REFLECTION

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The following document aims to present the final reflection on the approach chosen for the research proposal. In addition it will be outlined how it was planned and how it fits in the methods applied by the research laboratory, that this thesis was conducted in. It will be also indicated to which extent did it actually worked and if it supported obtaining the expected results, reaching the objectives and answering the research questions.

1.1. Product, process, planning: the reflection

From theory to practise in a smart way
I started thinking of how I would like my graduation project to look like in the summer of 2017. From the very beginning I was sure that I would like to conduct my graduation in a close relation to the practice. I wanted to make sure that the outcome of my work could be useful and possibly utilised in the practice. In the fast running world the professionals rarely look into the development of theoretical knowledge, ignoring the vast amount of data and useful information that was gathered through the years. I did not want my thesis to become just another report, which would never improve the changing environment.

Additionally, during the course of my studies I found my own interest in the Corporate Real Estate Management area and wanted to work in close connection to this field. For this reason I decided to work on my graduation project in the ‘Smart Real Estate Management’ laboratory, which allows working on problem solving with the use of smart environment and focusing on end users. The idea was that it is possible to link the users of the real estate to the state-of-art knowledge with the help of smart tool in order to bring the most added value possible.

The ‘smart’ term is very broad and in my research, the ‘smart managing’ refers to provision of the ‘smart tool’, a computer program improving human performance in the field of real estate management, by working with the data it gathered.

In the first part of the process, around the time of P1 I put a lot of focus into discovering and understanding the various frameworks and processes of location decision making in companies. I also looked at various decision supporting systems. Additionally, during the Operational Research Methods course at TU Delft, I made a first trial, a mock-up version of the tool, trying to visualise how the final product might look like.

As the research was progressing and I read more and more on the topic of location decision making it became the focus shifted a lot to business management field rather than purely real estate management. This is due to the fact that real estate strategies cannot be considered separately from the business strategies. Moreover, a lot of focus was given to existing theories, frameworks and views on how the decision making processes are conducted.

Before the P2, an insight into the expert tool systems and tools was gathered. The existing frameworks for development and requirements were addressed. However, the complete clarification of method and frameworks that were actually going to be used was done only after P2, which in a perspective of time can be seen as unnecessary delay.
**The theoretical base**

The final outcome of my master thesis is not only a report but also a functioning expert tool. In order to build such a tool, a vast and through literature research had to be done in the beginning. Only then the product could have been built. The process of designing and building it was proceeded by several weeks of analysis of literature covering various topics connected not only to the processes related to the location decision making, but also creating the list of criteria and finding out what determines the use of them.

It gave insights in the state of art development on both corporate real estate management in the field of location decision making and its relation to the business. The focus was on identifying a thorough list of the location factors and criteria that created the ‘backbone’ structure of the tool.

Finding the proper literature was not hard, however in order to recognise the reoccurring patterns in the research papers and build a solid map of dependencies was not easy. It took a lot of time and was quite difficult, as already before the P2 I certainly got lost in the literature study, diving into wrong topics.

In the beginning of the literature study period, I failed in keeping a proper literature research structure grid that could help tracking and analysing the literature I had gathered and read. Although I have always immediately saved the papers in a proper folder structure, dividing them by the topic, I had difficulties in creating the links between the papers. Only after the P2 I started creating certain kind of ‘structures (‘maps’) for each article, which help in deriving core points from them. Later on I was able to link the different structures to each other and build the tool backbone. However, I this could have been improved by maintaining a proper literature grid, which would make finding things easier from the very beginning. Unfortunately, this level was never reached, making process more complex than it could (and should) have been.

**The pilot study - working with the company**

As soon as I knew in which direction the research could had and that I want to work with the practical world, I discussed the possibilities of finding the proper company for pilot study with my supervisor. During the introduction to the laboratory, it was mentioned that it is possible to make a graduation internship in the FedEx/TNT, which are currently going through some substantial changes caused by recent acquisition. I have been working at the real estate department in this company before, for a short three-month project. I contacted the potential company mentor to describe the idea for the research. It was perfectly aligned with the project and pilot case that the company was organising internally. The company was willing to cooperate in the graduation process.

I got involved in the pilot case very early, around November 2017, before my own theoretical framework, approach and methodology were defined. As a result I took on various tasks within the company that were not always directly connected to my research, resulting in some distraction and delays in my own graduation process. However, I got some significant insights into the decision-making processes conducted within the company. It helped in clarifying research objectives and recognising gaps that I wanted to bridge with my final product.

Although in the very beginning it seemed that conducting the interviews in the company will be easy, it turned out to be to be the strikingly difficult. Many of the relevant stakeholders did not have time to take part in the testing and evaluation. Moreover, the theoretical level of the research was not fully accepted by the interviewees who called it ‘over scientific’ and ‘too academic’ for the practical world. Nevertheless, I managed to find some professionals who agreed to dedicate their time and provide a lot of valuable feedback.

**Building the tool**

Once the theoretical backbone structure was established, the recognised links were translated into simple numerical relations in Excel. It seems that Microsoft Excel is a very useful and quite intuitive tool for creation of simple prototypes of tools. I created sheets where the links were established, nevertheless, I
knew that the tool has to be visually appealing to encourage the potential users to test it. Additionally, I wanted to make sure that the tool can be used within the companies without a supervision of a system engineer. For this reason, I decided to use the Microsoft Visual Basics for Application.

The Microsoft VBA was suggested to me by one of my supervisors very early in the process (around October). I have never worked with the tool before and I had no programming skills, but I decided to postpone the building process until the proper theoretical framework is developed. Unfortunately, as mentioned before, the knowledge from literature was structured by me quite late in the process. I was forced to find out how to use the VBA and create the tool in a short period. I decided to watch a series of tutorials that I found online in the open sources and learn how to code in the program on my own. I was glad I had done this, as in my opinion, it allowed me to transfer and combine the gathered knowledge to create a new tool according to my own vision. I was able to reflect my own findings in the way I imagined it, as I created the tool structure from the scratch. I got a lot of valuable support from Rein de Graaf, who helped me in improving various elements of the tool.

Nevertheless, building the tool on my own was quite time consuming and taking into consideration the delays I have caused to myself before, the first version of the program was ready to be tested only in March 2018.

**Testing the tool**

I wanted the tool to be tested on a real-life on-going case. However, due to the graduation schedule and my own process development, the decision-making process was almost over and the final recommendation was presented, waiting for approval from the management side. As soon as the first version of the expert tool was ready to be tested, I contacted a number of stakeholders involved in the pilot case in the FedEx/TNT to schedule the interviews. Scheduling the interviews was very challenging as in such a big, globally operating company the personal schedules of employees are very tight and they have to travel a lot.

Although the number of interviewees was lower than I hoped in the beginning, it seems that the iterative process worked really well from a research perspective. The model was adjusted after every test. The stakeholders that were involved had various backgrounds and not all of them deal with the location decision making on daily basis. Because of this, an introduction to the tool and the research was given to each of them.

The interviewees provided very rich feedback, and were helpful and willing to cooperate. With the evaluation it became clear that the stakeholders valued the idea behind the tool very much. They unanimously admitted that the tool has a great potential. However the complexity of the tool limited significantly the acceptance level of the expert tool. The users indicated that such program can be used in the corporate world only if it is operated by a system engineer, which was contrdictive to one of the ideas that I had about the tool.

In general, after testing the developed expert tool with the first pilot study, the research outcome can be considered successful. Clearly, there is a number of points of improvement that can be applied to the tool, however it was considered as an added value by the stakeholders. It brought the knowledge gathered in the literature to the practise and proved that it can improve the location decision-making process. Personally, I am happy with the outcome of this pilot study.
1.2. Reflection of the research

Reaching the objectives and utilisation potential
The aim of my research was to develop an expert tool that would bring to the professional world the knowledge on the location decision-making criteria, gathered in the scientific world. This idea was formulated as a result of the recognition of the problem that the stakeholders do not always have a full overview of the location decision-making process complexity. As a result they follow limited or biased information, which leads to making the decision basing on incomplete set of requirements. Moreover, there is a lack of transparency in the majority of location decision-making processes conducted in the corporate companies, leaving a number of the stakeholders unsatisfied with choices done by the company.

As a result of this research, an expert tool was created next to the main report. The tool gathers the expert knowledge that was found in the literature research and makes it available to the stakeholders. Despite various points of criticism that were applied to the tool, the main research objective was met. The tool complied with the development framework and was evaluated as successful during the tests.

Nevertheless, there is still a lot of room for improvement. First of all, the tool was tested with only one pilot study, to test the full potential and usefulness, a number of follow-up studies should be conducted. In addition, the users indicated that they would like to see the tool within the ownership of a consultancy company. It was not tested yet if a consultancy company would see such a tool as useful for them.

The initial idea was to develop the tool in such a way that it can be used without guidance or supervision of the system engineer. Although it was proven with one of the tests that it is possible to use the tool individually, the interviewees claimed that the time required for the individual interaction is too long to apply it in real life.

Moreover, the tool was not tested with an on-going case, but rather to reflect on the decision that was taken and assessment of the approach that was chosen for the process. Working with an ongoing case would truly challenge the tool possibilities and utility.

In my opinion, the model requires significant improvements before it can present its full utilisation potential. The visual representation on output needs to be improved and the user interface simplified. On the other hand, the decisions makers claimed that already current version of the tool provides a lot of added value. It forces reflecting on the current processes and questioning the choices that were made basing on incomplete information. I was happy to hear that the users see a great potential in the tool and would like to see it further developed. I personally would like to work on the tool further, bringing it to more practical level, however, being aware of my own programming skills, I would need help from a professional program developer, who would be able to turn the established expert system into perfectly working tool.

Position in the laboratory and scientific relevance
As mentioned in the beginning of the reflection, the research was conducted within the Smart Real Estate Management graduation laboratory. It is closely related to the field of the Corporate Real Estate Management and thus, directly related to the Real Estate Management course organised within the Management in the Built Environment program. The research addressed the problems recognised in the build environment and also closely related to issue of the facilitating the business operations with the real estate.

The state of art scientific knowledge gathered through the years and built by a number of researchers is given to the practitioners with a computer programme, making it easily accessible. In addition, with this research I combined results from various studies and through recognition of reoccurring patterns I tried to interlink them. Basing on the ground established by others, I linked the location criteria with their
determinants, which (to my best knowledge) has not been done before. Thus, this research also builds on the continuous improvement of matching the real estate with the real user needs.

**Achievement of personal ambitions**

Apart from the relevance of the research to the scientific world and adding value for the graduation company, I had a set of my personal ambitions that I wanted to achieve. In the beginning of the second year, when the graduation process started, I reflected on how I would like the graduation to proceed.

The first goal was to create a tool that would be useful in practice. As much as I enjoyed my study period, working in the field closely related to my studies was very eye-opening. I realised that the vast amount of knowledge and clever solutions that are presented to as at the university are barely recognised in a practice. Even the professionals clearly indicate that ‘the real world’ has nothing to do with ‘academics’. I wanted to make attempt to bridge that gap. Although, the current version of the tool is not what would be used in practice, I was very pleased by the achieved acceptance level and trust in the potential of the tool.

Secondly, I hoped to get more insight into the decision-making processes in the companies. In this case both the in-depth literature research and graduation internship helped me in achieving this goal. I got a lot of insights in the process and was able to work with knowledgeable people, who contributed to my level of problem understanding.

Moreover, with the graduation internship I gained a lot of practical experience in the field I was researching. I got a chance to work with fascinating people and was able to view the problems in the corporate real estate from various perspectives. I got involved in a fascinating project and got insights into aspects that go beyond the scope of my research. I sincerely recommend everyone to follow a graduation internship while working on their thesis, as the experience is invaluable.

Additionally, I hoped to finish the thesis in the time that was assigned for the research and graduate from the university within the two years. Despite the delays that I have faced in the first part of the process, I was able to work hard and make up for the lost time. I contributed a lot of time and worked long hours to meet the deadlines.