

A Work Project, presented as part of the requirements for the Award of a Masters Degree in Management, from the Faculdade de Economia da Universidade Nova de Lisboa.

**Importance of decision-making in a purchasing context – DPS Case Study**

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## **Abstract**

This work project has the objective of exploring the importance of making good decisions on supplier selection, so that the purchasing department can contribute to the success of a company. For that it is presented a short bibliography review of the latest insights that were found relevant, on the subjects of purchasing, technology, outsourcing, supplier selection and decision-making techniques. For a better understating on how to deal with a decision-making situation, a case study is also presented: Digital Printing Solutions (DPS) is a Portuguese company that provides complete and integrated printing solutions and has been planning to contract a software supplier. DPS has no formal supplier-selection model and it has to choose between 2 suppliers. The case study was solved using the M-MACBETH software. I have found that complex decisions-making situations can be easily overcome by using the M-MACBETH decision model. Moreover, the usage of a model, instead of decision that follows no formal procedure, provides the decision maker with insights that can be useful to negotiate with the supplier.

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## **Introduction**

The competitiveness among firms is increasing every year and consumers are demanding price reductions (Monczka, Handfield, Giunipero, & Patterson, 2011). The ability to respond effectively to this new need has become the dominant objective pursued at all levels in the supply channel (Ross, 2010). Both, companies and the purchasing professional, face new challenges as procurement becomes more strategic and complex. (Spina, Caniato, Luzzini, & Ronchi, 2013).

Ross, 2010, points out that policy decision choices on quality, technology and service are some of the attributes providing for differentiation among competing companies. The same author also says that operational objectives, such as linkages to suppliers and customers fostering responsiveness or optimization, are also key to value creation.

Efficient and constructive relationships with suppliers are key to the company's short-term financial results and long-term competitive position. (Weele, 2014).

Moreover, business organizations have experienced rapid external environmental and internal organizational changes due to increasing, outsourcing, globalization, and e-business. Massive outsourcing has occurred in many sectors; as a result, companies tend to spend more money on procurement and customized services (Spina, Caniato, Luzzini, & Ronchi, 2013). Choosing a supplier is one of the most important functions in purchasing (Abdollahi, Arvan, & Razmi, 2015). Analytic supplier selection processes result in better decision outcomes (Kaufmann, Kreft, Ehrgott, & Reimann, 2012). The emerging trend in current research is the integration of decision-making techniques in constructing an effective decision model to address practical and complex supplier-selection problems (Chai, Liu, & Ngai, 2013).

## **Literature Review**

### Purchasing

There are several definitions for purchasing, depending on the perspective used for approach: function, process, link in the supply or value chain, relationship, discipline and profession (Farrington & Lysons, 2012). What I have noticed, while reviewing literature, it that there is an unclear definition of some supply chain management (SCM) concepts. Some authors interchange purchasing for procurement (Monczka, Handfield, Giunipero, & Patterson, 2011), while others strictly define purchasing as part of the procurement process (Weele, 2014).

I have decided that the definition that best applies to the work that I am presenting is the one that aligns purchasing with the value chain. I have chosen this approach because it offers a perspective that is most suitable for correctly understand the case study that follows.

Michael Porter is the founder of this definition approach, when he refers to procurement as one of the four support activities that contribute to the competitive advantage of a business. (Porter, 1998)

Recently Michael Porter has published a paper, with Mark R. Kramer, where is explained a new concept of value, the shared value.

Kramer & Porter, 2011, suggest a more broad value creation approach, discarding the optimization of short-term financial performance and place their focus on customer needs and ignoring the broader influences that determine their longer-term success. The authors say that some companies are beginning to understand that marginalized suppliers cannot remain productive or sustain, much less improve, their quality. So they suggest that by implementing procurement strategies, that allow the company to work close to their suppliers, companies can improve supplier quality and productivity.

Improving productivity will often trump lower prices. This will lead to stronger suppliers, and that is how shared value is created.

Following (Monczka, Handfield, Giunipero, & Patterson, 2011) refer to purchasing and supply management (PSM) as the “strategic approach to planning for and acquiring the organization's current and future needs through effectively managing the supply base. (Spina, Caniato, Luzzini, & Ronchi, 2013).

There are few doubts about the increased relevance of PSM for companies of various industries including manufacturing and services. (Spina, Caniato, Luzzini, & Ronchi, 2013) and (Monczka, Handfield, Giunipero, & Patterson, 2011). Mena, Christopher, & Hoek, 2014 elaborate on why purchasing is important for companies, emphasising several perspectives: cost saving, innovative, quality, time to market, and competitive advantage.

- Cost saving

Procurement costs comprise 60–80% of production cost for many manufacturing organisations. (Dey, Bhattacharya, & Ho, 2014). This is the reason why companies tend to place such a huge effort on minimizing their total cost, by making purchases more efficient and wise. According to McKechnie-Sharma & Penka, 2013, 86% of purchasing managers are now responsible to deliver at least 10% year over year savings. Christopher, 2011, reinforces this idea when he states that PSM can provide a multitude of ways to increase efficiency and productivity and hence contribute significantly to reduced unit costs. Suppliers also place an important role in the achievement of this goal: firms are dependent on the improvements made by their subcomponent suppliers to achieve better-cost performances. (Abdollahi, Arvan, & Razmi, 2015). Procurement professionals at this stage have strong analytical skills that allow them to analyze spend in different ways and evaluate the return on investment of different initiatives. They

also have good negotiation and contracting skills to be able to get the best deals from suppliers. (Mena, Christopher, & Hoek, 2014)

- Innovative

Purchasing helps creating innovation for the following reasons: it bridges to new entities, suppliers that can contribute with new tools and technology (Alleijn, Baarspul, & Plante, 2013) and (Mena, Christopher, & Hoek, 2014)

The innovation brought by suppliers can be as evident the generation of a new product, but also a more subtle one, such as the combination of existing elements or even the restructuring and process improvement (Alleijn, Baarspul, & Plante, 2013). Managers are more cognizant that no single firm has enough knowledge and sufficient human resources to create the innovations that are needed to compete globally (Lusch, Vargo, & Tanniru, 2009). Therefore firms can gain access to the supplier's innovation potential by managing the procurement and supply processes properly: Investing in knowledge-sharing activities, aligning incentives to encourage transparency and reciprocity, and discouraging free-riding, organizations can tap into this innovation potential. (Mena, Christopher, & Hoek, 2014)

- Improves quality

Purchasing and supply management also has a major impact on product and service quality. In many cases, companies are seeking to increase the proportion of parts, components, and services they outsource in order to concentrate on their own areas of specialization and competence. This further increases the importance of the relationships among purchasing, external suppliers, and quality (Monczka, Handfield, Giunipero, & Patterson, 2011).

- Reduces time to market

Companies that involve suppliers early, compared to companies that do not involve

suppliers, achieve an average 20 percent improvement on materials costs, material quality, and product development times. (Monczka, Handfield, Giunipero, & Patterson, 2011).

- Builds competitive advantage

If the company is unable to reach a distinguished product to offer its clients, they will consider the good as a commodity and search for the lowest price. This makes it crucial to encounter new ways of differentiation from the competition (Christopher, 2011). The basic premise is that the value delivered to the customer is dependent on more than one attribute, and possibly on more than one firm. (Hallikas, Immonen, Pynnonen, & Mikkonen, 2014). The perceived value of the service is dependent on the choice of purchasing strategy, and thus correlates with the depth of co-operation between the customer and the service provider (Hallikas, Immonen, Pynnonen, & Mikkonen, 2014)

#### The role of technology on the supply chain

Technology can be applied on the basis of improving efficiency of processes of the supply chain: automation of internal processes, online transactions (Fredendall & Hill, 2000) and this allows channel partners – which may be suppliers, intermediaries, third-party service providers (Dougados, Ghioldi, KVJ, & Doesburg, 2013)

It can also be a tool to better reach the customer and improve customer service, as it can produce a platform that easily takes the product to the customer and a high amount of information about the customer preferences. (Fredendall & Hill, 2000). The challenge is to select and implement technologies that employ reusable and exchangeable components with minimal investment in time and effort. (Dougados, Ghioldi, KVJ, & Doesburg, 2013).



## Outsourcing

Outsourcing means that the company divests itself of the resources to fulfil a particular activity to another company, to focus more effectively on its own competence (Weele, 2014). This has become the development trend of a company operations (Peng, 2012). Massive outsourcing has occurred in many sectors; as a result, companies tend to spend more money on procurement and to buy not just commodities but also more specialties and customized services. (Spina, Caniato, Luzzini, & Ronchi, 2013). The option to use outsourcing strategy globally is a choice which all companies, be it large or small, increasingly have to consider (Hansen & Rasmussen, 2013).

Weele, 2014, divides the reasons for a company to consider outsourcing in two: strategic, to improve company focus and tactical, to reduce control and operational costs.

The good choice of service suppliers is the key to success in outsourcing. (Peng, 2012). But, more and more difficulties exist in the choice of company outsourcing service suppliers, a main reason is lack of effective method on how to choose the suppliers suitable for the company development (Peng, 2012)

## Supplier Selection (SS) and Decision-making (DM) models

The function of selecting suppliers is one of the most important in purchasing (Abdollahi, Arvan, & Razmi, 2015). Companies are outsourcing a great part of their business, becoming more dependant on the quality and delivery performance of their suppliers. Therefore, a poor supplier selection ( can have severe consequences on the company (Araz, Ozfira, & Ozkarahan, 2007).

The objective of SS process is to identify suppliers with the highest potential for meeting a company's needs consistently and at an acceptable overall performance. Selecting suppliers from a large number of possible suppliers with various levels of

capabilities and potential is a difficult task and inherently a multicriteria decision-making (MCDM) problem (Araz, Ozfira, & Ozkarahan, 2007).

According to Mena, Christopher, & Hoek, 2014 the SS happens in 3 steps: the evaluation (the contracting company defines standards for suppliers and sets the minimum requirements to be met by them), the selection (afterwards it chooses from the range of suppliers available) and the development (monitors the performance of that supplier and overall influence on the organization). Despite being known that analytic SS processes result in better decision outcomes (Kaufmann, Kreft, Ehrgott, & Reimann, 2012), formality is still generally low in the purchasing department as many companies still don't undertake formal supplier selection processes (Pressey, Winklhofer, & Tzokas, 2009).

Nonetheless there are emerging trends in current research that present DM techniques to address practical and complex SS problems (Chai, Liu, & Ngai, 2013).

The most common decision-making techniques can be divided into 3 categories: multiple criteria decision-making (MCDM), mathematical programming techniques and artificial intelligence techniques (Chai, Liu, & Ngai, 2013).

MCDM model is the most suitable for supplier selection, says (Lin, Lin, Yu, & Tzeng, 2010), as he considers SS as a multiple criteria decision-making problem.

Inside the MCDM there are several methods. The analytic hierarchy process (AHP) is the most used method according to (Chai, Liu, & Ngai, 2013) AHP is suitable for evaluating and ranking suppliers (Levary, 2008) however, its said to fail on complex criteria evaluation (Wu & Lee, 2007).

The analytic network process (ANP) is said to be more correct for complex criteria evaluation. This model is able to overcome the problem of interdependence and feedback amongst criteria (Lin, Lin, Yu, & Tzeng, 2010).

MACBETH is a MCDM model constructed by Carlos Bana e Costa, Jean Marie De Corte and Jean-Claude Vansnick. This model is founded on difference measurement, whose most significant innovation is the introduction of the ability to generate numerical scales based on qualitative pair wise comparisons in terms of difference in attractiveness. (Costa & Chagas, 2004). This method can be applied using qualitative judgments that allow the decision-maker to quantify the relative attractiveness between options. This will place the options and the criteria in a numerical scale and then additive methodology is used to calculate the overall performance of each option. (Costa, 2006). The application of the model implies going through the following stages, as shown in Table 1:

<b>Criteria definition</b>	The user defines the relevant criteria for option evaluation
<b>Evaluation of the performance for each alternative on each criteria</b>	The user defines how important are the internal aspects of each criteria
<b>Ranking of criteria</b>	The user ranks the criteria according to its importance
<b>Evaluation of the performance of each criteria when compared to another criteria</b>	The user defines the real weight of each criteria for the final decision
<b>Option scores</b>	The software computes the overall score for each option using an addition method

Table 1 - Steps to apply the MACBETH model

Every method has its pros and cons. The selection of specific method for supplier evaluation depends on many factors such as characteristics of supplier evaluation constructs, implications of supplier evaluation decision on overall organisational performance, user friendliness, flexibility, and both capital cost and operating costs of the model. (Dey, Bhattacharya, & Ho, 2014).

## **Methodology**

As said previously, this work project has a case study approach. After presenting a short bibliography review of the latest insights on how relevant is decision-making in purchasing, I will describe how to overcome a real SS problem. A case study allows a more practical understanding, as it studies real people, real problems, and real organizations (Edmondson & McManus, 2007). Case studies are especially useful when examining controversial points of view and new theories, and provide a basis for future organizational problem solving (Green, 2007).

Because of the component of offering problem solving, field research is critical to the development of scientific knowledge within operations and supply chain management (Rabinovich & DeHoratius, 2011).

Case studies can accommodate a rich variety of data sources, including interviews, archival data, survey data, ethnographies, and observations. (Eisenhardt & Graebner, 2007).

In this paper research I have conducted 2 interviews with the decision-maker. The first interview had the objective of understanding the problem that the company was facing and if it was a case worth being studied in this directed research thesis. The second interview was made with 2 main intentions:

1<sup>st</sup>: Gathering information on the suppliers that have meet their basic criteria;  
2<sup>nd</sup>: Agreeing on what are the secondary criteria and their weighted importance for the supplier selection method.

Having the details on the suppliers, I have applied a decision-making model.

The model MACBETH seems to be the more adequate, taking into consideration the complexity of this decision-making and also the time available to do so. The model has a very easy application due to the existence of software (M-MACBETH) and its

available online for academic purposes. This software is very user-friendly and allows the analysis of decision-making problem in few simple steps, as I could confirm during the development of this paper.

Based on the output given by the software I will then analyse the results and take conclusions.

## Case Study – Digital Printing Solutions (DPS)

### Company description

DPS is a Portuguese company that provides complete and integrated printing solutions for the B2B and B2C market. It performs under the VASP group. VASP is the leading company in the distribution of periodic papers in Portugal. DPS was created as a backward vertical integration for VASP. This can be better understood looking at the value chain of VASP:

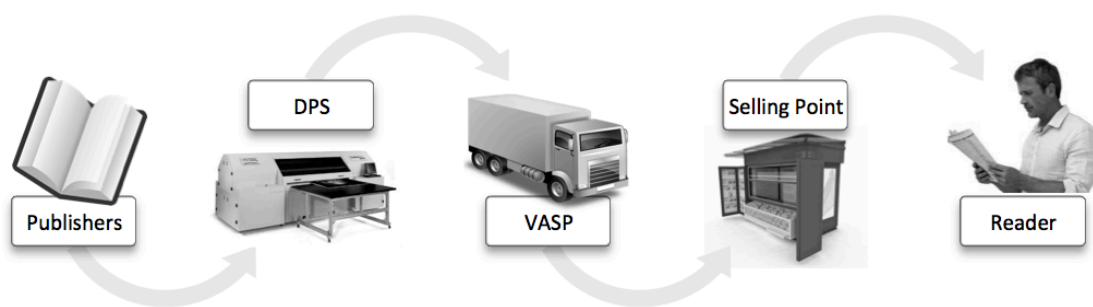


Figure 1 - VASP's value chain

DPS was created in 2007 and is currently printing more than 70 million copies per year. Nowadays DPS has more than 250 costumers, and the order process is made manually for each customer in the following way: 1) Customer calls DPS or sends an e-mail with the printing job and specifications and asks for a budget. 2) A budget is given within 2 days, depending on the complexity of the task. 3) The client either accepts the budget or gives up on the order. 4) The order is placed and DPS prints and sends the order to the customer.

Recently DPS has been planning to contract a software supplier that would enable the automation of the steps 1) to 4) and also some steps related to the payment and receipts. This software would also make their product more visible to the B2C market. This market segment offers two major advantages to the business:

- 1) The average payment period in the B2B segment is around 60 days, while for the B2C segment, the payment is made upfront (in the moment of ordering);
- 2) The profit margins for the B2C segment are higher when compared to the B2B segment.

#### Actual decision making techniques at DPS

DPS has no formal model for supplier evaluation. The company usually relies on some criteria on the supplier and chooses based on intuition. Their basic criteria for supplier evaluation are the financial condition of the supplier, the price, and the payment conditions. Trust relationships built with suppliers often also act as a decision criteria, when the offers are very similar.

#### Proposed decision-making model

A decision made based on intuition is not the most accurate one, specially when the complexity of the situation makes it hard to compare all the criteria at the same time. Therefore, I have decided to use the multi-criteria model – MACBETH. M-MACBETH is a software that facilitates the application of the model MACBETH, because of its accurate judgment on a multi criteria decision-making and user-friendly software. This makes it both accurate and fast to apply.

#### Software Supplier Proposals

At the stage this work project was started, DPS had already begun sourcing the suppliers for this type of software. There are not many suppliers specialized in design of this type of software working on the Portuguese market. Moreover, DPS has 4 rejection criteria: being a supplier financially healthy, proposing a non-royalties contract, being capable of offering a two platform application (for both B2B and B2C) and a software as a service (SAAS), i.e. the uploads made by the customer where hold by DPS.

The company has selected 2 suppliers that have met the rejection criteria. Due to confidentiality issues I will be referring to the suppliers not in their real names, but as Supplier A and Supplier B.

Evaluation criteria for the software proposals

The next step was to define what were the characteristics that could offer a good evaluation of each supplier – criteria. For each criteria, the decision-maker and I, have made a brief description, defined a scale that allowed the quantification of the criteria and then analyzed how two offers acted in relation to each criteria chosen. This information can be found in the table below:

		Description	Scale	Supplier A	Supplier B
<b>Price</b>	(Euro)	Base price + yearly maintenance price + implementation package for a 24 months licence.	10 000 to 70 000	52300	57297
<b>Technical Characteristics</b>	Level of job preview	How can the customer view the current printing job while ordering	No preview 2D or 3D preview	2D	3D
	Level of customization	How many changes in layout, structure, design can the software take	Low Med-low High Full None	High	Full
	Customer Support	What is the level of support to the customer that the software offers	FAQ Online support	None	Online
<b>Implementation Time</b>	(Days)	Number of days that it takes to have an operational platform	0 to 30	7	12
<b>Implementation Difficulty</b>	Programming interface	How friendly-user is the programming interface	Easy Medium Hard None	Medium	Easy
	Support from supplier	How complete is the support from the supplier helping DPS with the implementation	Forum Cell-phone Video-chat Person	Person	Cell-phone support

Table 2 - Information on the criteria chosen





extreme, very strong, strong, moderate, weak, very weak, no). He considered this difference to be Extreme. After the table is complete, the software places each point on the scale from 0 to 100. Negative points can also occur when the scale goes under the basic requirements to be considered a qualified supplier. The same was made for all the combinations of criteria and for all criteria remaining. The output from the software, for all the criteria, can be seen in the appendices booklet. The next step is to attribute the weight for each criteria on the overall scale. For this I have asked the decision maker to ordinate the following criteria from less important to highly important. This was the order from less important to the most important.

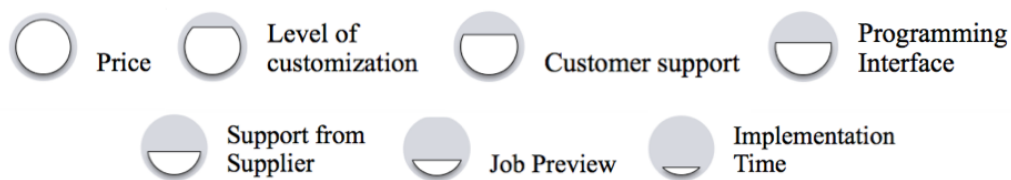


Figure 3 - Criteria ranking

Although we now know the order of importance for the criteria, they may not follow a linear relation. So once again, the adjustment in scale were made in order to determine how distant are the criteria amount each other.

## Result Analysis

### General analysis

After all the adjustments, the M-MACBETH software was able to calculate the overall results for the decision-making. The results are the following:

Options	Overall	Price	Job Preview	Customization	Customer support	Implementation Time	Programming Interface	Support supplier
Supplier A	45,74	29,50	62,50	70	0	79,31	66,67	100
Supplier B	70,83	21,17	100	100	100	62,07	100	37,50
Weights		0,2667	0,0667	0,2333	0,1500	0,05	0,1333	0,100

Table 4 - Overall and criteria scores

The supplier B has a better overall evaluation, meaning that this is the supplier to be chosen.

It is also interesting to compare option B with option A using this bar graph:

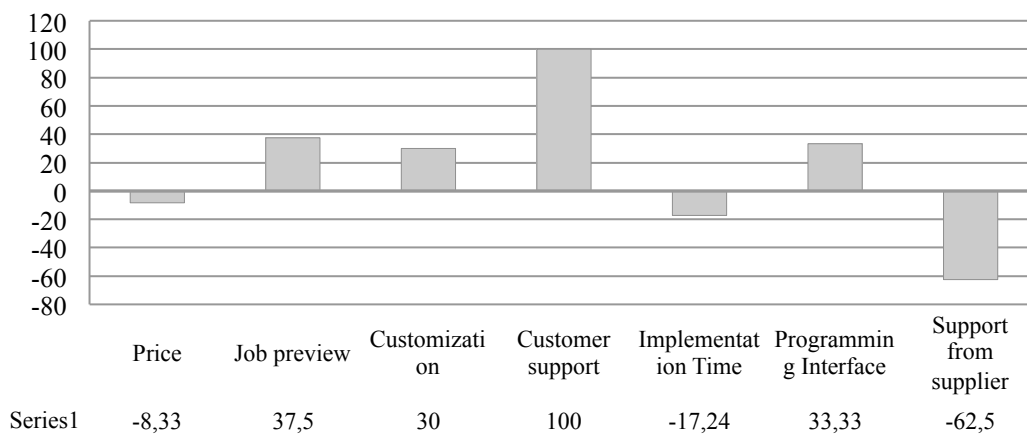


Figure 4 - Differences profiles: supplier B compared to supplier A

It can be seen that option A is better on price and on support for implementation. But still supplier B offers a stronger offer in the overall criteria ranking and weighting.

### Sensitivity analysis on price

Another useful analysis to be made, it's a sensitivity analysis, where it can be seen how the weight on a determined criteria can influence the final decision. The weight given for price was 26,67%. From the graph bellow, it can be seen that if the weight of the price varies from 0% to 78,1% Supplier B is the best choice. For weights on the price, superior to 78,1%, the alternative A suppresses alternative B.

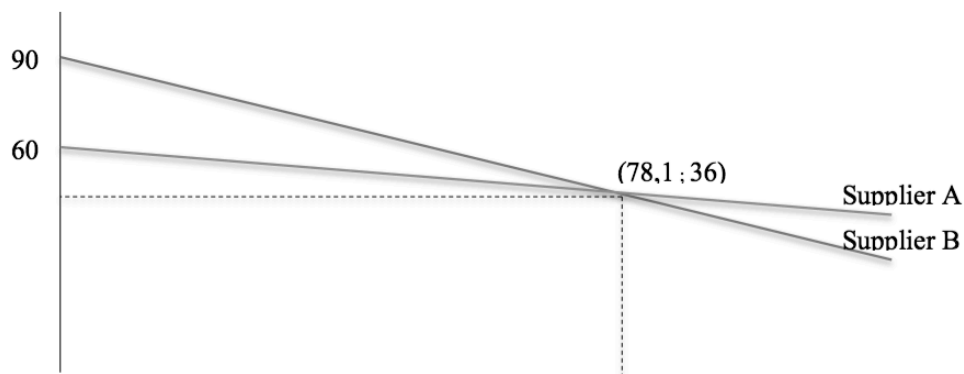


Figure 5 - Weight analysis on price

It is also interesting to see the influence that variations on price has on the final decision. For instance, how much had the supplier A to lower their price, in order to match the overall score? By changing the price input in the model and then check what is the price that allows a matching score, I could see that Supplier A would have been an equally good option if was sold for EUR 8180. This means EUR 44120 less than what they are currently asking. In this case the difference in price that equals the offers is very big. But if it was small, this could have been a good negotiation basis to get an equally good offer for a lower price.

## **Conclusions**

The first main objective of this study was to present an overall theoretical connection between decision-making on the purchasing function and the added value of a firm. The second main objective was to focus on a small process of the conducted line of thought from decision-making to increased competitiveness – the process of decision-making. Thus, a case study was used to explore on detail how to decide between complex supplier situations. This was helpful not only to learn how to deal with complex decision environments, but also to see what information can be extracted from this analysis in order to improve negotiations and explore alternative deals.

In this case study, the company under analysis is looking for a software supplier that would offer a solution to improve processes and improve contact to a new market segment.

For this analysis I have used the software M-MACBETH because of its potential to explore multi criterion environments features that allow the handling of complex solutions and obtain concrete relatively short period of time, even for first time users.

M-MACBETH allowed me to find the best supplier proposes. From a 2-supplier hypothesis, I have found that Supplier B present a most satisfactory score, therefore it was the best option to contract. The analysis of the results also helped me to find out how much a change on the importance given to each criterion would influence the final decision.

In summary, I believe that this study presents a fresh perspective of what are the current theories that connect decision-making to the competitive value of a company and offers practical insights on how can a company take advantage of decision-making techniques to pursue this competitive advantage.

## **Limitations and further research**

Although I was able to present a decision-making model and a solution for the case study, there were some points where some improvement could be done.

The case study was constructed based on interviews with the decision-maker, but some other points of view could have been collected in order to avoid limited bias.

Also the analysis was made considering the previous supplier search made by the company under study, which left me with 2 suppliers to choose from. A more complex environment would have offered a more enriching situation to analyse and take conclusions from.

The method M-MACBETH is also a technique that requires the decision-maker to compare and qualify every criterion in great detail. Sometimes it can be a very ambiguous to ranked criteria. For instance: saying that the support from the supplier has a smaller importance than the easiness to programme the software is a hard task. These two criteria are clearly related to each other: If the support from the supplier to apply the software is good, then the importance given to how easy is the interface of the programming is not that high.

Also it is possible that the decision-maker would give me some different answers, if he were asked again to rank and compare criteria. Which can lead to slightly different results each time the method is implemented.

This is an interesting case study to learn how to evaluate multi criteria decision-making environments and it makes sense to propose a formal decision-making process so that the procedure for decision is optimized. But, usually bigger size companies already have formal guidelines to follow whenever they face a decision-making situation. Making this study only relevant for managers that have to deal with complex decisions and don't have guidelines to do so.

The decision making model was chosen mainly because of its user-friendly features and rapid implementation time that was adequate to the time I had available for the conduction of this study. There are maybe more complete models that could overcome the problems mentioned above.

If I had undefined time and no page limit for this study, I would extent the amplitude of the case study to other points presented in the literature review. For instance, it would have been interesting to see how is this study going to influence the performance of the company.

## References

- Abdollahi, M., Arvan, M., & Razmi, J. (2015). An integrated approach for supplier portfolio selection: Lean or agile? *Expert Systems with Applications journal* , 42 (1), 679-690.
- Alleijn, S., Baarspul, F., & Plante, M. (2013). *Supplier Relationship Management (SRM) Research 2012-2013 Solution Analysis and Business Insights*. Capgemini Consulting.
- Araz, C., Ozfira, P., & Ozkarahan, I. (2007). An integrated multicriteria decision-making methodology for outsourcing. *Computers & Operations Research* , 3738-3756.
- Costa, C. Bana., & Chagas, M. (2004). A career choice problem: An example of how to use MACBETH to build a quantitative value model based on qualitative value judgments. *European Journal of Operational Research* , 323-331.
- Costa, C. Bana & Corte, Jean Marie De. (2006). *Home: m-macbeth*. Retrieved 12 06, 2014 from m-macbeth Web site: <http://www.m-macbeth.com/>
- Chai, J., Liu, J., & Ngai, E. (2013). Application of decision-making techniques in supplier selection: A systematic review of literature. *Expert Systems with Applications* , 3872-3885.
- Christopher, M. (2011). *Logistics and Supply Chain Management* (4 edition ed.). Financial Times/Prentice Hall.
- Dey, P. K., Bhattacharya, A., & Ho, W. (2014). Strategic supplier performance evaluation: A case-based action research of a UK manufacturing organisation. *Int. J. Production Economics journal* .
- Dougados, M., Ghioldi, S., KVJ, S., & Doesburg, R. V. (2013). *The Missing Link Supply Chain and Digital Maturity*. Capgemini Consulting.
- Edmondson, A., & McManus, S. (2007). Methodological fit in management field research. *Harvard Business School* , 1155–1179.
- Eisenhardt, K., & Graebner, M. (2007). Theory building from cases: opportunities and challenges. *Academy of Management Journal* , 25–32.
- Farrington, B., & Lysons, K. (2012). *Purchasing and supply chain management* (8th edition ed.). Pearson.
- Frendall, L. D., & Hill, E. (2000). *Basics of Supply Chain Management (Resource Management)* (1st Edition ed.). CRC Press.
- Gelderman, C., & Semeijn, J. (2006). Managing the global supply through purchasing portfolio management. *Journal of Purchasing & Supply Management* , 12 (4), 209-217.
- Green, R. (2007). *Library management: a case study approach*. Oxford: Chandos Publishing.
- Hallikas, J., Immonen, M., Pynnonen, M., & Mikkonen, K. (2014). Service purchasing and value creation: Towards systemic purchases. *Int. J. Production Economics journal* , 147, 53-61.
- Hansen, Z., & Rasmussen, L. (2013). Outsourcing relationships: Changes in power and dependency. *European Management Journal* , 655-667.
- Kaufmann, L., Kreft, S., Ehr Gott, M., & Reimann, F. (2012). Rationality in supplier selection decisions: The effect of the buyer's national task environment. *Journal of Purchasing & Supply Management* , 76-91.



- Kramer, M. R., & Porter, M. E. (2011, 01 01). *Competitive strategy: Harvard Business Review*. Retrieved 12 04, 2014 from Harvard Business Review Web site: <https://hbr.org/2011/01/the-big-idea-creating-shared-value>
- Levary, R. R. (2008). Using the analytic hierarchy process to rank foreign suppliers based on supply risks Reuven. *Computers & Industrial Engineering* , 535-542.
- Lin, C.-T., Chen, C.-B., & Ting, Y.-C. (2011). An ERP model for supplier selection in electronics industry. *Expert Systems with Applications* , 1760-1765.
- Lin, Y.-T., Lin, C.-L., Yu, H.-C., & Tzeng, G.-H. (2010). A novel hybrid MCDM approach for outsourcing vendor selection: A case study for a semiconductor company in Taiwan. *Expert Systems with Applications* , 4796-4804.
- Lusch, R., Vargo, S., & Tanniru, M. (2009). Service, value networks and learning. *Journal of the Academy of Marketing Science* , 38 (1), 19-31.
- McKechnie-Sharma, H., & Penka, A. (2013). *2012-13 Global Chief Procurement Officer Survey Leveraging Digital Procurement and Innovation to Expand Procurement's Business Value*. Capgemini Consulting.
- Mena, C., Christopher, M., & Hoek, R. (2014). *Leading procurement* (1st edition ed.). (K. Page, Ed.)
- Monczka, R., Handfield, R., Giunipero, L., & Patterson, J. (2011). *Purchasing and supply chain management* (5th Edition ed.). (South-Western, Ed.) nao sei: n sei publisher.
- Peng, J. (2012). Selection of Logistics Outsourcing Service Suppliers Based on AHP Jianliang. *Energy Procedia* , 595-601.
- Porter, M. E. (1998). *Competitive advantage. Creating and sustaining superior performance*. (2nd addition ed.). New York: The free press.
- Pressey, A., Winklhofer, H., & Tzokas, N. (2009). Purchasing practices in small- to medium-sized enterprises: An examination of strategic purchasing adoption, supplier evaluation and supplier capabilities. *Journal of Purchasing and Supply Management* , 214-226.
- Rabinovich, E., & DeHoratius, N. (2011). Fiel research in operations and supply chain management. *Journal of operations management* , 371-375.
- Ross, D. F. (2010). *Competing through supply chain management: creating market-winning strategies through supply chain partnerships*. massachusetts: Springer.
- Spina, G., Caniato, F., Luzzini, D., & Ronchi, S. (2013). Past present and future trends of purchasing and supply management: an extensive literature review. *Industrial Marketing Management* , 1202-1212.
- Weele, A. J. (2014). *Purchasing and supply chain management - analysis, planning and practice* (3rd edtion ed.). Cengage Learning EMEA.
- Wu, W.-W., & Lee, Y.-T. (2007). Selecting knowledge management strategies by using the analytic network process. *Expert Systems with Applications* , 841-847.