

A BUSINESS PROCESS ANALYSIS

FOR THE LARGEST FOOD AND BEVERAGE COMPANY

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ABSTRACT

How is the procurement department integrated in one of the largest FMCG organizations and how does their process look like? That is what this paper aims to indicate by means of descriptive and quantitative research effort. This project was designed to investigate the process relationships within a procurement department. Based on the domain knowledge provided by the domain expert within our team, and some elaboration on the expertise of former colleagues, this paper tries to indicate the processes as detailed as possible. Furthermore, the paper describes how it is suggested to streamline the process early on, as there is room for efficiency improvement by streamlining the communication of request to the procurement team.

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1. Introduction

1.1 Overview of Organization

The organization (“Company Z”) discussed in this project is one of the largest packaged food and beverage companies in the world, as they prioritize the safeguarding of their business processes and procedures they requested us to pseudonymize the organizations’ name and internal document names where possible. Nevertheless, they provided us with insightful information and data to develop a thorough understanding of the business processes discussed.

Company Z owns over 2000 different brands globally in multiple categories of which some are considered world-famous while others are more local delicacies. Its product portfolio consist of product lines such as chocolate, bottled water, milk, coffee and pet food (Bloomberg, 2019). The organization is steered and managed at global top-level by a multidisciplinary Board of Directors led by a Chairman and an Executive Board that care for the day-to-day management. Company Z divides its global market into sub-regions such as EMENA (Europe, Middle East and Africa), AMS (Americas) and AOA (Asia/Oceania/sub-Saharan Africa) which have their own region level “hubs” and corresponding executive boards to manage those geographical areas. At last, every country has its own country specific headquarter that manages the local import and sales of their products and the country specific demand.

At country level, in the Netherlands the Headquarters consist of multiple floor areas in which different actions and transactions take place. The majority of the organization consists of departments that are responsible for a specific product category of brand. Those departments have their own marketing and sales specialists that try to realize the best possible brand exposure in the market to optimize sales. In order to so, these brand divisions are supported by the activities performed on the operations floor, that consist of multiple departments that together try to create the highest level of efficiency possible in an attempt to increase profit (Kenton, 2019). Within Company Z the following departments make up the Operations floor: Supply and Demand planning, Logistics, Customer Front Office, Procurement, QA and Accounting. This project focuses on the activities of the Procurement department at country level in the Netherlands, as one of our team members had worked within that department and therefore could establish a link with the organization and provide relevant information.

The remainder of the paper is organized as follows. In section 2, the identification of the process landscape as well as the role of procurement within the organization are discussed. Section 3 elaborates further by explaining the discovery activities and the complete as-is model. Section 4 will more describe in more detail the qualitative and quantitative aspects of the processes, where Section 5 will suggest potential redesign efforts. Finally, issues regarding implementation are discussed and the paper ends with a brief reflection on the team work.

2. Identification

2.1 Process landscape

This project is supported by the methods, techniques and tools provided by Business Process Management to identify, discover, analyze and redesign the business processes within Company Z. We will not only provide meaningful process adjustments to improve performance but also suggest a fitting implementation. Within the BPM Lifecycle, this section will discuss the definition of the boundaries of the process architecture as part of the process identification (Dumas, Rosa, Mendling & Reijers, 2019). The defined process landscape in figure 1 represents a high-level overview of the processes and interrelations within Company Z and indicates the scope of this project. The process landscape model differentiates between managerial, core and supporting processes with regards to value creation for the organization.

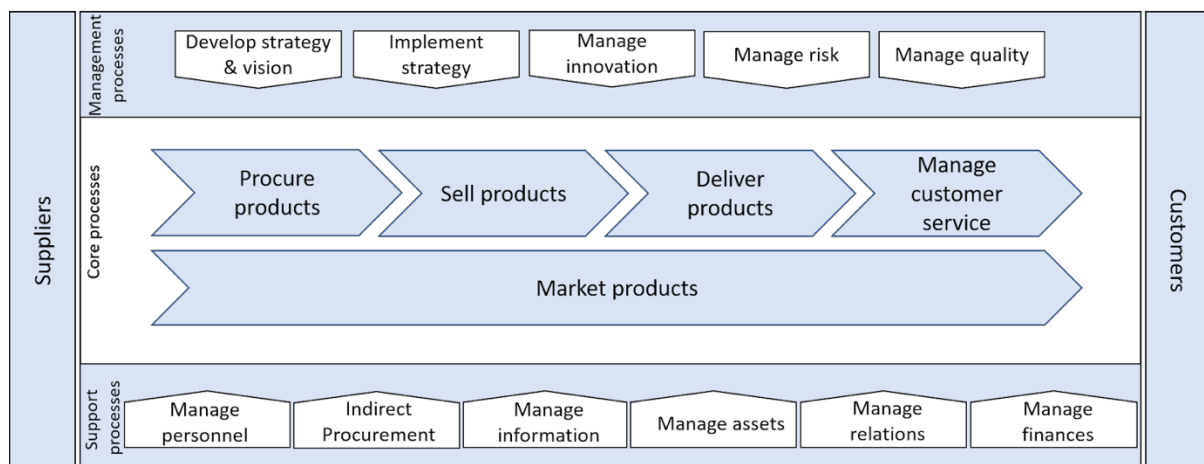


Figure 1. The Process landscape model of Company Z

The process landscape of Company Z is divided into three sections: management processes, core processes and support processes. In order to fully understand the process landscape model it is paramount that one can differentiate between these three categories of processes. Therefore a short description of each process category will be given, followed by a justification of our decision to model it this way.

The most important process category are the core processes of at the organization which can be observed in the middle section of the process landscape model. These processes cover the essential value creation of a company (Dumas et al., 2019). It is important to identify end-to-end processes to fully comprehend how an enterprise creates value. As mentioned before, Company Z creates value by managing the local import and sales of their global product portfolio for the Dutch market. During the process identification we discovered two different streams of end-to-end processes. The first end-to-end process contains four different core

processes, namely: Procure products via direct procurement, sell products, deliver products and manage customer service. This end-to-end process is easily recognized as it resembles the path that products take in order to end up at the customers' location. Customers in this case are to be considered large wholesalers and supermarkets. As can be observed in the process landscape model, for this project, we do not consider Company Z as being involved in any form of production and manufacturing. Note however, that Company Z (the Dutch daughter organization) does not manufacture or produce any products itself. The second end-to-end process we recognized is marketing. Marketing is a core process for Company Z because it is essential in order to promote their product, gain market awareness and to realize sufficient sales. It is an end-to-end process on its own because marketing processes are constantly performed and are not directly related to flows of specific products or services.

Another process category is support processes. These can be found in the bottom section of the process landscape model. Support processes enable the execution of core processes (Dumas et al., 2019). We identified the following support processes: Manage personnel, indirect procurement, manage information, manage assets (includes indirect procurement), manage relations, manage finances. These findings are not very unique as these support processes are often apparent in most organizations. Very little enterprises can thrive or even exist without personnel, information, assets or financing and company Z is no exception. However, we argue that the management of relationships with stakeholders and suppliers is a support process that is more important to Company Z than for most other organizations, because Company Z acts as an "intermediary" between Dutch retailers and its parent company.

The last process category is management processes, which can be observed in the top section of the process landscape model. These processes provide direction, rules and practices for the core and support processes (Dumas et al., 2019). Just as support processes they often do not differ greatly among firms (at least at conceptual level). For Company Z we identified: Develop strategy & vision, implement strategy, manage innovation, manage risk and manage quality.

2.2 The Procurement Department

The process landscape model (Figure 1) shows a conceptual overview of the various activities performed by Company Z. In order to improve the company's performance, we have to select a process to improve. Several selection criteria are used: Strategic importance, Health, and Feasibility. This paper focuses on the core processes because strategic importance is predominant in process selection. It becomes clear that the strategic importance of direct procurement (or procure-to-pay) is very high. In this case the acquisition of products meant for

resale are considered direct procurement. In contrast, indirect procurement is concerned with buying indirect products or services that the business needs to operate. Goods and services considered as indirect can be among other things: building utilities, office supplies and technological supplies (Biedron, 2018). For this project, we did not consider indirect procurement a core process, as at the department discussed, the buyers were mainly responsible for the procurement of indirect goods and services.

The management of supplier contracts and products that Company Z sells are dependent on the efforts and processes within the procurement department. Their performance and the ability to control the company's spend has indirectly a huge effect on sales, marketing approaches and profit margins. When considering the health of the procurement processes we have to admit that we do not have proper process performance measures readily available. Therefore a quantitative value for process health - time/cost/quality/flexibility - is out of reach and can only be estimated (Dumas et al., 2019). However we see that a significant amount of communication is facilitated via email, which has the possibility to generate (significant) waiting times and is often non-value adding. Therefore we think a performance improvement is feasible through (semi-)automatization and more responsive forms of communication. Additionally, one of our team members has briefly worked in the procurement department discussed and enabled brief communication with employees. Therefore we will have better access to active domain experts. For the reasons mentioned above the decision has been made to further discover, assess and finally suggest a redesign for the procurement-to-pay process at Company Z. The core process Procure-to-Pay is executed by the same buyers that also do indirect procurement, which is a support process. On top of that the processes are very similar and follow the same general flow except that direct procurement requires longer contract negotiations. It is very useful to understand the bigger picture when trying to improve the interlinked processes.

3. Process Discovery

The previous section introduced the process landscape and discussed the more in depth details on the selection rationale that we decided to use. This section will cover the process discovery stage of the BPM Lifecycle and the techniques used in this discovery along with an evaluation on the quality assurance.

3.1 Discovery Activities

The discovery of a process involves collecting information about the respective process and structuring the retrieved information in the form of an ‘as-is’ process model. Furthermore, Dumas et al., (2019) specified three distinguishing steps:

1. The retrieval of information from various sources
2. The structuring of information by means of a process model
3. The assurance of information quality

To effectively progress through the discovery phase, three methods can be used: evidence-based, interview-based and workshop-based. Those three methods come with different implications and are conducted based on the situation and available resources. It is ideal to make use of all three discovery methods. However we were restricted to two out of three methods, which will be discussed below. First of all, we made use of the evidence-based method by means of a document analysis and observation. We had access to these types of information because one of our team members worked for Company Z and is considered a domain expert for this project. This means that we could leverage his hands-on experience and process insights. The available documents and observed information acted as a profound basis for the understanding of the operational business processes.

To extend our understanding and fill gaps where knowledge fell short, we conducted a phone interview with a current employee of Company Z. This enabled us to ask more specific questions about the details and structure of the process flows. This interview also ensured that the information that we retrieved from the evidence-based method was as up-to-date and unbiased as possible. Unfortunately we were unable to perform the workshop-based method, as availability of employees from the procurement team and distance (Amsterdam - Maastricht) were of significant negative weight.

3.2 As-is process Model

After having discussed the processes and stakeholders with the domain expert and having received the answers to the interview questions as evidence based method, we selected the following processes which are modeled later in this paper:

- One level 2 process:
(In-)direct procurement of products “Procure-to-Pay” ([Appendix I](#))
- Four level 3 processes:
Initiate request 1 ([Appendix II](#))
Initiate request 2 ([Appendix III](#))

Assess request ([Appendix IV](#))

Look for Suppliers ([Appendix V](#))

- One level 4 process:

Competitive bidding ([Appendix VI](#))

3.2.1 Level 2 - Procure-to-Pay

The process is initiated by an action performed by the Requester within the organization ([Appendix I](#)). The Requester represents the “Business” and when the Business has a need, this person has to initiate the procurement process by defining what product or service needs to be bought. When the requester has identified the needs for the Business, he or she can do two things: use the online portal or go to the buyer’s desk directly.

3.2.2 Use of online portal - Level 3 process: Initiate request 1

The company developed an online portal that is accessible for requesters in the organization to see which suppliers are available to purchase products or services from. The requester can go to the online procurement portal and see whether a preferred supplier is available for the needed product or service. In the portal a buying catalog is available in which the requester can find the Preferred Supplier List (PSL), this list displays all the vendors that are compliant with the organization's’ practices and with whom there is a contract or formal agreement. If there is a supplier available that can provide the service or product, the requester sends an e-mail to the procurement department in which he or she states what product or service needs to be bought and with which preferred supplier. If there is no supplier available in the PSL that can provide the product or service, the requester has to schedule a meeting with a buyer in order to discuss the request and define the possibilities or searching a new vendor. The use of the online portal is modeled in process: ‘Initiate Request 1’ ([Appendix II](#)).

3.2.3 Go to the buyers’ desk immediately - Level 3 process: Initiate Request 2

Although the company developed this portal and it should be best practice to use it, a lot of requesters are slightly stubborn and prefer to go the buyers’ desk immediately to request their service. When they do so, any buyer can be approached and check the PSL after having discussed the business needs with the requester. This time, the buyer himself will open the catalogue, opens the PSL and checks the supplier availability. Depending on whether the supplier is or is not available to things can happen. This process is modeled in: ‘Initiate Request 2’ ([Appendix III](#)).

3.2.4 Supplier is available - Level 3 process: Assess request

When there is a supplier available that matches the requesters' request, a buyer has to assess the specific request based on the expected amount to be spend (Assess request). This amount is usually defined by the requester itself as they have a certain budget to spend and assign a proportion of this amount to the relevant purchase action. The assignment is done by the Procurement Manager based on the value amount of the expected purchase. When the amount totals a sum lower than €15.000, a junior buyer is allowed to begin with the purchase. If the amount to be spend is between €15.000 and €150.000, a senior buyer is assigned to the actual purchase. However, if the amount is larger than €150.000, the procurement manager is responsible for and has authority over the purchase. When the right person is assigned, he or she checks whether the request is valid and in line with the businesses' best practices. Following, the request can be approved or disapproved and this has an effect on what happens thereafter. This process is called 'Assess request' and can be found in [Appendix IV](#).

3.2.5 Supplier is unavailable - Level 3 process: Assess Request & Pick Supplier

It could happen that there is not yet an appropriate supplier available in the PSL. If that is the case, a buyer needs to be assigned to the case according to the same process as discussed above, based on the sum amount of money to be spend ('Assess Request', [Appendix IV](#)). The buyer can again approve or disapprove the request. If the request is approved, the responsible buyer has to identify what kind of purchase needs to be done ('Look for Suppliers', [Appendix V](#)).

- *Single Source*

If the money is to be spend with a supplier that appears to be the only provider in the market, this supplier is considered a Single Source (SISO) supplier. If the purchase is to be done with such a supplier, the buyer needs to fill in and sign an approval document that indicates that the supplier is officially to be considered Single Source supplier.

- *One Time Vendor*

It could be that the request is to be consider a one-time only exception. For example, if there needs to be something purchased immediately (or at least, as fast as possible) and there is no time for formal procedures. The responsible buyer can sign of a One Time Vendor (OTV) exception form. Which covers compliance and best practices for this instance only by exception.

- *Regular*

Usually, the purchase can be done with a regular vendor that exists in the market for which no exception has to be made. The company then makes a distinction between spend amounts smaller than €15.000 and larger than this amount. If it the purchase concerns the smaller amount, the buyer can select a supplier based on his experience and some desk research. However, when the purchase concerns a larger amount, the buyer needs to go through a process called “competitive bidding” (see [Appendix VI](#)). Finally, when a buyer has found and selected a fit supplier, he or she requests the supplying organization to sign a pre-requisites form. This form is a formal agreement between the buying and selling party, in which the selling party indicates that it agrees with the terms and conditions set by Company Z. It could be however, that the party declines the request, and makes an addendum to the form because it wishes not to agree to all terms and conditions. The Procurement Manager then has to consider whether to agree with the addendum and if not, the collaboration is terminated. Usually the supplying parties agree and sign the prerequisites form. When they have signed the forms and the procurement department received them, the buyer enters the supplier details in SAP and adds the supplier information in the Vendor Master Data (VMD) file.

- *Competitive Bidding*

When the purchase is to be done with a regular vendor of which there are multiple competitors for in the market and the amount to be spend is larger than €15.000 the buyer has to do competitive bidding ([Appendix VI](#)). After the buyer has obtain a Request for Proposal (RFP) defining all the specifications and amount of the purchase, he or she will perform some research on vendors in the market that can supply the product or service. Thereafter the buyer will select at least three suppliers to whom he or she will send the RFP form. As answer on the RFP, the buyer will receive quotations from suppliers, that indicate what level of quality can be offered for what price. Following, the buyer will try to negotiate the best deal with the suppliers and selects the one that fits the needs best. When the buyer has selected the preferred supplier, he or she will inform the “winning” supplier and reject the vendors that are not selected for the purchase activity. This process is on the 4th level and can be found in Appendix I.

- *Disapproval of the request*

If, after assessing the request of the requester is denied by the buyer, the requester is notified via email that the request is declined.

- *Supplier selected*

Usually, the request received is legitimate and the buyer manages to find a supplier to buy the product or service from. If so, the Purchase Request becomes a Purchase Order (PO) that the buyer makes in the system. After approval, there is a message send to the requester to indicate

that procurement successfully found a supplier and that the transaction will occur. Also, the formal PO is communicated to the supplier so he knows that he can start with the delivery of the good or service.

- *Accounting*

Before or after the delivery of the goods or service, the supplier sends an invoice to the accounting department of Company Z. The department will check whether the invoice is correct. If the invoice contains incorrect information, such as a larger requested amount of money than agreed with procurement or an insufficient quantity of goods, the invoice is blocked. Accounting will notify the supplier of this issue. Most of the time the invoice received is correct and the accounting department will ensure that the invoice is paid after 60 days.

3.2 *Quality Assurance*

The quality of our process models can be assessed along the lines of three quality assurance criteria, as defined by Dumas et. al., (2019):

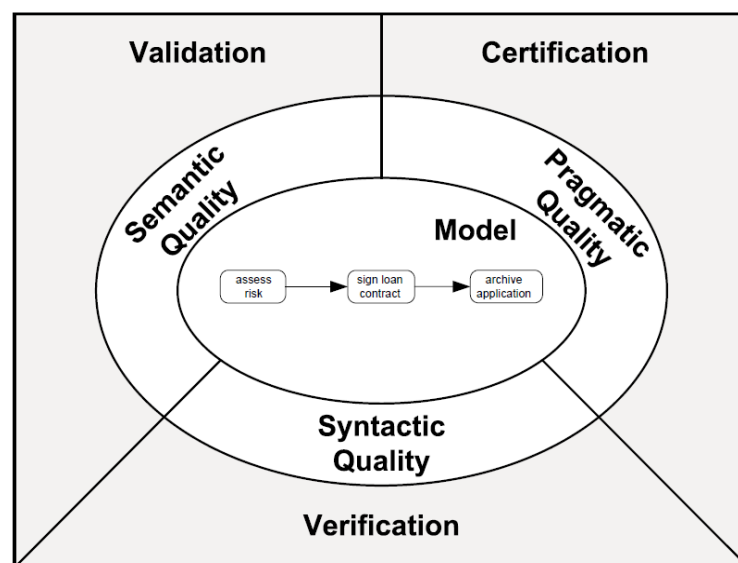


Figure 2. *Three Quality Assurance Criteria*

First, the semantics of the model were checked. This criterion examines if the constructed model accurately represents the real-life scenario. More specifically, the completeness and validity of our models was checked. This was done by constructing the as-is models with the information that we extracted from the evidence- & interview-based discovery methods. After putting this information together and constructing a first draft-model out of it, we asked the company representative to see if this model accurately reflects the actual processes (validity), and if all the steps of the process were included and well-connected

(completeness). Apart from some minor mistakes related to the sequence of certain tasks, the model reflected the reality accurately. The minor adjustments were made and included in the development of the final process models.

Second, the pragmatic side of our model was examined. Pragmatic quality means that the model is useable and understandable for the reader and user of your model. In general, three aspects of pragmatism are considered: understandability, maintainability and learning. These aspects were ensured by living up to a certain predefined set of guidelines which we noted at the beginning of the modelling process, in order to protect ourselves from common caveats. For example, we tried to limit the use of ‘OR-Gateways’ as much as possible, because these can be interpreted in multiple ways and leave room for ambiguity. We also tried to limit the size of the model to no more than 30 nodes, to keep readability and user experience at a satisfactory level. Additionally, we tried to make every data object or artifact of added value by ensuring that they capture more than only the information flow from one user/system to the other. Finally, for coherence we enforced a standardized style of layout and labeling of the nodes. After making sure that all these guidelines were followed, we presented the model to peers without any BPM or modeling experience. We asked them if they could explain us the flow of the process, and what they think the model represents. The outcomes were positive: 4 out of 5 peers could explain the model in relative depth after having studied the models for 10 minutes. This leads us to conclude that the model is comprehensible for both experts and non-experts.

Lastly, the syntax of our model was checked. This criterion relates to the compliance to the syntactic rules of the modeling language used named Business Process Model and Notation (BPMN). Syntactic correctness is two-folded: structural correctness and behavioral correctness (Dumas, et al., 2019). Structural correctness was ensured by checking if all the activities have input and output, all the gateways have one input and at least two outputs and if there are no disconnected arcs or nodes. To further ensure the pragmatic and syntactic quality of our model, we followed the seven process modeling guidelines as defined by Mendling et al. (2010). For instance, we paid attention to the size, number of routing paths, model structure and we tried to limit the use of OR-splits as much as possible. Mainly because we clearly predefined our guidelines, only slight adjustments to the model had to be made in our case. Furthermore, the behavioral correctness was investigated. The behavioral side of the syntactic criteria follows certain rules that ensure that all the tokens are able to reach the end of the process, and that there is no possibility for deadlock. After checking for deadlock we found a mistake in the combined use of an ‘XOR-split’ and ‘AND-split’. This resulted in deadlock possibility. After redesigning the process-flow we were able to say that our model

survived all three quality assurance criteria and was ready to be analyzed for optimization purposes.

4. Process Analysis

This section focuses on the redesign goals and analysis of the procurement process with qualitative and quantitative techniques. Based on the as-is process and general procurement issues, we decided on two main goals that could improve the process efficiency for the Procurement department:

1. Decrease the duration of procurement process
2. Reduction of the procurement process costs

In order to find areas to decrease duration time and eliminate manual tasks, we performed a Value-Added analysis and a Waste analysis to identify unnecessary steps in our as-is process. Furthermore, we tried to uncover the root causes with a Cause-Effect Diagram or Fishbone Diagram (see Figure 3) and aggregated all identified inconsistencies in the Procure-to-Pay Process in the Issue Register.

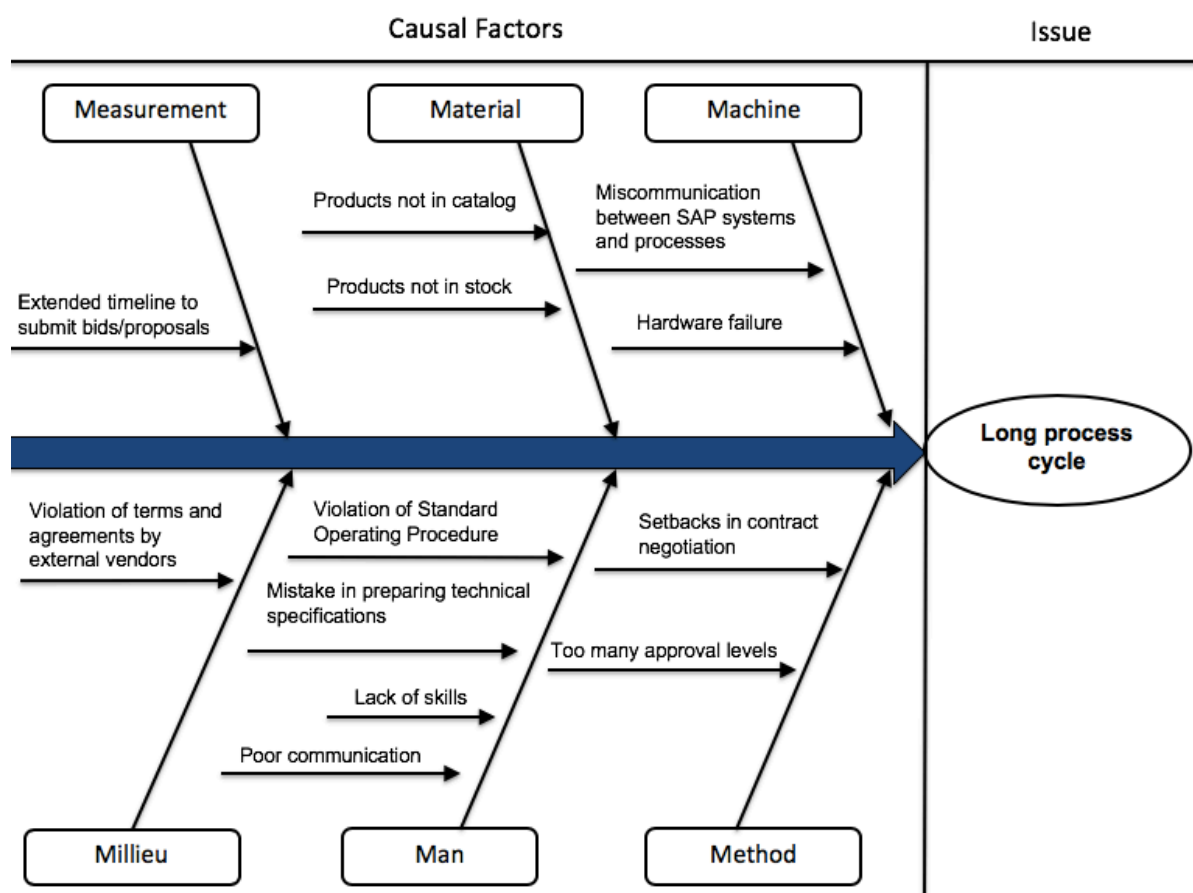


Figure 3. Cause-Effect Diagram ("Fishbone" Diagram)

4.1 Value-Added and Waste Analysis

The Value-Added Analysis is a technique to identify unnecessary steps in a process with the goal of eliminating them where possible. The process steps were classified being value-adding (VA), business value-adding (BVA) or non-value adding (NVA). Value-adding means that produced goods or services lead to customer satisfaction or value. Business-value adding is means that the task is necessary for Company Z to operate smoothly and thus generates value to the organization. Lastly, non-value adding considers the tasks not classified in the two other categories and are for example handoffs that do not necessarily generate value for the business or customer (Dumas et al., 2019).

Most of the activities in the procurement process are considered as value-adding . Besides that, we found some non-value adding activities, such as sending or receiving requests, opening the supplier catalogue and the check of supplier availability in the supplier list. During this analysis, we experienced some difficulties with regards to discriminating value-added and business value added or non-value-added activities. Sometimes, it is not straightforward. For example, an activity as sending or receiving notifications ‘supplier not found’ looks like non-value-added. On the other hand, however, as a “customer” you want to know as soon as possible whether there is a supplier available or not, so other actions can be undertaken.

To gain further insights about the process activities, we have performed a waste analysis in the second stage of our qualitative process analysis. We analyzed each activity and evaluated whether it can be assigned to any of the seven types of waste: transportation, motion, inventory, waiting, defects, over processing and overproduction. In the procurement process there is quite a lot of motion and transportation activities such as checking supplier availability, checking the invoice, open the catalog or supplier list and a couple of waiting activities such as receiving an approval or disapproval. Waste analysis helped us to identify redundant and can be automated or removed. The Value-Added and Waste Analysis is displayed in [Appendix VII](#).

4.2 A Cause-Effect Analysis

In order to suggest a solution for the goal of reducing the duration of the procure-to-pay process cycle which we defined earlier, we used a Cause Effect Diagram to uncover issues that trigger waiting times and thus slow down the process. A Fishbone diagram depicts the relationship between a given negative effect and its causes, which are further grouped in primary (*direct*) and secondary (*indirect*) causes. As a guideline for brainstorming, we used the 6 M’s techniques, which consist of Machine (*technology*), Method (*process*), Material, Man, Measurement and Milieu. We identified the negative issue in the Fishbone diagram as Long Process Cycle expressed in number of days. We identified that Extended timeline to submit

bids/proposals, Products not in catalog, Miscommunication between SAP systems and processes, Violation of terms and agreements by external vendors and Violation of Standard Operating Procedure and Setbacks in contract negotiation are the primary triggers for the long process cycle. The secondary effects such as Product not in stock, Hardware failure, Mistake in preparing technical specifications, Lack of skills, Poor communication and Too many approval levels have different effects on the process duration.

4.3 Issue Register

An issue register is a listing that provides a detailed analysis of each issue and its impact in the form of a table with a predefined set of fields (Dumas et al., 2019). We found 9 main issues which appear during the procurement process displayed in the Issue Register (see [Appendix VIII](#)). Some of them occur more often, others happen only rarely. However, most of them cause a delay in the overall process and thus potentially increase costs. Because of the lack of some information about the values about the exact amount of delays and instances of time duration, we were not able to fully describe the quantitative impact. Nevertheless, we made the priority of the issues based on the qualitative impact. After the interview with domain expert and discussion the issues in the our team, we concluded that the long process cycle and high costs are caused by delays in delivering products and delays in contract negotiations. The last mentioned activity can take up a duration ranging from a couple of hours to a couple of weeks.

4.4 Quantitative Analysis

Qualitative analysis is a valuable tool to gain systematic insights into a process. (Dumas et al., 2017). For the purpose of our goals we counted the cycle time, processing time and cycle time efficiency for subprocesses and the whole process. For this calculation we used flow analysis. It's important to notice, that duration of some activities can vary significantly. For example, it depends how quickly the buyer receive RFP from requester or how long the negotiation lasts.

4.4.1 Subprocess Competitive Bidding

This process contains fifteenth activities ([Appendix VI](#)), which are connected in two different ways (sequence and alternative paths or XOR blocks). Our domain expert identified how long each of the process lasts, so we could count the duration of each processes. As you can see, this process is quite long. The total cycle time is 61.2 h and the processing time is 11.2 h. The cycle time efficiency is 0.183, what means that only 18.3% of the total cycle time was spent on performing the competitive bidding. Other 81.7% of the total cycle time was spent on waiting.

The Processing Time:

$$30m + 240m + 120m + 180m + 60m + 0.5 * 60m + 10m = 11.2h$$

The Waiting time:

$$50h$$

The Total Cycle Time:

$$11.2h + 50h = 61.2h$$

Cycle Time Efficiency:

$$11.2h / 61.2h = 0.183$$

4.4.2 Subprocess Looking for supplier

The total cycle time spent on looking for supplier is 40.75 h. The total cycle time efficiency is 0.141. It means, that only 14.1 % of total cycle time was spent on looking for supplier. A little bit less than in case of competitive bidding.

The Processing Time:

$$120m + 10m + 10m + 20m + 5m + 180 = 5.75h$$

The Waiting Time:

$$35h$$

The Total Cycle Time:

$$5.75h + 35h = 40.75h$$

Cycle Time Efficiency:

$$5.75h / 40.75h = 0.141$$

4.4.3 Initiate request 2

The subprocess of initiation a request doesn't look time consuming. From initiation the product/service search to find a supplier it takes 14 minutes. There is no waiting time, so the processing time is equal to the total cycle time and cycle time efficiency is equal 1, what means that process is efficient.

The Processing Time:

$$5m + 2m + 2m + 5m = 14m$$

The Waiting Time:

$$0m$$

The Total Cycle Time:

$$14m$$

Cycle Time Efficiency:

$$14m / 14m = 1$$

4.4.4 Initiate request 1

Similar to the subprocess Initiate request 2, in this process we don't have waiting time. So, the processing cycle time is the same as the total cycle time and is equal 9 minutes. What is less, than in previous process.

The Processing Time:

$$2m + 2m + 5m + 9m = 18m$$

The Waiting Time:

$$0m$$

The Total Cycle Time:

$$18m$$

Cycle Time Efficiency:

$$18m / 18m = 1$$

4.4.4 Assess request

Assess request takes 135 minutes. The cycle time efficiency is 0.111. So, only 11.1 % of the total cycle time is spent on assessing request. Other 88.9 % of the total cycle time is spent on waiting for buyer's response.

The Processing Time:

$$5m + 2m + 10m = 15m$$

The Waiting Time:

$$120m$$

Total Cycle Time:

$$15m + 120m = 135m$$

Cycle Time Efficiency:

$$15m / 135m = 0.111$$

5. Process Redesign

Most organizations focus first on product improvements and later on process improvements. Company Z does not produce any products. Therefore we are left with process optimization. Because the earlier mentioned goals of the process redesign is reduced cycle time and reduced costs, we will value these two types of improvements more than quality and flexibility, which can also be found in the devil's quadrangle. The methods used for process redesign are transactional methods. Based on our process analysis we can conclude that processes are generally performed in a logical and efficient way with minimal non-value adding activities. Because of that reason we conclude that transactional methods and incremental improvements based on the current process is more beneficial and certainly cheaper than a complete overhaul of the process. We stick with heuristics because the other methods are more time consuming and our time horizon is limited. The process analysis in last chapter identified several issues which we will address through process redesign. In the next part of this chapter we will discuss three of the main issues and the response that we recommend through process redesign (Dumas et al., 2019).

First of all, as can be seen in [Appendix IX](#), there are two similar but different ways of initiating a procurement request. Requesters can either initiate the procurement procedure through the procurement portal or go directly to the buyer in the procurement department. When the latter is the case the buyer has to check the procurement portal. Several similar and parallel processes result in unnecessary paths, complication of the process, and can result in delays. Additionally it makes automation difficult because the process is very flexible and not structured at all. We recommend only initiating the procurement procedure through the portal to alleviate buyers from constantly walking requesters through the process. Instead requesters

can do this process themselves through the portal. This will decrease cycle (waiting) time as requesters do not directly go to buyers and therefore not have to wait for an appointment. Additionally the buyer will not have to extract the needed information out of the requester, decreasing both cycle time and labor costs. Having one standardized way of initiating the procurement process decreases the resources needed to manage and control the process. In the implementation section we discuss the optimal approach for achieving this redesign.

Secondly, in the current situation procurement request are either received through emails or word of mouth. These request are often messy and unstructured. In the current way of working it is unnecessary difficult to have a central overview of the current requests. As mentioned in the previous paragraph we want to eliminate the option for initiating the procurement process by going to the buyer in person. This redesign element would already greatly simplify the information flow of procurement requests. Because all the requests would now be channeled through the same process it also makes improving this process flow more beneficial. We propose the option to extend the functionality of the buying catalogue to not only view products/services/suppliers but also place requisition requests. This would eliminate the need to write a separate email, which decreases cycle time and labor costs. Also the information in the request would be delivered to the buyer in a consistently structured way, which makes reading and processing the request much quicker. Reading a structured dashboard overview will proof to be much more efficient than trying to decipher the meaning of numerous unstructured emails. This further decreases cycle time and labor costs. Also, now all the requests are processed into a structured format it will be easier to analyze historic requisition requests. In [Appendix IX](#) below the current processes in shown in a BPMN model. Also, In [Appendix X](#) the redesigned process is shown.

5.2 Heuristics and Devil's triangle

During the redesign of above discussed process we used and applied the following heuristics:

- *Contact reduction* - The requester can be seen as one of the customers. Contact reduction is achieved by allowing them to order smoothly through the portal.
- *Activity automation* - The automatic structuring, sending and receiving of procurement requests.
- *Split responsibilities* - The redesigned process shows a split of responsibilities. Requesters are now solely responsible for creating a procurement request. Buyers are still responsible for the assessment.
- *Interfacing* - The portal for the requesters and the dashboard for the buyers functions as an interface between the two groups of employees.

In order to better understand the effect of the process redesign we developed the Devil's quadrangle displayed below of the process before and after the implementation of our proposed redesign Figure 4. This quadrangle looks for this instance only at the redesigned part of the process, not the entire core-process. The Devil's quadrangle consists of the following four performance dimensions: Time, Cost, Quality and flexibility (Dumas et al., 2019).

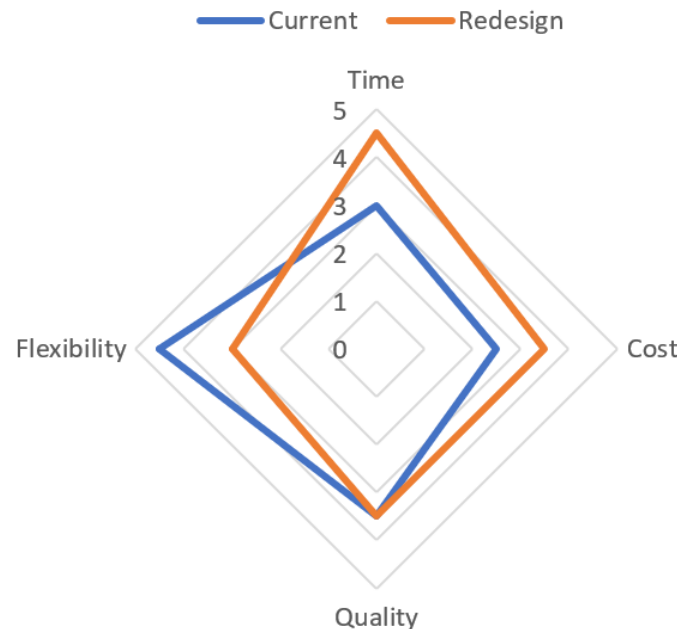


Figure 4. Predictions of the Devil's quadrangle before and after process redesign.

Important to note is that the two most important goals of the redesign are cycle time reduction and cost reduction. As mentioned in the two previous paragraphs implementation of the redesign will result in decreased cycle times because part of the process will be more standardized and partly automated. Additionally, the inefficient way of initiating a procurement request is eliminated so all buyers will use the more efficient and now improved process. Because of the automation the buyers do not have to deal with lists of unstructured emails, but will have a precise overview of requests instead. This further reducing time spent on trivial tasks. A big part of the costs of the procure-to-pay process is labor costs. Company Z will reduce labor expenses because the employees will not have to invest as much time in the process. Therefore cost as a performance dimension will also increase. A significant change in the quality dimension is not expected initially, but with the new system it will be possible to log transaction requests and analyze them for future improvements. Flexibility however will decrease significantly because the possible ways to initiate a procurement request will be limited to one. We do not think that this will reduce performance of the process significantly in any way because one efficient way is better than two mediocre ways to perform a process.

The reduction in flexibility can have negative effects when the employees do not like the it or refuse to work with it. This issue will be addressed in the implementation chapter.

In the current way of working many tasks are manually performed and therefore not logged by the system. For effective process automatization and future BPM projects it is important that the BPMS system is fully aware of the performed activities. In the case of company Z we conclude that it is not beneficial to transform the manual tasks in the subprocesses to user tasks or automated tasks for the following reason: the manual tasks are often complex to automate and can vary greatly from case to case and therefore has to be handled in various ways. Examples of hard to automate processes within Company Z are ‘Assess request’ and ‘Competitive bidding’. Transforming the manual tasks into user tasks would also be counterproductive as the buyers would have to log the end of each activity, which would increase cycle time and labor costs. Additionally it would increase repetitiveness in their work, while the benefits of these logs would be minimal.

The waste we identified was motion (*in digital systems*) or transportation (*through email/messages*). Because procurement for each case is different it is not possible to automate the activities with motion and transportation waste. However the motion waste that occurs when requesters are looking through the catalogue in the buying portal can be minimized by optimizing the quality of the search engine. We recommend the option to not only search for products and product types, but also for supplier categories and individual suppliers. This way requesters that already have a supplier in mind do not have to scroll through all other suppliers that sell similar products. By implementing this improvement time and labor cost will be saved, additionally the user friendliness of the portal will increase.

6. Process Implementation

6.1 Process automation activities

The previous section has touched upon process redesign. This section will follow up by discussing the implications of possible automation and streamline activities. Additionally, limitations of implementation and of this paper in general will be discussed.

Streamlining the process design has several advantages such as: Workload reduction, Transparency and rule enforcement (Dumas et al., 2019). However, the implementation of such practices is not as straightforward as one might think. Implementation often takes a long time, and because there is a human element involved it can lead to unexpected or unpredictable results. For example, In an earlier attempt for change Company Z has already made clear that requesters should use the portal and rely less on the buyers in the procurement department to initiate procurement procedure. Despite this effort in trying to align automation strategy, this

did not result in a significant change in employee behavior. Implementations of this nature can be challenging from an organizational perspective. The main reason for this is the fact that the interests of different stakeholders have to be balanced. All these stakeholders have different objectives and goals and are constantly trying to optimize their effectiveness. It can therefore be hard to align the automation strategy with the interest of the executors of this strategy. Additionally, this reluctance towards change can be (partly) allocated to the company culture. Dumas et al. (2019) define organizational culture as follows:

“Culture, is the set of corporate values and beliefs, which may contribute to shaping the process-thinking mindset of employees. This, in turn, has implications on the extent to which process participants will adhere to new process designs or how much corporate leaders will be interested in and value BPM.” (Dumas et al., 2019)

Thus, it is of crucial importance that process participants (employees in this case) are sufficiently informed, inspired and engaged by the process redesign initiatives that flow from the process analysis. Also, high-level management should ensure that the right human capital is allocated to the right tasks, in other words, the people involved in the redesign need to be equipped with the right set of tools to be able to execute the task as is expected from them. Additionally, the proposition towards the employees should focus on the benefits of the redesign for employees so they realize that the benefits overshadow the negatives. This can be achieved by making sure that employees understand why using and ordering through the portal is beneficial for them, for example: time savings. Additionally, Company Z can provide tutorials and training on how to use the system and how to deal with problems employees could possibly run into. By doing so, hurdles that would normally prevent change can be taken away. It ensures that the organization is responsive to changes and embraces dynamics and process thinking.

6.2 Limitations

6.2.1 Limited access of information

Although we had a domain expert within the team and had the opportunity to ask a few relevant questions regarding the process, we cannot guarantee that the information altogether includes all the details with respect to the procurement process. Nevertheless, we tried to represent the process and shortcomings as detailed as possible and hope it provides useful insights in a procurement process environment. In the future, it would be very helpful and of added value if

we were to organize workshops. Then we would really be able to model more accurate and maybe gain even more valuable insights.

6.2.2 Limitations regarding redesign

The organization was identifying opportunities to increase the efficiency of the requesters initiating the process by implementing a state of the art portal. However, such an implementation is time and resource consuming and will take a serious amount of time. Also, such a process is not implemented at local level, rather on European level and this is outside of the responsibilities of the local procurement team.

6.2.3 Duration assumptions

Although we have identified all activities in the procurement process, we were not able to accurately perform a quantitative analysis as we did not have exact time durations for the activities involved in the process. Nevertheless, some activities were easy to estimate, as they are just handoffs or activities of short duration. It was more difficult to estimate the more abstract and time consuming activities such as negotiation and competitive bidding. Such activities rely on the specialism of the buyer and can be therefore very volatile.

7. Team Work

7.1 Roles and responsibilities

Our team existed of four people and proved quite balanced. All members had some experience working in medium size and larger organizations, which made it easy to discuss business and process issues. One team member had deep knowledge on the processes discussed in this paper, and is therefore considered domain expert. He explained extensively how the processes flows and where bottlenecks exist. However, as his knowledge is not completely comprehensive regarding the finer details, we send out a short document with questions to be answered by his former manager. It was the domain experts role to lecture the team on all the organizational “vocabulary” and to write down all the processes as detailed as possible. Two other team members were really skilled regarding the BPMN notation and best practices and therefore agreed on the actual development of the process models together with the domain expert.

The identification of all the processes and the modelling were done first. The last team member was very skilled regarding his academic knowledge, and added more theoretical relevant information where necessary. Together we brainstormed about the issues and bottlenecks within the existing process. One should note that as we were limited by time and resources, we probably have not uncovered every tiny detail and therefore might miss some

valuable insights. However, in the process flows we identified, we were able to already suggest improvements. The identification of the issues as well as the suggestions for redesign were initiated later in the process, as those were based on the findings in first two parts of the project. Finally, we revised the paper and changed mistakes and shortcomings.

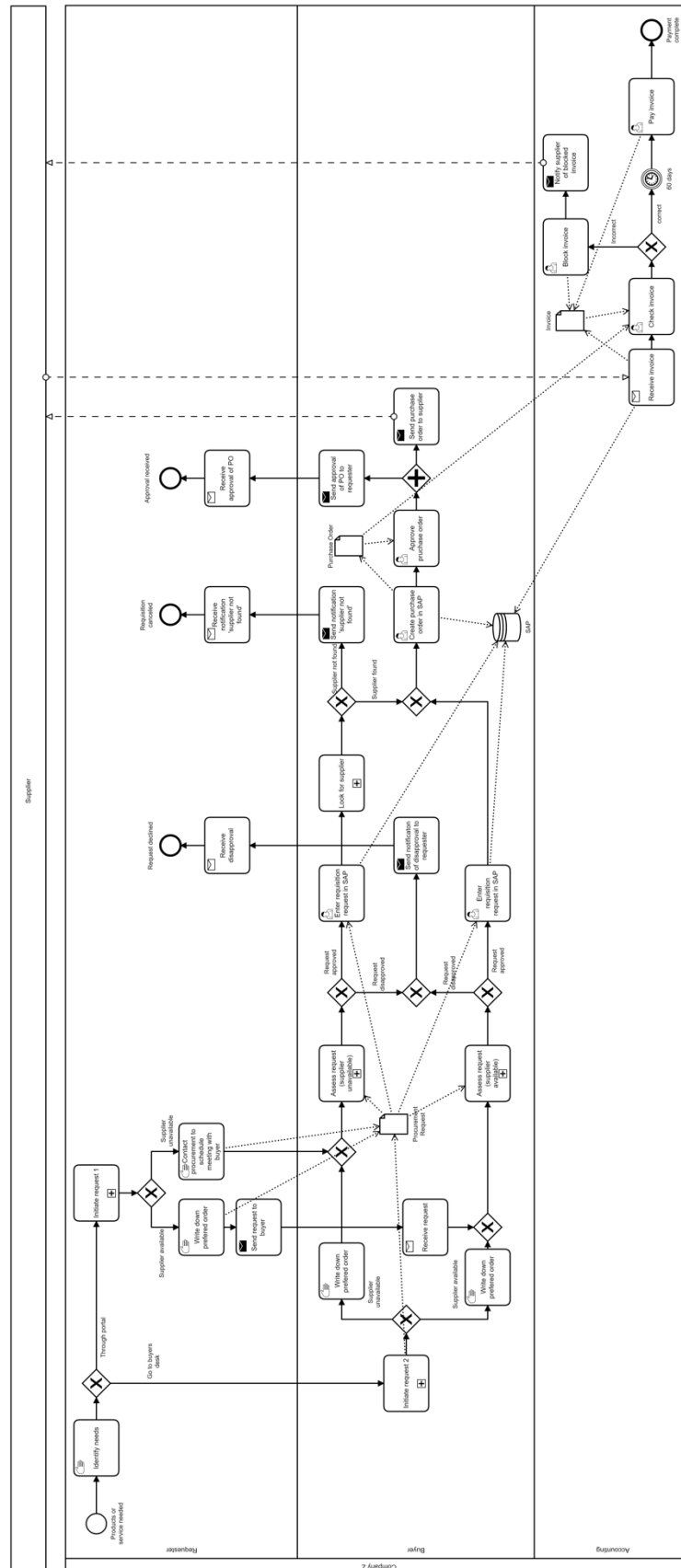
7.2 Information retrieval

The information retrieved for this project comes from three different sources. The first, as mentioned above, comes from the experience of the domain expert. The second source of information of course was the internet where we searched for Procurement best practices, examples and information publicly available about Company Z. This information is to be considered “existing documents”. At last, we have send out a document that contains questions about specifics our domain expert was not sure about and were not able to find on the internet. By asking an old colleague of the domain expert, we managed to clarify missing activities in the process.

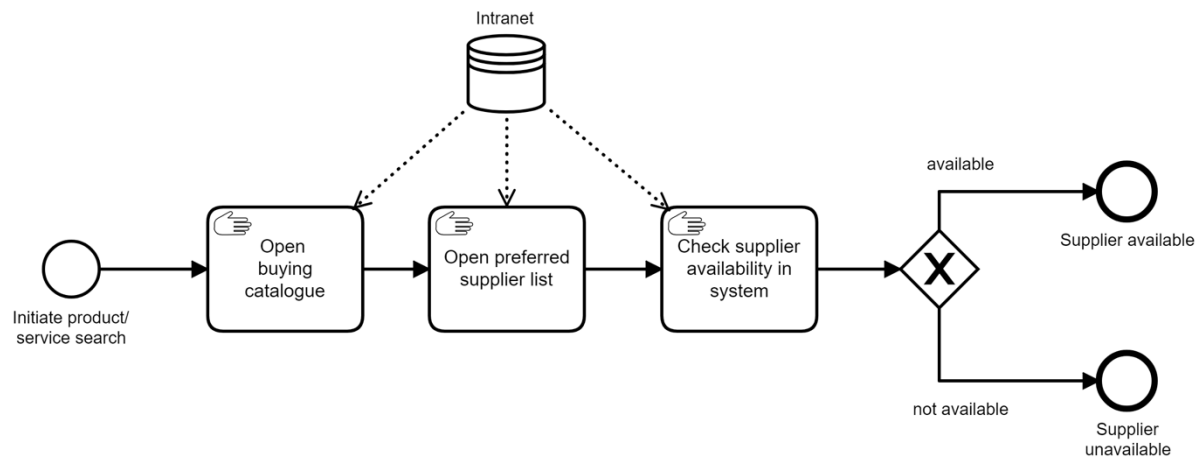
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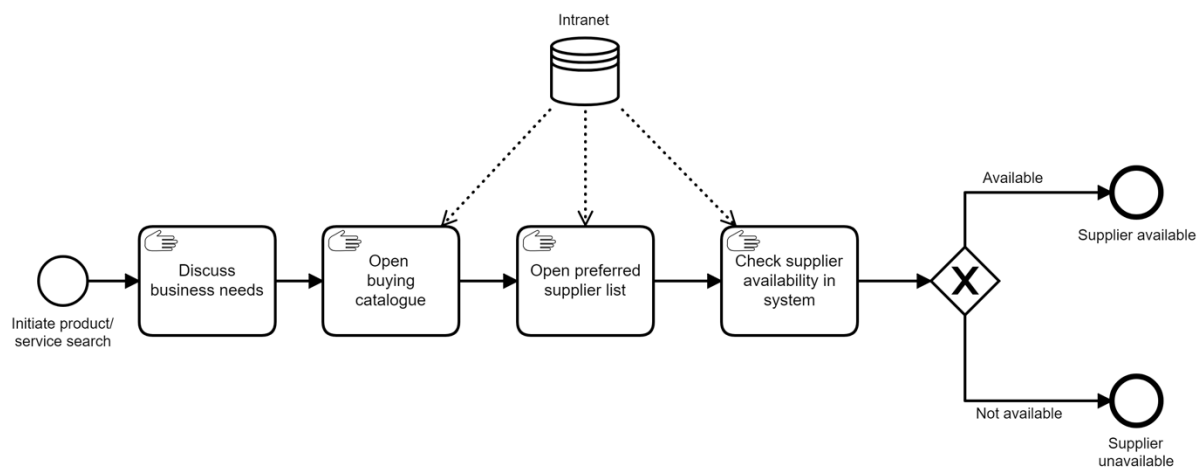
I. (In-)direct procurement of products



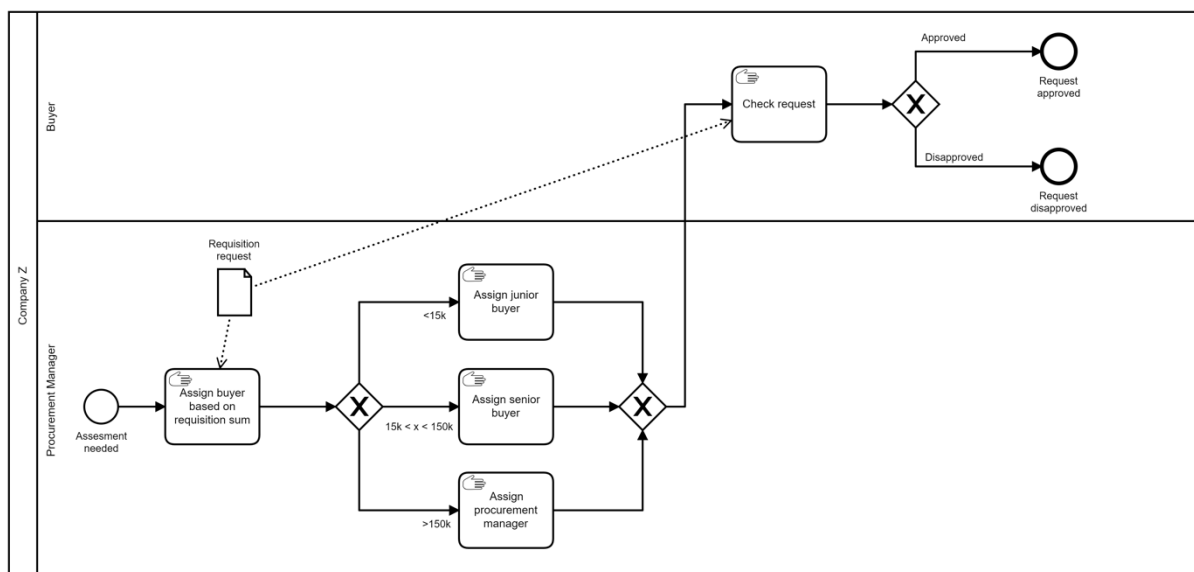
II. Initiate request 1



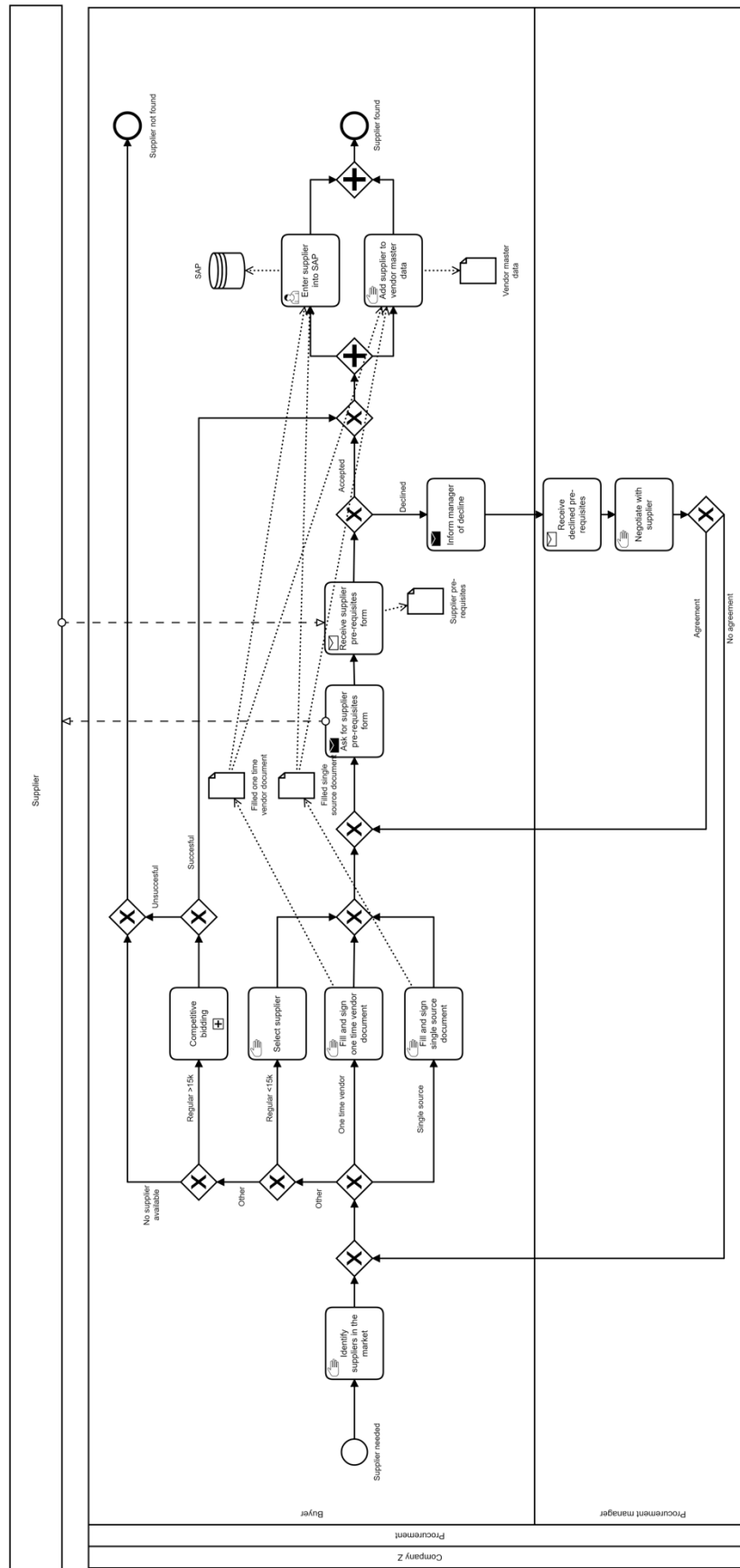
III. Initiate request 2



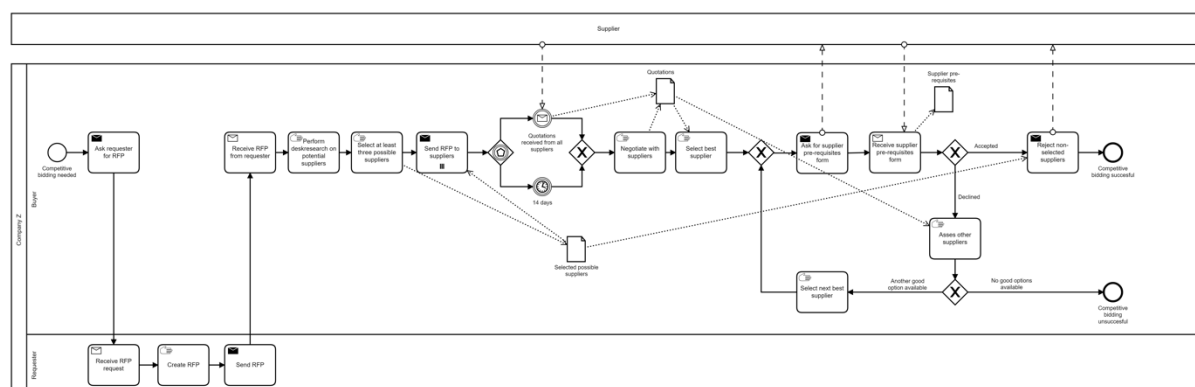
IV. Assess request



V. Look for Suppliers



VI. Competitive Bidding



VII. Value-Added and Waste Analysis

Activity	Performer	Value Classification	Waste
Identify needs	Requester	VA	-
Open buying catalog	Requester	NVA	Motion
Open preferred supplier list	Requester	NVA	Motion
Check supplier availability in system	Requester	NVA	Motion
Write down preferred order	Requester	BVA	-
Contact procurement to schedule meeting with buyer	Requester	BVA	-
Send request to buyer	Requester	NVA	Transportation
Discuss business needs	Buyer	BVA	
Open buying catalogue	Buyer	NVA	Motion
Open preferred supplier list	Buyer	NVA	Motion
Check supplier availability in system	Buyer	NVA	Motion
Receive request	Buyer	NVA	Transportation
Assign buyer based on requisition sum	Buyer	BVA	-
Assign buyer	Buyer	BVA	-
Check request	Buyer	BVA	-
Enter requisition request in SAP	Buyer	VA	-

Send notification of disapproval to requester	Buyer	NVA	Transportation
Receive disapproval	Requester	NVA	Transportation
Identify supplier in the market	Buyer	BVA	-
Ask requester for RFP	Buyer	NVA	-
Receive RFP request	Buyer	NVA	-
Create RFP	Buyer	BVA	-
Send RFP	Buyer	NVA	Transportation
Receive RFP from requester	Buyer	NVA	Transportation
Perform desk research on potential suppliers	Buyer	BVA	-
Select at least three possible suppliers	Buyer	BVA	-
Send RFP to suppliers	Buyer	BVA	-
Negotiate with suppliers	Buyer	BVA	-
Select best supplier	Buyer	BVA	-
Ask for supplier prerequisites form	Buyer	BVA	-
Receive supplier prerequisites form	Buyer	BVA	-
Asses other suppliers	Buyer	BVA	-
Reject non-selected suppliers	Buyer	BVA	-
Select next best supplier	Buyer	BVA	-
Fill and sign one time vendor document	Buyer	BVA	-
Fill and sign single source document	Buyer	BVA	-
Ask for supplier pre-requisites form	Buyer	BVA	-
Receive supplier pre-requisites form	Buyer	BVA	-
Inform manager of decline	Buyer	NVA	Transportation
Receive declined pre-requisites	Buyer	NVA	Transportation
Negotiate with supplier	Buyer	BVA	-

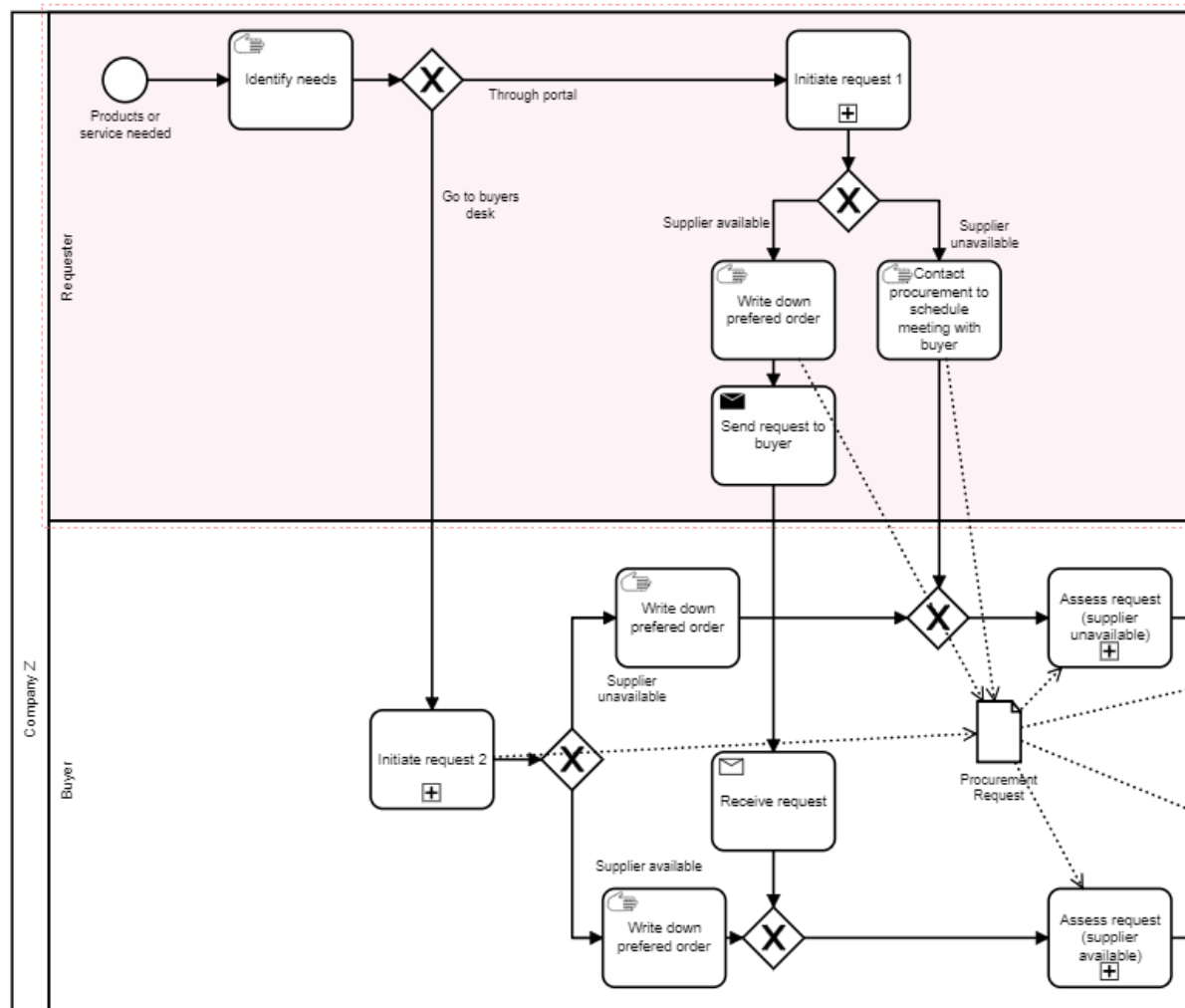
Enter supplier into SAP	Buyer	BVA	-
Add supplier to vendor master data	Buyer	BVA	-
Send notification ‘supplier not found’	Buyer	NVA	Transportation
Receive notification ‘supplier not found’	Requester	NVA	Transportation
Create purchase order	Buyer	VA	-
Approve purchase order	Buyer	VA	-
Send approval of PO to requester	Buyer	NVA	Transportation
Receive approval of PO	Requester	VA	Transportation
Send purchase order to supplier	Buyer	VA	-
Receive invoice	Accounting	VA	-
Check invoice	Accounting	BVA	-
Block invoice	Accounting	BVA	-
Notify supplier of blocked invoice	Accounting	VA	-
Pay invoice	Accounting	VA	-

VIII. Issue Register Analysis

Priority	Name	Explanation	Qualitative Impact
3.	Difficulties in identifying the best suppliers	Oftentimes, received bids and offers don’t satisfy the expectation / requirements of the firm.	Chosen wrong suppliers, could cause additional cost for firm, delays and increase risk exposure.
2.	Unstable supply or quality of materials	In very small number of cases, some suppliers deliver not exactly what they say they will deliver and to the quality agreed.	Courses delays of the other activities, doesn’t allow to perform planned next activities / processes, increases costs and risk.
1.	Delay in delivering the product	Sometimes, actual lead times, or the time required to source certain materials, end up being considerably more than that anticipated or scheduled.	It can thwart the entire project, cause the delay of the other activities.
6.	Delay in Preparing Technical	Sometimes, due to lack of expertise in preparing these	Extends the process duration of procurement

	Specifications, Scope of Work or Terms of Reference	documents, or not realizing the extent of the information and research that may be needed to complete them, causes delays.	process, doesn't allow to perform the next planned activities, increase risk.
7.	Extension of Bid or Proposal Submission Date.	Sometimes, suppliers ask to extend the submission date.	Courses delay in awarding the contract.
9.	Delay in Opening Bids or Proposals Received.	In very small number of cases, proposals are submitted late and they are rejected, unless the procurement rules or the solicitation documents state otherwise.	Good offers / suppliers can be missed.
4.	Delays during the Approval Process.	Sometimes, it is time consuming to get the approval because of the busy or absence of the responsible person (holidays) .	Courses the delay of the process.
5.	Delay in Contract Negotiations.	Sometimes, in the case of more complex contracts negotiations take longer than anticipated.	Courses delay in awarding the contract.
8.	A Contractor, Supplier or Service Provider Challenges the Procurement Process.	In very small number of cases, contractors, suppliers and service providers want to challenge the procurement process if they have evidence or reason.	It can thwart the entire project, cause the delay of the other activities and processes .

IX. Level 2 BPMN model - The current process for initiating a procurement request



X. Level 2 BPMN model - Redesigned process for initiating a procurement request.

