, so to speak weakening of the GBP could turn out as an immense advantage for the purchasing EU Company. Supply Chain Cost - will be impacted differently. Prices levels of labour/ transportation costs will suffer under any event of Brexit, especially delays, caused through the longer customs control, could lead to an increase in transportation costs since the occupation time of transportation service providers will need to be extended with every UK-order for an unknown time, favourable INCOTERM agreement covers Supply chain costs including Non-Tariff Barrier rates.

Table 1: Model Variables, Values and Relevance

4.3 Model description

In this simulation model, designed through Vensim, the current state of events is being compared to every type of Brexit scenario and its consequences. It is clearly visible, how each Brexit event differently impacts the 3 flows firstly on the currency rate fluctuations of the GBP/Euro, which has a direct effect on the acquisition costs, which influences the total Cost of UK operations, but whether it is positive or negative depends on how the real event turns out to be. The next variable effected, presents the Non-Tariff Barriers. The customs burdens administrative costs in the context of Customs duty and/or Import/export tax. The customs also result in higher costs due to longer and stricter controls which directly influences the transportation time and this can in the most extreme form lead to the risk of unplanned downtime costs. These costs indirectly flow into the total purchasing cost. Additional bureaucracy, as an outcome of new trade agreements, will increase the Administration cost, which in turn can be compensated with proper INCOTERM agreements. Finally the Tariff-Barrier costs, which would likewise add up to the total purchasing costs, but are only relevant if Scenario 4/5 occurs.



Model 2: Brexit simulation model with Vensim

4.4 Different outcomes per Scenario

The Table below clearly show the impact of the different Brexit scenarios on export rates of the major players in the industry. Scenario 1 is the baseline assumption against which all other Scenarios were assessed. It represents the state as if the UK remains within the Single Market and Customs Union. The GBP/E depreciation however, is assumed due to the already ongoing assumptions. In scenario 2, the free movement of goods, services, people and capital within the EEA (Single Market) would continue. There would be no tariffs on goods traded between the UK and the EU countries. Non-tariff barriers between the UK and the EU would remain low, which means that UK operations remain potentially competitive. Similarly, scenario 3, except for the increase of 1/2 on the non-tariff barriers. Based on the agreed INCOTERMS, Non-Tariff barrier rates are mostly covered and as such, in theory they would not influence the Decision making criteria. The outcomes of Scenario 4 / 5 lie on the focus of this paper, if one of the last two Scenarios occur, trades are dealt under a WTO agreement. That means that additional cost occur which are not covered by INCOTERMS. If the sum of the Variables GBP/E rate + WTO-Tariff Rate results in a Positive outcome the Model suggests to phase out the UK supplier. As an example (Marked orange in table 2) in the Textile Industry, if Scenario 5 would occur, -6% + 9.6% result in a positive outcome of the Model suggests to phase out the UK supplier. As an example (Marked orange in table 2) in the Textile Industry, if Scenario 5 would occur, -6% + 9.6% result in a positive outcome of the Model suggests to phase out the UK supplier. As an example (Marked orange in table 2) in the Textile Industry, if Scenario 5 would occur, -6% + 9.6% result in a positive outcome of the Model suggests to phase out the UK supplier.

Brexit	1	2	3	4	5
Food & Beverages	GBP/E: -1%	GBP/E: -2% Non-Tariff Barrier: +14.2%	GBP/E: -3% Non-Tariff Barrier: +28%	GBP/E: -5% Non-Tariff Barrier: +42% WTO-Tariff: +5%	GBP/E: -6% Non-Tariff Barrier: +42% WTO-Tariff: +5%
Metals	GBP/E: -1%	GBP/E: -2% Non-Tariff Barrier: +3%	GBP/E: -3% Non-Tariff Barrier: +6%	GBP/E: -5% Non-Tariff Barrier: +9% WTO-Tariff: +1.9%	GBP/E: -6% Non-Tariff Barrier: +9% WTO-Tariff: +1.9%
Wood	GBP/E: -1%	GBP/E: -2% Non-Tariff Barrier: +2.8%	GBP/E: -3% Non-Tariff Barrier: +5.7%	GBP/E: -5% Non-Tariff Barrier: +8.5% WTO-Tariff: +3.6%	GBP/E: -6% Non-Tariff Barrier: +8.5% WTO-Tariff: +3.6%
Textiles	GBP/E: -1%	GBP/E: -2% Non-Tariff Barrier: +4.8%	GBP/E: -3% Non-Tariff Barrier: +9.6%	GBP/E: -5% Non-Tariff Barrier: +14.4% WTO-Tariff: +9.6%	GBP/E: -6% Non-Tariff Barrier: +14.4% WTO-Tariff: +9.6%

Table 2: Outcome per Scenario

5.CONCLUSION

The aim of this study is to answer the question if it is possible to support purchasing professionals in taking the 'most advantageous sourcing decision' with help of a simulation tool. The study is grounded on the notion of bounded rationality in decision making. An important finding that results from the interviews is that bounded rationality does exist in the decision-making process of purchasing professionals. Therefore, the relevance of a simulation model that partly replaces the decision making process is confirmed. Based on input from purchasing professionals and desk research, I proposed a model that supports the decision-making process, to a certain degree. The model is not a general model that solves the uncertainty around the Brexit. This model includes the major contextual variables that are relevant for firms who are currently importing goods from the UK to Europe. The model lacks firm specific factors, which is not a problem, but should be considered when using the model. Therefore, purchasing professionals should address their firm specific factors. By doing so, the reliability of the outcome will increase. After testing the model with several different values, it resulted in different outcomes, which is favourable. Before using the model, both purchasing professionals mentioned that they would phase-out suppliers from the UK because of the imposed WTO-tariffs, which are expected to make profit margins shrink. In contrary, the model suggests that firms do not have to phase out suppliers from the UK if they (1) have an agreement with suppliers to buy in EURO and (2) have benevolent INCOTERM (DDP) deals where the supplier bears all the transport costs and responsibility. Thus, this outcome confirms that bounded rationality is still present nowadays in decision-making and that Vensim could help purchasing professionals in taking the most advantageous sourcing decision.

6.APPENDICES

Appendix A: Interview protocol

This interview protocol describes the general outcome of the interview that is designed for the purpose of gaining knowledge about relevant variables that are sensitive to the type Brexit.

General

- Interview Duration: Thirty minutes.
- Location: Interviews conducted at the campus of the University of Twente.
- Semi structured interview based on open-ended questions.

Procedure

- I am a student at the University of Twente, I planned and scheduled two interviews with two Purchasing Professionals
- During the interview, notes were written, with permission of the interviewees.

Appendix B: Interview Questions

1. Brexit related questions
 - 1.1. According to you, how will the Brexit impact the purchasing function in an organization?
 - 1.2. What type of Brexit event do you expect to occur?
 - 1.3. How do you keep track of the Brexit?
 - 1.4. How are you dealing with different stakeholders present in the Brexit?
 - 1.5. What are the biggest problems that you have faced during the Brexit?
2. Variable/vensim related questions
 - 2.1. Could you name some topics that are of crucial value to consider in analyzing the effect of the Brexit on a purchasing function?
 - 2.2. How will the incoterms come to play according to the different types of Brexit?
 - 2.3. How will the pound react to the different outcomes of the Brexit, and what is the risk exposure for a buyer?
 - 2.4. If I would try to build a simulation model, would that help mapping all the risks?
3. Bounded rationality related questions
 - 3.1. How do you make purchasing decisions as a purchaser?
 - 3.2. To what degree does self-interest come to play when you try to identify criteria?
 - 3.3. In your decision-making process, what is considered as a "good enough" solution
 - 3.4. Are there stakeholders in the organization who have power to influence your choice?
4. Most Advantageous Sourcing Decision related questions
 - 4.1. How would you characterize the most optimal strategic sourcing decision?
 - 4.2. How are you making sure to take this decision?
 - 4.3. Can you tell more about the value of purchasing for the organization?

Appendix C: Summary of interview findings

Interviewee 1

Brexit

- According to the purchaser, the Brexit has a direct impact on organizations buying from UK. Depending on the severity and type of Brexit, it might impact the profit margin for several products. Also, it depends on contextual factors. The impact differs per organization.
- I do not expect a hard Brexit. I expect a trade-deal between Europe and UK because the UK will lose otherwise a lot of its trade with EU.
- I follow the news. Often, some people are assigned to do research about the Brexit in a typical multinational.
- Uncertainty. The outcome is still a scenario.

Variable/Vensim

- The total amount of trade with UK versus the total amount of trade in an organization
- I do not see a direct problem with INCOTERMS.
- The GBP already lost value because of speculation. I am not a financial expert, I cannot give predictions. However, in general it is expected that a Hard Brexit can lead to a higher depreciation of the pound. In turn, this could affect our purchasing power.
- A simulation model would be helpful because we are dealing with different scenarios which have an individual impact for each organization.

Bounded Rationality

- When I was working at an American multinational, we used to make decisions based on pre-scribed procedures, in the best interest of the company.
- I always try to make the decision that is in the best interest of the company. However, I believe that relationship with suppliers can affect this. A good buyer-supplier relationship might damage professional behaviour
- A solution is good enough when it matches the identified need.
- Stakeholders do not have a direct influence, but like in any other organization, a stakeholder might indirectly exert influence.

MASD

- The MASD is similar to the “good enough” solution
- The core of our job is to make the best purchasing decision and best sourcing decision. This decision matches the internal need, is acquired for the best price and is adding value to the organization. In best case, a good purchasing strategy could bring competitive advantage to the organization.

Interviewee 2

Brexit

- This depends on the industry of the organization and the applicable WTO-rules.
- In the beginning of the soap, I expected a soft Brexit. As of today, there is no trade-deal between EU and UK. Therefore, the likelihood of a hard Brexit is possible.
- By reading research articles.
- By exchanging as much as relevant information
- Definitely the uncertain outcome.

Variable/Vensim

- The total trade with UK, the importance of the supply from UK and the outcome of the Brexit
- The INCOTERMS have to be re-considered by every purchaser buying from the UK, since the brexit can cause longer lead-times.
- A weaker pound is expected with the occurrence of a Hard Brexit. This could compensate for the costs of WTO-tariffs and longer lead-times when buying from UK.
- A simulation model would only reflect the outcome of the information that is integrated in the model. This model should therefore include all the relevant variables to result in reliable outcomes.

Bounded Rationality

- By following procedures and expectations of upper management.
- Self-interests is not a problem in taking decisions or when trying to identify criteria
- A solution is good enough when it supports the goals of the organization. A good enough solution should benefit the organization in the long run.
- Upper management has the ultimate power to plan, direct and influence the day-to-day tasks and functional management of purchasers. Yes, there are stakeholders that can influence the work of a purchaser

MASD

- The decision that is in line with higher organizational goals. Most of the time, that will be the decision that is best for the organization in terms of costs, quality and delivery.
- Purchasing can be strategic as well as supportive. The more the purchasing department is strategic, the higher the cost saving potential will be. It is reasonable to state that the more autonomy and power the purchasing department in an organization has, the higher its value is.

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