The utilization of Project Management methods and tools in start-ups considering the influence of the entrepreneurs’ work background

A study on software development start-ups in Sweden

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Abstract

This thesis aims to increase knowledge about the usage and relevance of Project Management (PM) methods and tools within start-up companies, with regard to the previous work experience of the entrepreneur. The underdeveloped connection of PM and entrepreneurship will be further explored by following the research question proposed below that guides the study.

What PM methods and tools do entrepreneurs apply in the process of launching the business versus the operation of the start-up, especially considering their previous work experience and contact with PM?

In order to answer the proposed research question and pursue the set objectives, the thesis is structured as follows. First, the methodology within this study is represented in theoretical and practical form in chapter 2 and 4. Furthermore, the theoretical context in the field is summarized in chapter 3. The topics of traditional PM and agile PM (APM) with their characteristics and tools are portrayed; especially the latter is extensively presented in chapter 3.2 due to the need of flexibility and adaptability in the highly dynamic business environment nowadays, as well as the strong connection between APM and the IT development sector. Existing theories about the topics of entrepreneurship and start-ups are described in the subsequent chapter, whereby a focus is set on the entrepreneur itself and his or her previous work experience. To summarize the existing theory in the fields of PM and entrepreneurship a conceptual framework was created by the researchers of this study in chapter 3.4, which also serves to represent the findings of the study in the concluding chapter.

The empirical findings, which are presented in chapter 5, were organized in chronological order of the conducted semi-structured, qualitative interviews with software development start-ups in Sweden. Valuable results for the research areas of entrepreneurship and PM, as well as for the practical usage in those fields could be generated. The summarized results of this qualitative study are summarized and presented in chapter 6, titled empirical analysis. The authors found out that the majority of the contacted start-ups did not plan a lot in the launching phase of the business, in fact, they did not apply specific PM tools. While the business was growing, so did its complexity, which is why the need for applying PM tools became more present. Even though no clear connection between the previous work experience of the entrepreneur and the applied PM tools could be established, it was noticeable that prior exposure to PM made the entrepreneurs more aware of the methods and tools. They specifically looked for some and used them more knowingly. Further drivers for choosing a PM method and tools were recommendations and personal research. Next to the stage and scale of the business, especially the team size, the location of the team members and their familiarity with each other appeared to influence the decision on using specific tools tremendously. In general, it could be detected in this study, that the APM framework was commonly recognized as highly valuable for start-ups and many of the respondents already follow it or want to do so in the future. Moreover, primarily only one or very few tools were applied within the start-ups to not lose track of the business development and keep everything concise.

Keywords: Project Management (PM), agile Project Management (APM), PM methods and tools, start-ups, software development, IT, entrepreneurship, the entrepreneur, prior work experience
Table of Content

Abstract..............................................................................................................................................I
List of Tables .......................................................................................................................................IV
List of Figures .....................................................................................................................................V
List of Abbreviations ........................................................................................................................VI
1 Introduction......................................................................................................................................1
2 Theoretical research method ...........................................................................................................4
  2.1 Preconceptions..........................................................................................................................4
  2.2 Research philosophy ................................................................................................................6
  2.3 Approach to theory ...................................................................................................................8
    2.3.1 Keywords ...................................................................................................................................8
    2.3.2 Source evaluation ..................................................................................................................9
3 Literature review ..............................................................................................................................9
  3.1 Project Management ..................................................................................................................10
    3.1.1 PM nowadays .......................................................................................................................10
    3.1.2 Methods and tools of traditional PM ..................................................................................11
      3.1.2.1 Tools for time planning and scheduling ........................................................................12
      3.1.2.2 Tools for controlling costs ..............................................................................................13
      3.1.2.3 Other tools and techniques ............................................................................................13
  3.2 Agile Project Management .........................................................................................................14
    3.2.1 Research on APM ................................................................................................................14
    3.2.2 Characteristics of APM .......................................................................................................15
    3.2.3 Usage of APM ......................................................................................................................16
    3.2.4 APM in practice ....................................................................................................................17
  3.3 Entrepreneurship and start-ups .................................................................................................18
    3.3.1 The role of planning and PM within entrepreneurial activities ...........................................19
      3.3.2 The entrepreneur .................................................................................................................21
        3.3.2.1 Influence of previous work experience ......................................................................21
        3.3.2.2 Linking entrepreneurs with PM ..................................................................................23
  3.4 Conceptual framework ..............................................................................................................24
4 Practical research method ..............................................................................................................25
  4.1 Data collection method ............................................................................................................25
  4.2 Research context .......................................................................................................................26
  4.3 Finding respondents ..................................................................................................................26
  4.4 The interview ..............................................................................................................................28
    4.4.1 Interview guide .....................................................................................................................28
    4.4.2 Conducting the interviews ..................................................................................................29
    4.4.3 Processing the interviews ..................................................................................................30
  4.5 Research ethics ..........................................................................................................................31
  4.6 Quality criteria ...........................................................................................................................32
5 Empirical findings ..........................................................................................................................34
  5.1 Ricardo Russo ..............................................................................................................................34
    5.1.1 Launch and growth of e-flow ..............................................................................................34
    5.1.2 Team of e-flow ....................................................................................................................34
    5.1.3 Work experience and previous contact with PM of Ricardo ..............................................35
    5.1.4 Applied tools in e-flow ........................................................................................................35
  5.2 Per Fransson ................................................................................................................................35
    5.2.1 Launch and growth of Musikmedel ....................................................................................35
    5.2.2 Team of Musikmedel .........................................................................................................36
    5.2.3 Work experience and previous contact with PM of Per ....................................................36
5.2.4 Applied tools in Musikmedel .................................................................................. 36
5.3 Juha Niemi .................................................................................................................. 36
  5.3.1 Launch and growth of Vacaverde ................................................................. 36
  5.3.2 Team of Vacaverde ....................................................................................... 36
  5.3.3 Work experience and previous contact with PM of Juha ......................... 37
  5.3.4 Applied tools in Vacaverde .......................................................................... 37
5.4 Abdullah Yousuf ...................................................................................................... 37
  5.4.1 Launch and growth of Strativ ...................................................................... 37
  5.4.2 Team of Strativ ............................................................................................ 37
  5.4.3 Work experience and previous contact with PM of Abdullah ............... 37
  5.4.4 Applied tools in Strativ ............................................................................... 38
5.5 Daniel Wiberg .......................................................................................................... 38
  5.5.1 Launch and growth of Skillster .................................................................... 38
  5.5.2 Team of Skillster .......................................................................................... 38
  5.5.3 Work experience and previous contact with PM of Daniel ................. 39
  5.5.4 Applied tools in Skillster ............................................................................. 39
5.6 Henrik Frienholt ...................................................................................................... 39
  5.6.1 Launch and growth of ZunZun ................................................................... 39
  5.6.2 Team of ZunZun ......................................................................................... 40
  5.6.3 Work experience and previous contact with PM of Henrik ............... 40
  5.6.4 Applied tools in ZunZun ............................................................................. 40
5.7 Miguel Fürst ............................................................................................................... 40
  5.7.1 Launch and growth of Lejonapa .................................................................. 40
  5.7.2 Team of Lejonapa ....................................................................................... 40
  5.7.3 Work experience and previous contact with PM of Miguel ............... 41
  5.7.4 Applied tools in Lejonapa .......................................................................... 41
5.8 Meiju Vartiainen .................................................................................................... 41
  5.8.1 Launch and growth of Mowida .................................................................. 41
  5.8.2 Team of Mowida ........................................................................................ 41
  5.8.4 Applied tools in Mowida ........................................................................... 42
5.9 Summarizing the mainly applied tools .................................................................. 42

6 Empirical analysis ...................................................................................................... 46
  6.1 Applied PM methods .......................................................................................... 46
  6.2 Applied PM tools for launching the start-up ................................................... 48
  6.3 Applied PM tools for operating the start-up .................................................... 50
  6.4 Traditional PM .................................................................................................... 51
  6.4 APM framework .................................................................................................. 52
  6.5 Prior work experience of entrepreneurs ............................................................. 54

7 Conclusion ................................................................................................................... 54
  7.1 Contributions ....................................................................................................... 57
    7.1.1 Theoretical contributions ......................................................................... 57
    7.1.2 Practical contributions ............................................................................... 58
  7.2 Limitations and future research ......................................................................... 59

Reference List ............................................................................................................... VII

Appendices ..................................................................................................................... XV
  Appendix 1 - PM tools and techniques from PMI BoK (PMI, 2017) ..................... XV
  Appendix 2 - Cover Letter ...................................................................................... XXI
  Appendix 3 - Interview guide .................................................................................. XXII
  Appendix 4 - Interview partners and their start-ups .............................................. XXVI
List of Tables

Table 1: Interview situation (Own illustration, 2017) ................................................................. 30
Table 2: Applied tools (Own illustration, 2017) .............................................................. 44
List of Figures

Figure 1: Project-based view on start-ups (Own illustration, 2017). .............................................. 20
Figure 2: Conceptual framework (Own illustration, 2017). ................................................................. 24
Figure 3: Conceptual framework including results (Own illustration, 2017). .............................. 57
**List of Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>APM</td>
<td>Agile Project Management</td>
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<tr>
<td>BoK</td>
<td>Body of Knowledge</td>
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<td>CPM</td>
<td>Critical Path Method</td>
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<td>DSM</td>
<td>Dependency Structure Matrix</td>
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<tr>
<td>EVM</td>
<td>Earned Value Management</td>
</tr>
<tr>
<td>FF</td>
<td>Finish to finish</td>
</tr>
<tr>
<td>FS</td>
<td>Finish to start</td>
</tr>
<tr>
<td>IPMA</td>
<td>International Project Management Association</td>
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<tr>
<td>MSP</td>
<td>Microsoft Project</td>
</tr>
<tr>
<td>MVP</td>
<td>Minimal Viable Product</td>
</tr>
<tr>
<td>OBS</td>
<td>Organisational Breakdown Structure</td>
</tr>
<tr>
<td>PDM</td>
<td>Precedence Diagramming Method</td>
</tr>
<tr>
<td>PERT</td>
<td>Program Evaluation and Review Technique</td>
</tr>
<tr>
<td>PM</td>
<td>Project Management</td>
</tr>
<tr>
<td>PMI</td>
<td>Project Management Institute</td>
</tr>
<tr>
<td>RACI</td>
<td>Responsibility, accountability, consultancy and informing</td>
</tr>
<tr>
<td>RAM</td>
<td>Responsibility Assignment Matrix</td>
</tr>
<tr>
<td>RBS</td>
<td>Risk Breakdown Structure</td>
</tr>
<tr>
<td>SF</td>
<td>Start to finish</td>
</tr>
<tr>
<td>SS</td>
<td>Start to start</td>
</tr>
<tr>
<td>WBS</td>
<td>Work Breakdown Structure</td>
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<td>XP</td>
<td>Extreme Programming</td>
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1 Introduction

The general interest in the field of Project Management (PM) is gradually increasing because it is considered as a helpful way for organisations to adjust to the market and incorporate change in order to stay competitive in a dynamic environment (Kiznyte et al., 2016; Kuura et al., 2014; Miloševic & Iewwongcharoen, 2004; PMI, 2017). According to one of the main associations in the field, PM is valuable in today’s business environment where budgets are tighter, timelines are shorter, resources are scarce and technology is changing rapidly (PMI, 2017, p. 10). Therefore, its utilization in start-ups is expected to be beneficial and supposedly increases efficiency (Kuura et al., 2014, p. 222).

In PM, two main approaches can be differentiated, namely a traditional and an agile approach. Traditional PM is considered to be linear with a high focus on initial planning. A project is defined and broken into parts, which are accomplished before they are in the end assembled to complete the project (Hebert & Deckro, 2011, p. 21; Sage Business Researcher, 2017; Weaver, 2007, p. 2). Multiple sources agree that PM tools, if applied accordingly, are useful in the whole project process to make more profound decisions and to ensure efficiency and the success of PM (Asad Mir & Pinnington, 2014, p. 202; Jugdev et al., 2013, p. 536; Kostalova & Tetrevo, 2014, p. 679; Miloševic & Iewwongcharoen, 2004, pp. 2; Shi & Blomquist, 2012, p. 504). To abide the requirements defined in the beginning of a project and accomplish sets of planned and forecasted activities, various traditional PM skills, tools and methods for scheduling, cost control, risk management, resource scheduling, responsibilities, quality management or IT support can be applied. Commonly, Gantt Charts, Work Breakdown Structures (WBS), Program Evaluation and Review Technique (PERT) and the Critical Path Method (CPM) as well as the software of Microsoft Project (MSP) are used in the traditional PM approach due to their high value in a project (Gelbard et al., 2002, p. 467; Jugdev et al., 2013, p. 537; Kenley & Harfield, 2014, p. 887; Miloševic & Iewwongcharoen, 2004, p. 3; Shi & Blomquist, 2012, p. 504). Those, together with various other tools will be explained in the literature review chapter in more detail.

Agile Project Management (APM) methods attempt to respond better to today’s fast changing business environment by dealing with changing requirements and unpredictable situations during the execution of the project (Dyba & Dingsoy, 2008, p. 834; Conforto & Amaral, 2016, p. 3), which increases the flexibility of this PM approach in comparison to traditional PM. Short iteration intervals help to break requests down into smaller and better manageable work tasks; less initial planning prevents rework as well as it reduces wasting time and the cost of changes (Jayawardena & Ekanayake, 2010, p. 1; Kautz et al., 2014, p. 309). Moreover, a flexible scope of a project increases an open interactions with customers that results in higher customer satisfaction (Lee & Yong, 2009, p. 204; Serrador & Pinto, 2015, p. 1). The before mentioned traits of APM are the reason why this approach is widely spread in the IT sector; a more flexible reaction to fast changing customer needs and requirements claim this approach to be more suitable for software development projects nowadays (Alahyari et al., 2017, p. 271). The different existing APM methods are defined by rules about team organisation, frequency of meetings, progress visualization and clear deadlines (Augustine et al., 2005, p. 86; Moe et al., 2010, p. 480; Kautz et al., 2014, p. 309; Rasnacis & Berzisa, 2015, p. 122; Stankovic et al., 2013, p. 1664).

The perceived benefits of the utilization of PM methods and tools in general, led to the anticipation of its value generation for entrepreneurial activities (Kuura et al., 2014, p. 223).
New business formations, so called start-ups, are newly emerging companies commercializing a business idea developed through entrepreneurial activities (European Commission, 2006, p. 20). Those activities are positively affected by planning activities (Brinckmann et al., 2010, p. 24) and can be divided into different phases, the pre-formation phase, the act of launching to the market and the growth phase (Bellabara, 2013, pp. 23; Macheridis, 2009, p. 4). In the course of this, the external projected-based view considers the whole process of starting up a business as a project (Kuura et al., 2014, p. 222), whereas the internal project-based view, which focuses on a narrower layer, considers different activities in order to realise the business strategy as projects (Lindgren & Packendorff, 2003). In both cases, an advanced planning effort is supposed to have positive external and internal effects; it supports the business position for allowance and delivers internal clarification regarding the company's vision and strategy (Kiznyte et al., 2016, p. 5).

The positive effects of start-ups on the economic development, employment numbers, competition, innovation and structural development, can be divided into indirect and direct effects (Fritsch & Schroeter, 2011, p. 383). Effects on the employment number are defined as direct effect, which is especially significant after the first one to two years of launching a business (Fritsch & Mueller, 2008, p. 16; Kiznyte et al., 2016, p. 1; Schindele & Weyh, 2011, p. 360). Additionally, positive contribution on the gross national product as an indicator for economic development is identified as direct effect (Ajam, 2011). The indirect supply-side effects include a rise in competition that counteracts the concentration of power and can result in structural change within industries, regions or the economy (Audretsch, 2011, p. 152; Fritsch et al., 2005, p. 545; Sternberg, 2006, p. 257). Therefore, start-ups have the potential to challenge and innovate markets, products, services or processes that can lead to more efficiency, a technological shift and economic growth (Andersson, 2016, p. 2; Certo & Miller, 2008, p. 267; Hedfeldt & Lundmark, 2015, p. 92; Shepherd & Patzelt, 2011, p. 140). Those positive effects of start-ups explain the importance of entrepreneurial activities and justify the involvement in research about techniques and tools that might facilitate starting a new business or increase its chance of survival. However, the research regarding the application of PM methods and tools in new firm foundations is underdeveloped. Consequently, it is important to increase the understanding of the influence of PM methods and tools in start-up companies. The generated knowledge will provide a valuable first attempt for assessing the effect of PM methods and tools on the survival of the business (Kuura et al., 2014, p. 219). This can be considered as precious information, which has the potential to contribute to lifting the chances of start-up survival and consequently exploiting the positive indirect and direct effects of start-ups to a higher extent.

The single individual or a group of people responsible for the formation of new businesses is called entrepreneur (European Commission, 2006, p. 20). Entrepreneurs recognize opportunities and their value, which makes them innovators and managers of innovation. Based on that central role in the entrepreneurial act, they represent a focus area of the academic field of entrepreneurial research (Bolton & Thompson, 2004, p. 16; Drucker, 2015; Economist, 2014; European Commission, 2006, p. 20; Tülüce & Yurtkur, 2015, p. 720). The previous work experience of entrepreneurs appears to be a valuable source when making decisions, exploiting opportunities, solving problems, assessing resources and driving business performance in general (Bolton & Thompson, 2004; Gabrielson & Politis, 2012; Politis, 2008). While implementing a business plan as well as afterwards in various stages of the operation of the company, entrepreneurs can be considered project managers since the characteristics and required skills of both are overlapping in many points (Bell, 2015; Bolton & Thompson, 2004; Gaddis, 1959; Kazmi, 1999; Kuura et al., 2014, p. 215, p. 222). Regarding work experience of project managers, studies show that knowledge and experience
on how to use PM methods and tools adequately is essential (Miloševic & Iewwongcharoen, 2004, p. 2). In general, project managers tend to use the tools they are familiar with (Miloševic & Iewwongcharoen, 2004, p. 3). Furthermore, the higher the expertise in PM, the better the chances of successfully completing a project (Kostalova & Tetreva, 2014, p. 679). Accredited project managers are supposedly more aware of the PM tools, their capabilities and uses, which is why they apply them more cautiously and more successfully (Jugdev et al., 2013, p. 547). It appears that the work experience of both entrepreneurs and project managers have positive effects on how they operate their business or run their projects. Even though project managers and entrepreneurs are generally defined by similar characteristics and skills, the connection in research between the two is limited (Kuura et al., 2014, p. 223). Concluding, connecting PM and entrepreneurship can be mutually beneficial and additional perspectives can be established (Kuura et al., 2014, p. 224).

Even though it can be noticed that PM is a widely researched field and exists for many years in practice, the theory behind the management practice is still young and somewhat underdeveloped (Davis, 2012, p. 189; Garel, 2013; Kuura et al., 2014, p. 217; Miloševic & Iewwongcharoen, 2004, p. 1; Padalkar & Gopinath, 2016, p. 1305). There is an extensive list of PM tools and techniques for managing a project as well as good practice tools that can be applied in various phases of a project (Jugdev et al., 2013, p. 542; Kostalova & Tetreva, 2014, p. 679; PMI, 2017, p. 685). PM tools and techniques in relation to success have been extensively researched (Jugdev et al., 2013; Miloševic & Iewwongcharoen, 2004; Patanakul et al., 2010), however, there appears to be a gap in research in the field of the practical use of PM tools depending on country, type of organisational setting and PM maturity within a company (Jugdev et al., 2013, p. 548). Depending on the kind and size of a specific project, different PM tools and methods are useful, but this situational use of PM tools is underdeveloped in research (Miloševic & Iewwongcharoen, 2004, p. 3). Several first attempts in the literature tried to connect the fields of entrepreneurial activities, planning, projects and consequently also project management, based on their certain similarities (Kuura et al., 2014, p. 219). Mutual learning effects and benefits are expected from extending research in this area (Kuura et al., 2014, p. 219) and that is why this study tries to focus on linking those areas by answering the following research question:

What PM methods and tools do entrepreneurs apply in the process of launching the business versus the operation of the start-up, especially considering their previous work experience and contact with PM?

The study aims to increase knowledge about the usage and relevance of PM methods and tools within start-up companies, with regard to the previous work experience of the entrepreneur. To understand the usage and relevance of PM within different stages of the start-up, the distinction between methods and tools applied in the launching phase and during the operation of the business was made. Following objectives are designed as framework to perform the research and answer the proposed research question:

- Identification of PM methods and tools used within start-ups for launching the business
- Identification of PM methods and tools used within start-ups for operating the business
- Increase the understanding of the influence of previous work experience of entrepreneurs on whether and which PM methods and tools are applied in start-ups
Furthermore, by addressing these objectives, the connection between entrepreneurship and PM will be further explored. The area of investigation will be restricted to Sweden, which represents a country with increasing entrepreneurial activities (Andersson et al., 2016, p. 2). Large scope business reforms in the early 1990s regarding deregulation, taxes, and privatization evoked this development (Andersson et al., 2016, pp. 3). Furthermore, the research’s restriction regarding location will increase the homogeneity of the data basis and consequently the comparability of the research. Entrepreneurs of start-ups will be interviewed in form of semi-structured, qualitative interviews to provide the data basis for conducting the analysis. In order to provide more comparable results, the research will focus on start-ups in one specific industry, the software development sector. This specific group has a high influence on the digitisation of the global market and is therefore representing innovative and future-shaping business formations, which is why the importance of those start-ups on indirect supply-side effects and consequently the economic development is unquestioned (Strålin et al., 2016). Increased insights and understanding about the utilization and role of PM methods and tools within those start-up companies will be beneficial in order to support the development of start-ups in this sector appropriately. Results that are significant in drawing precise recommendations and conclusions for practical users in entrepreneurial environments are expected. In addition, the study contributes to the generation of theoretical knowledge in the field of entrepreneurship and PM.

2 Theoretical research method

Firstly, this chapter will inform about the authors’ preconceptions of the topic of research. Thereafter, the underlying research philosophy will be introduced and insights about the applied research method are presented. The way of approaching the existing theory is discussed in the last part of this chapter.

2.1 Preconceptions

The way research is conducted is highly dependent on the background, knowledge, and understanding of the authors because they are the ones designing the research question, execution, and analysis (Padgett, 2004, p. 7; Wisker, 2001, p. 189). Everyone approaches a topic differently, understands facts in a different way and connects their thoughts and knowledge in a distinct way, which causes research to be value-laden (Wisker, 2001, p. 204). Furthermore, the authors’ worldview, culture and values influence their preconception (Bryman & Bell, 2007, p. 30; Saunders et al., 2009, p. 119). As a consequence, it is important to highlight the background of the authors as well as their knowledge, understanding and stance regarding the topic of the thesis in order to apprehend their way of approaching the topic area and choices made.

One of the authors (Anna-Lena Böhnke) has previous work experience in a start-up company that is developing software to conduct their everyday operations in the logistic industry sector. Furthermore, the family background influenced her awareness in the entrepreneurial field due to the fact that her father started his own business 25 years ago. Those experiences increased her interest, awareness, and understanding of entrepreneurial activities. The start-up company applied Scrum as a PM method for developing the software, while Jira was utilized to visualize the progress of work. This allowed the author to get great insights on APM and the Scrum method, which enabled her to evaluate the flaws and perks of this method based on her own experience. Overall, she assessed it to be beneficial to structure workflows, to create more feasible work packages and to deliver fast outcomes. Furthermore, this insight allowed her to consider Scrum as a potential method for conducting projects and increased the
probability for her of applying it in the future. This thought evoked the assumption that previous experiences influence the choice of applied methods and tools. Consequently, the assumption that former knowledge and experience in PM might increase the probability of applying PM tools aroused. Except for the project of developing software, also other attempts of using planning tools have been made in the start-up company. Shared to-do-lists (Wunderlist) for certain teams were created to assign work packages to team members, visualize the progress of work and communicate deadlines. Moreover, Google drive was applied as a shared platform and cost analyses were conducted in order to assess the business and its risks. However, all those attempts were not named or considered as PM, but rather as a way of conducting or managing work. This actually made the author think that PM methods might even be applied unknowingly while managing a business. Consequently, the author was interested in generating some empirical research in this field in order to better understand the role of PM within start-ups.

On the contrary, the other author (Alexandra Spindler) does not have any previous work experience in the start-up industry. However, due to the fact that especially in her home country Austria, small and medium sized businesses (SMEs) dominate the business landscape, even though SMEs and start-ups have to be clearly distinguished, the author is very much interested in the field. Another reason for her interest in the field was her previous Bachelor thesis, which was tailored to a small family business. Connected to that, entrepreneurship and innovation has been a big part of her educational background so far and something she is very passionate about. Nevertheless, studying something in theory is not enough according to the author and therefore the interest in talking to entrepreneurs and figuring out how they are operating their business arose. Additionally, software development is also something new for this author. She has not been in contact so much with that field, yet is highly interested in it because of the development towards more and more software oriented companies on the market in general. Wanting to expand her knowledge in a field that is growing so fast and big is one of the main drivers for choosing an unknown field and quite frankly a challenge. Also, acknowledging the growing importance towards APM, the author developed interest in studying and exploring it more. She only got introduced to APM in this Master program, yet she never applied any tools in practice. Also, due to her lack of experience in the IT sector where this approach of PM is primarily used, she realizes that this study could be something valuable for any future job. In general, she personally values planning a lot, which is why she wants to explore the usefulness of PM tools and methods to do so. Considering the input versus the output that can be generated, she questions if the balance is acceptable though. Concludingly, because of the unknown work terrain of start-up companies and software development for this author, the expectations of this thesis are to understand the fields in a much better way and to connect them in a theoretical as well as practical way to possibly generate some type of scheme for entrepreneurs and project managers.

Even though the two authors have different backgrounds in terms of work experience, family, previous studies and so on, they both share their interest for entrepreneurship, start-ups and especially PM. Both authors study a Master program in Strategic Project Management, which expresses the interest of the authors in this research area. It also confirms their understanding of PM as an academic management discipline, which allows conducting and structuring projects in a more accurate way, and helps to align projects strategically. Furthermore, the program taught both authors basic concepts, methods, tools, techniques, controversial discussion fields, and challenges within the topic area. This shaped the basic understanding of the authors in PM and also influenced their choice of topic to be related to PM. They experienced that research emphasises on the advantages of planning and witnessed high
interconnection between PM and other fields in practice, whereas the theoretical linkage is underdeveloped. That is the reason why the authors decided to investigate in developing this theoretical interconnection.

2.2 Research philosophy

This chapter will illustrate the philosophical stance that the research method is built upon. Therefore, the underlying research paradigm, applied methodology and the approach of data analysis will be introduced. This clarification is essential in order to state clearly the standpoint of the authors, to understand their decision-making in the research approach and to comprehend the context of their findings (O’Gorman & MacIntosh, 2014, p. 52; Wisker, 2001, p. 123). Furthermore, it allows the authors to defend their choices made by “draw[ing] connections between the assumptions [they] hold about reality (ontology) and the ways in which [they] might develop valid knowledge (epistemology)” (O’Gorman & MacIntosh, 2014, p. 59).

The first step of the investigation on the utilization of PM methods and tools in start-up companies is based on the identification of methods and tools applied. This might indicate that an objective perspective on looking at the circumstances has been used since it seems to be a quite forward approach of “looking at reality as made up of solid objects that can be measured and tested” (O’Gorman & MacIntosh, 2014, p. 56). Such an objective ontology considers the identification process as something concrete that is comprised of consistently real processes and structure, which can be measured and is not influenced by anybody's perceptions (Bryman & Bell, 2007, p. 25). However, this study is not based on an objective ontology but views the mentioned identification process as something more complex that is not that easy measurable and not free from perceptions. Based on the fact that the authors anticipate that methods and tools can also be unknowingly applied and that they are also taking the work background of the entrepreneurs into consideration, the research requires a deeper understanding and interaction with the research objects. Therefore, further questions and interaction with the entrepreneurs are necessary to get a deeper insight on PM utilization and its connection with previous work experience. Consequently, the evaluation will be influenced by the perception of the authors and their interaction with the entrepreneurs, which leads to a subjective ontology. This emphasis on the subjectivity of the authors and the observed, which is driven by the belief “that each individual experiences their place and time in the world in a different way” (O’Gorman & MacIntosh, 2014, p. 57), forms the way the authors view reality.

The ontology is connected with the epistemology, which is focusing on the way people obtain knowledge. Different positions can be taken in order to explain one’s understanding about the nature of knowledge generation, whilst positivist, critical realist, action research and interpretivist form the four main epistemological positions (O’Gorman & MacIntosh, 2014, pp.58). Due to the fact that the research is dealing with understanding and interpreting generated data, which is influenced by the interactive set up and the authors’ perceptions, the study is based on an interpretivist paradigm (Walliman, 2005, p. 205). That is why it is essential to state the authors’ preconception, which was done in the previous chapter, in order to understand their position and perception of the research area. Even though factual information will be generated (whether or not entrepreneurs apply PM), the emphasis is on reasons and the meaning of applying PM methods and tools. Consequently, ideas will be developed through data analysis, which will allow defining trends. On the contrary, the positivist approach would be testing hypotheses in order to establish common rules, which underlies the belief that society can be empirically analysed (O’Gorman & MacIntosh, 2014,
This does not seem to be applicable for understanding the deeper connections between the utilization of PM and the entrepreneurs work background, which is not that easy to codify in laws. The authors believe that it is necessary to interact and have the option to ask further questions for receiving a deeper understanding of this complex interrelation.

The researchers’ standpoints influence the choice of methodology and the selection of techniques to generate data, which can be summarized as research strategy. Whereas the methodology can be distinguished in qualitative and quantitative, various different techniques of data generation can be introduced for both of them. Quantitative approaches try to measure the social world by numbers, which lays the focus of this objective approach on the codification and description of social phenomena based on those codes (Bryman & Bell, 2007, p. 425). As mentioned by Kumar (2014, p. 376), a quantitative methodology “follows a rigid, structured and predetermined set of procedures.” Therefore, it can be considered a rational research approach measuring variables. A large sample size is essential to ensure the objectivity and allow generalizations of findings, which stand in the center of quantitative research (O’Gorman & MacIntosh, 2014, p. 156). However, quantitative studies are “quantifying the problem or research question and establishing the mechanisms through which one or more (quantitative) variable(s) may affect another variable” (O’Gorman & MacIntosh, 2014, p. 155) by testing predefined hypothesis. Flaws of this methodology are that this quantification can be considered as a rather descriptive approach, which does not allow to capture the interrelationships and insights to such a full extend as the qualitative approach. Consequently, this study is applying a qualitative methodology, which is aligned with the underlying research paradigm and enables the authors to get a deep insight in the way the observed view the social world, which is defined based on their social background and perception (Flick, 2009, p. 16). Furthermore, it allows the authors to collect detailed information and personal experiences within the research area that is still underdeveloped (Edmonson & McManus, 2007, pp. 1161). Only a few attempts of connecting theory of PM and entrepreneurship exist so far and consequently it is desirable to develop knowledge and understanding about the phenomenon of utilization of PM within start-up companies by conducting exploratory research (O’Gorman & MacIntosh, 2014, p. 66). This qualitative methodology aims at exploring diversity and focuses on the description of perceptions and experiences, while a structured and analytical approach of conducting the research is applied. Therefore, it is precisely addressing the need of developing deeper insight and understanding of the underdeveloped research area. The choice of utilizing a qualitative methodology leads to an inductive data analysis. This means, that instead of testing hypotheses and existing theories, the study tries to contribute to the understanding of an underdeveloped research area and develop theory based on the observations made (Bryman & Bell, 2007, p. 14).

Critics of the qualitative methodology point out the risk of research being influenced too much by subjective perceptions of the authors. Thus, it is hard to replicate a qualitative study and to draw generalisations based on a low number of investigations (Bryman & Bell, 2007, p. 423). In order to minimize this risk, transparency of the research conduction is important and therefore the research design will be introduced in chapter 4. Furthermore, an inductive analysis approach burdens the threat of naïve conclusion making, which might lead to false assumptions (Walliman, 2005, p. 191). Consequently, it is essential to ensure a transparent and structured research approach and an appropriate number of observations to reduce the risk of making unsophisticated conclusions (Walliman, 2005, p. 192). This challenge will be further considered in the chapter 4.5 and 4.6 of ethics and quality criteria.
Overall one can say that the determined research philosophy is highly dependent on the addressed research problem and what researchers try to find out about it (Walliman, 2005, p. 270). This shows that there is no right or wrong way of conducting research, but different approaches will focus on different angles of the problem setting. This of course has in the end an impact on the outcome of a study and conclusions drawn (Padgett, 2004, p. 5).

2.3 Approach to theory

Nowadays, it is fairly difficult to find widely undiscovered areas in the literature because of the vast amount of existing research in identical or neighbouring fields (Flick, 2014, p. 65). It is therefore vital to look at the existing theory, meaning already observed regularities to explain a phenomenon or situation (Bryman & Bell, 2007, p. 7). The theory is the background to research, the facts that have to be studied before conducting primary research (Seale et al., 2004, p. 107). Getting to know the existing literature is essential in inductive research to gain insight in the field of interest and the different sources, as well as to understand the differences before and after the study (Bryman & Bell, 2007, p. 295; Flick, 2014, p. 66-67; Kumar, 2014, p. 48). All in all, “the dialogue between theory and research is crucial” (Seale et al., 2004, p. 108), which is why the following paragraphs display how the theory was approached to write the literature review and how it is connected in the further chapters with the empirical research.

The literature review not only forms the theoretical background of a study (Kumar, 2014, p. 48), but it also provides the basis for forming and justifying a research question and to construct a research design (Bryman & Bell, 2007, p. 94). Therefore, it is important to critically interpret the existing literature in the field to not only understand what concepts and theories already exist, but also to evaluate which of them can be further discussed because of a considerable lack or some controversies (Bryman & Bell, 2007, p. 295; Flick, 2014, p. 67; Kumar, 2014, p. 48; Silverman, 2013, p. 342). In order to do so, the authors first of all generated the main topic areas relevant for this study, which are PM, start-up companies and the entrepreneur. Firstly, reading about those topics in a broader sense helped them to reasonably narrow it down and identify what can be investigated on, to form a research question and to grasp the most important concepts (Kumar, 2014, p. 51; Silverman, 2013, p. 344). During that process it also became clear that the APM method can be seen as the standard approach of conducting projects in the software development industry, which is why there lies such a strong focus on this topic area in this thesis (Hoda et al., 2017, p. 60; Lee & Yong, 2009, p. 204). In comparison to APM, the traditional PM method and corresponding tools are also one of the main topics in the theory chapter, because their application provides an answer for high overruns in cost and time (Association for Project Management, 2016, p. 7).

2.3.1 Keywords

After determining the topics, specific keywords for each topic of this thesis were used to find valuable and suitable sources in the existing literature (Bryman & Bell, 2007, p. 107, p. 112). For PM those were (traditional) PM, PM tools, methods and planning tools; for APM they were agile, agile methods, APM, Scrum, Kanban and agile software development; the topics of start-up, entrepreneurship and entrepreneurs were covered with the keywords entrepreneurship, start-up company, start-up, new venture formation, new business formation, firm foundation, entrepreneurs, characteristics of entrepreneurs, project managers, entrepreneurial project managers and (prior) work experience. The keywords have been used in different combinations and orders to ensure getting a thorough representation of the existing theory and to not oversee valuable insights.
2.3.2 Source evaluation

Considering sources, the authors relied on journals, books, reports and newspaper articles. Mainly, the electronic databases of Heriot Watt University (HWU) in Edinburgh, Umeå University (UMU) and Google Scholar were used. In addition to that, online newspapers, the PMI website and other online libraries were considered for the literature review. For the latter, subscriptions were mostly required, which were to some extent provided by HWU and UMU, whereas for the PMI website, a specific subscription was created. Also, books from the Umeå University Library were used for this thesis.

In order to create an informative, substantial and critical literature review, the authors chose sources in a well thought through manner, nevertheless they have to be critically reviewed. Choosing peer-reviewed journals and articles that were not outdated was one of the guidelines followed. The International Journal of Project Management for example was an academic source that the authors used frequently to generate a good understanding of the theory. In general, online sources were particularly critically evaluated since not all of them are valuable because anybody can put up information on the web. Who are the authors of the sources, what are their motives for publishing it, the site location of the source (URL), as well as the recency of the reference and site was considered (Bryman & Bell, 2007, p. 109). Newspaper articles for example were not only assessed based on their newness but also on the prominence of the newspaper in the sector and/or the country. This type of source was especially considered in order to show the currency of the topic. Books were selected with similar requirements to ensure a valuable theoretical background. One of the most valuable sources for this thesis was Kuura et al. (2014), because it provides first attempts of connecting the fields of entrepreneurship and PM. Valuable insight could be gained from that work in multiple topic areas of the literature review. Furthermore, the PMI BoK (PMI, 2017) was another important reference for this thesis. Even though this source is not an academic one, it can be considered to be highly valuable and trustworthy since it is commonly used in the field of PM due to its derivation from one of the major PM associations.

As already mentioned, to cover the theory part of this research, keywords helped to find suitable sources. The title of each possible reference was then examined and the abstracts were skimmed through to distinguish their relevance for this thesis (Bryman & Bell, 2007, p. 114). Once a source was considered valuable, extensive notes with citation and page numbers were taken while reading attentively. The notes were sorted under the main themes with remarks for gaps and highlighting most important ideas and controversial statements (Kumar, 2014, p. 56). This not only was essential for the writing process afterwards, but also helped the authors to generate further ideas, to find other keywords and sources, to focus on the relevant parts of the theory that have to be mentioned, to narrow down the topic, and ultimately to create the research question and objectives of the thesis (Bryman & Bell, 2007, p. 97-98). One of the authors in addition used the computer application Mendeley to arrange and sort the references as well as to write notes. After the collection of theory to a somewhat saturation point the authors started writing the literature review. In the following chapter, the result of that, meaning the existing knowledge in the field will be represented and the relations between the topics will be evaluated.

3 Literature review

The literature review will provide a theoretical background on the two main approaches within PM, which can be divided into traditional and agile methods. The key concepts, characteristics and development of both will be described to deliver a profound theoretical body that allows building the analysis on it. Additionally, the evolvement of entrepreneurship
and characteristics of the entrepreneur are introduced. Finally, the connection between the two research areas of PM and entrepreneurship will be made.

3.1 Project Management

Kuura et al. (2014, pp. 217) claim that we are living in a project-oriented society. “A project is a temporary endeavor undertaken to create a unique product, service, or result” (PMI, 2017, p. 4). Projects are means of business development (Kuura et al., 2014, p. 221) in terms of implementation or change of strategies, to meet regulatory, legal or social requirements, as well as to fulfil stakeholder needs and create, improve or fix products, services or processes (Kenley & Harfield, 2014, p. 888; PMI, 2017, p. 8; Weaver, 2007, p. 2). Any series of activities and tasks with a clear and defined objective, specification, start and end date, a funding limit as well as resource consumption in terms of money, people and equipment can be considered a project (Hornstein, 2015, p. 291). Projects ensure success during times of change in an organisation (Hornstein, 2015, p. 291); therefore they can be considered essential in terms of creating value and benefits for an organisation (Jugdev et al., 2013, p. 535; PMI, 2017, p. 10). Furthermore, “projects intend to bring something new to their original environment, thus projects are innovative and can be considered as ‘entrepreneurial acts’” (Kuura et al., 2014, p. 220). Projects have a lifecycle in which skills, tools and people are required to use resources effectively to complete the endeavour (Jugdev et al., 2013, p. 535).

In order to manage projects accordingly, the research field of PM emerged. PM is an ancient phenomenon, considering ancient artefacts for example the great pyramids of Egypt and cultural concepts such as the Magna Charta. The civil engineering industry and the military are the sectors in which PM was first applied in a practical way (Garel, 2013, p. 665; Kuura et al., 2014, p. 217). PM as a term itself supposedly exists since 1953 and started in the US defence-aerospace sector (Hornstein, 2015, p. 291). It spread gradually thereafter and became relevant in various industry sectors and contexts. Yet researchers are uncertain when this dispersion began since PM literature only dates back to the 1950s when managerial tools for planning and implementation of complicated and big projects evolved within the literature (Kiznyte et al., 2016, p. 5; Kuura et al., 2014, pp. 217; Padalkar & Gopinath, 2016, p. 1306). In general there is a rich body of PM literature (Padalkar & Gopinath, 2016, p. 1305), however large parts of the backbone of the theory is based upon best practices of large North American engineering projects (Garel, 2013, p. 663). Therefore, national and international associations such as the Project Management Institute (PMI) in 1969, the International Project Management Association (IPMA) in 1972 or PRINCE were founded to form PM standards (Garel, 2013, p. 667; Hebert & Deckro, 2011, p. 21; Hornstein, 2015, p. 292; Kostalova & Tetrevo, 2014, p. 679; Padalkar & Gopinath, 2016, p. 1305). Moreover, since the publication of books for example the PMI Body of Knowledge (BoK) in the beginning of the 1980s, or specialized journals, seminars, conferences, professional certifications, tools and methods, the field of PM evolved further (Garel, 2013, p. 668; Hebert & Deckro, 2011, p. 21; Hornstein, 2015, p. 292; Voropajev & Scheinberg, 1992, p. 253).

3.1.1 PM nowadays

Nowadays, PM is seen as a successful way of organizing work as projects to communicate and arrange work across the entire organisation (Kiznyte et al., 2016, p. 5). PM can be used to boost efficiency considering coordination, planning and running a business competitively (Kuura et al., 2014, p. 223). Implementing structured strategies and methods in form of PM helps to focus and control activities, goals and outcomes of a company (Fister Gale, 2008), as well as to survive against competition on the market (Miloševic & Iewwongcharoen, 2004, p. 1). In the centre of PM are processes of planning, monitoring, controlling, delivering,
realising benefits and managing change (Kuura et al., 2014, p. 218). The management of budget, risks and time, together with the creation of a teamwork culture within the firm highlight the increase of efficiency through the use of PM (Kinznyte, 2016, pp. 1). PM is valuable in terms of accomplishing activities within time, budget, defined range and quality and with better results (Kostalova & Tetrevo, 2014, p. 678; Laursen & Svejvig, 2015, p. 736), since it is a way of “anticipating and rationalizing temporary collective initiatives” (Garel, 2013, p. 663).

PM can be described as a strategic competence within organisations, since it helps to follow business goals through projects and is an effective way of competing, sustaining a company and facilitating the response to changes of the business environment (PMI, 2017, p. 11). It is getting more and more complex due to the increasing complexity of companies executing their business strategy through projects because it is more than just numbers, templates, charts or graphs (Kuura et al., 2014, p. 218; PMI, 2017, p. 60; Milošević & Iewwongcharoen, 2004, p. 1). However, PM can be seen as an aid to solve managers’ problems such as predicting outcomes to reduce uncertainty over output (Fister Gale, 2008). It is therefore used to create value and increase the productivity of a firm (Asad Mir & Pinnington, 2014, p. 202; Kenley & Harfield, 2014, p. 887), together with the fact that properly applied PM can create competitive advantage, satisfy stakeholders, maximise the use of resources and handle complexity more efficiently (Milošević & Iewwongcharoen, 2004, p. 2). Traditional PM can be described as being linear, meaning a project is defined, broken into parts and the parts are accomplished before they are assembled to complete the project (Hebert & Deckro, 2011, p. 21; Sage Business Researcher, 2017; Weaver, 2007, p. 2). A newer method that is less linear but a spiral process is APM, which will be described in chapter 3.2.

3.1.2 Methods and tools of traditional PM

Abiding costs, quality and time are the basic goals in traditional PM, which is why in this thesis the focus will be on the most commonly used tools to fulfill that purpose (Kostalova & Tetrevo, 2014, p. 679; Laursen & Svejvig, 2015, p. 736; Shi & Blomquist, 2012, p. 509; Weaver, 2007, p. 4). In order to meet those project requirements and reach set goals, knowledge, skills, methods, tools and techniques of PM need to be applied thoroughly in projects (Hornstein, 2015, pp. 291; Jugdev et al., 2013, p. 535; Kostalova & Tetrevo, 2014, p. 679; Milošević & Iewwongcharoen, 2004, p. 2). A method is “a system of practices, techniques, procedures, and rules used by those who work in a discipline”, whereas tools can be defined as “something tangible, such as a template or software program, used in performing an activity to produce a product or result” (PMI, 2017, p. 711, p. 725). This distinction is essential to make in order to clarify the difference between the two and avoid misunderstandings in further readings.

In general, PM methods are comparable to “guidelines and checklists to ensure that practices are being followed properly and that the right outcomes are attained” (Jugdev et al., 2013, p. 538). According to Kiznyte et al. (2016, pp. 9, p. 12, p. 20), different methods of PM exist, one of them is traditional PM. Characteristics of that approach are requirements defined in the beginning of the project and sets of planned and forecasted activities. Traditional PM is linear, compared to APM, which is more spiral (Sage Business Researcher, 2017). APM delivers working projects where the team is more involved and the customers are included throughout the whole process (Kiznyte et al., p. 12). Further PM methods can be distinguished, however for the purpose of this thesis the focus will be on traditional and agile PM. In general, the different methods always have to be aligned with the organisation to create a functional management system across the company, therefore adjusted in house approaches or methods are quite common (Jugdev et al., 2013, p. 539; Kiznyte et al., 2016, p. 5).
In the beginning of the 1960s, PM methods and tools developed from practice and became the norm in management (Garel, 2013, p. 667). The PMI was created to share experiences in PM, discuss issues and form a community of project professionals, but also to establish tools and techniques of PM across various industries (Garel, 2013, p. 667). In connection to that it can be said that the PMI BoK or similar books by other associations are the dictionary or guide with the common norms, methods, processes, skills, tools and techniques for project managers (Jugdev et al., 2013, p. 538; Kiznyte et al., 2016, p. 7). In this BoK (PMI, 2017), various tools and techniques are presented to deliver outputs in every one of the stages of PM, which can be divided into project integration, scope, schedule, cost, quality, resource, communications, risk, procurement and stakeholder management. The appendix 1 shows all the tools and techniques of every stage in more detail, some of the most important tools and techniques that appear in many stages are expert judgment, meetings, data gathering and data analysis, as well as interpersonal and team skills, diagrams in various forms, decision making and PM information system tools (PMI, 2017). Even though frequent meetings are a useful tool to discuss goals, costs, timelines, activities and issues (Fister Gale, 2008), they are as well as many of the other tools mentioned not explicitly used in the field of PM, which is why in the following section some specific PM tools will be discussed that are most commonly used.

Since the development of the Program Evaluation and Review Technique (PERT) and the Critical Path Method (CPM) in the late 1950s, many other new PM tools have been developed (Hebert & Deckro, 2011, p. 21; Kostalova & Tetreova, 2014, p. 679). PERT and CPM initiated in the military sector, together with other tools in engineering projects, and they are considered to be the first standard management tools for projects (Garel, 2013, p. 666; Hornstein, 2015, p. 291). Nowadays, various tools exist for every project phase, national and international projects, project types as well as different company sizes (Voropajev & Scheinberg, 1992, p. 255). Tools describe the information flow in a project and assist the process of analyses and decision-making (Shi & Blomquist, 2012, p. 504), however it is vital to know how to apply them accordingly (Jugdev et al., 2013, p. 536; Milošević & Iewwongcharoen, 2004, p. 3). The utilization of suitable PM tools ensures efficiency and the success of PM, which is why they are widely used by professionals (Asad Mir & Pinnington, 2014, p. 202; Kostalova & Tetreova, 2014, p. 679; Milošević & Iewwongcharoen, 2004, p. 2). The general aim of the use of PM tools and techniques is scheduling as well as controlling costs and quality (Jugdev et al., 2013, p. 537).

3.1.2.1 Tools for time planning and scheduling

Time planning and scheduling is considered to be one of the main purposes of PM to control vagueness and uncertainty (Shi & Blomquist, 2012, p. 504; Weaver, 2007, p. 4). For the process of scheduling within projects, a great number of tools exist; Work Breakdown Structures (WBS) and Milestones are most commonly applied (Bitner, 1985; Jugdev et al., 2013, p. 544). A WBS is used to divide the project into manageable segments in an organisational chart to provide a plan of what needs to be accomplished and delivered; it is the basic project-planning tool (Garel, 2013, p. 667; Kenley & Harfield, 2014, pp. 887; Kostalova & Tetreova, 2014, p. 680; PMI, 2017, p. 570). Furthermore, Project Schedules or Project Schedule Network Diagrams are two basic tools that are frequently applied in projects (PMI, 2017, p. 717). PERT and CPM are also adopted for planning and scheduling in form of project networks (Garel, 2013, p. 667; Hebert & Deckro, 2011, p. 21; Kostalova & Tetreova, 2014, p. 681). CPM was established after PERT to eliminate drawbacks (Garel, 2013, p. 668) and functions as scheduling tool in terms of estimating the minimum duration of a project to schedule flexibility and control complications (PMI, 2017, p. 704; Shi & Blomquist, 2012, p. 503). When dealing with dependency issues between activities, a tool called Dependency
Structure Matrix (DSM) is applied to improve scheduling (Shi & Blomquist, 2012, p. 503). The Precedence Diagramming Method (PDM) is another PM tool that is used for modelling relationships between start to start (SS), finish to finish (FF), start to finish (SF) and finish to start (FS) to facilitate scheduling in a project (Hebert & Deckro, 2011, p. 21). Nowadays, the most widely used PM software tool for scheduling is Microsoft Project (MSP) (Gelbard et al., 2002, p. 462; Hebert & Deckro, 2011, p. 21; Jugdev et al., 2013, p. 538). Project schedules, relationship networks or precedence diagrams as well as relationships portrayed in a Gantt Chart are some of the most prominent features of MSP (Hebert & Deckro, 2011, p. 21; Jugdev et al., 2013, p. 538). A Gantt Chart shows activities and dates on the axes to draw activity durations in form of bars according to start and finish dates (PMI, 2017, p. 707). The purpose of a Gantt Chart is to define time demands, portray succession, dependencies, availability and performance of resources to estimate the duration of activities and the project as a whole (Kostalova & Tetrevo, 2014, p. 680). All in all, in traditional PM Gantt Charts, WBS, PERT and CPM as well as the software of MSP help to organize and split up the work in projects and enable dynamic control over the actual process, which is why they are so valuable in traditional PM and the most common used tools (Gelbard et al., 2002, p. 467; Jugdev et al., 2013, p. 537; Kenley & Harfield, 2014, p. 887; Milošević & Iewwongcharoen, 2004, p. 3; Shi & Blomquist, 2012, p. 504).

3.1.2.2 Tools for controlling costs

Cost control tools are furthermore important in PM since they guide how the costs will be managed correctly throughout the project (Garel, 2013, p. 667). Keeping the budget of a project is an important task; tools for doing so are for example Coding Systems, Comparative Tools, Cost Management Plans, Risk or Contingency Plans (Bitner, 1985; PMI, 2017, p. 577). Potential sources of risks for example can be represented in a Risk Breakdown Structure (RBS) (PMI, 2017, p. 720), also risks can be assessed with Probability Analysis, Life-Cycle Cost Analysis or Reliability Analysis (Jugdev et al., 2013, p. 538; Kostalova & Tetrevo, 2014, p. 682). Other tools for controlling costs in a project can be Activity-Based Costing (Milošević & Iewwongcharoen, 2004, p. 2), Cost-Benefit Analyses, Control Charts in general or additional decision management tools such as Sensitivity Analyses or Decision Trees (Jugdev et al., 2013, pp. 537; PMI, 2017, pp. 702). Moreover, to monitor and control a project in terms of comparing work done and planned value, Earned Value Management (EVM) is frequently used (Kostalova & Tetrevo, 2014, p. 682; Milošević & Iewwongcharoen, 2004, p. 2).

3.1.2.3 Other tools and techniques

Other tools and techniques that are used during the implementation and execution of a project are for example a Milestone or Master Schedule, as well as a Monte Carlo Simulation, which is a tool that can be used to look at possible outcomes for a project generated by a software in order to assess risks and schedule accordingly (Jugdev et al., 2013, p. 539; PMI, 2017, pp. 710). Furthermore, a Procedure Manual is a useful tool that shows tasks of individuals or groups, decision checklists, activity flowcharts and responsibility matrix charts (Bitner, 1985). A Responsibility Assignment Matrix (RAM) shows the resources of projects assigned to the work packages (Kostalova & Tetrevo, 2014, p. 681; PMI, 2017, p. 720), a RACI Chart is a common type of responsibility matrix that shows stakeholder involvement in activities with statuses of responsibility, accountability, consultancy and informing (PMI, 2017, p. 718). A similar purpose as RAM or RACI has the Organisational Breakdown Structure (OBS), which links project activities with organisational units that will be performing those activities (PMI, 2017, p. 712). Last but not least, quality management tools such as Six Sigma are valuable tools in PM, as well as human resource tools to facilitate team development, or IT support...
tools such as shared web portals, video conferencing or internet protocols available for everybody involved (Jugdev et al., 2013, p. 538).

Concluding, PM is a widely researched field and exists for many years in practice. Nevertheless, the theory behind the management practice is still young and somewhat underdeveloped (Davis, 2012, p. 189; Garell, 2013; Kuura et al., 2014, p. 217; Milošević & Iewwongcharoen, 2004, p. 1; Padalkar & Gopinath, 2016, p. 1305). There is an extensive list of PM tools and techniques for managing a project as well as good practice tools that can be applied in various phases of a project (Jugdev et al., 2013, p. 542; Kostalova & Tetrevo, 2014, p. 679; PMI, 2017, p. 685). PM tools and techniques in relation to success have been extensively researched (Jugdev et al., 2013; Milošević & Iewwongcharoen, 2004; Patanakul et al., 2010), however, there appears to be a gap in research in the field of the practical use of PM tools depending on country, type of organisational setting and PM maturity within a company (Jugdev et al., 2013, p. 548). Depending on the kind and size of project, different PM tools and methods are useful, this situational use of PM tools is underdeveloped in research (Milošević & Iewwongcharoen, 2004, p. 3).

3.2 Agile Project Management

As already mentioned, traditional PM tools, techniques and practices focus on detailed initial planning (Brechner & Waletzky, 2015, p. 40). Requirements are defined long before their implementation and adjustments in the implementation phase are time consuming. This makes traditional approaches very rigid and inflexible, whilst change requests, updates and revisions in the plan are costly in terms of time and budget (Brechner & Waletzky, 2015, p. 44). The increasing trend to a fast changing, highly dynamic environment with shorter business cycles makes the traditional methods seem to be outdated (Boehm & Turner, 2003, p. 1; Raval & Rathod, 2014, p. 80; Serrador & Pinto, 2015, p. 1041). In order to embrace change in a more flexible and appropriate way, agile project management (APM) evolved (Boehm & Turner, 2005, p. 32). It was introduced with a Manifesto in 2001 and gained increasing popularity over the last two decades (Kautz et al., 2014, p. 303). Especially in software development, which deals with fast changing requirements, this method is often utilized (Association for Project Management, 2017, p. 6). It addresses the high failure rate of projects in the IT sector and delivers an alternative regarding the thought that traditional PM methods might not be suitable for this industry anymore (Gandomani & Nafchi, 2016, p. 257; Jayawardena & Ekanayake, 2010, p. 1). Moreover, it claims to deal with increasing competition more effectively by focusing on time and budget pressure, which defines competition to a large portion (Jayawardena & Ekanayake, 2010, p. 1; Raval & Rathod, 2014, p. 80). This justifies the emphasis on APM in the literature review.

3.2.1 Research on APM

The research area of APM has been evolving since the Agile Manifesto in 2001 (Hoda et al., 2017, p. 60). The interest in this field increased especially since 2008, being still on a rise while reaching a peak of conducted studies in 2014 and 2015 (Hoda et al., 2017, p. 64). This can be identified as a trend of high awareness and interest in the research area. In general, the investigations focus on the industry of software development (Conforto & Amaral, 2016, p. 1), emphasising on the adaptation and implementation of APM within an organisation (Senapathi & Drury-Grogan, 2017, p. 298). Furthermore, social aspects within agile development as well as methods, practices, and usability are widely conducted research areas in APM (Hoda et al., 2017, p. 60). However, since the research area is still very young, there is a lot of room for further inspections. On the one hand, supporting or challenging existing studies in order to add evidence or decline made statement is an option. On the other hand, the
investigation of studies that focus on different aspects of APM, which are not yet covered in the literature, is applicable.

3.2.2 Characteristics of APM

The characteristics of an agile approach vary from the traditional approach in many ways. Instead of detailed upfront planning, a product vision defines the direction of development (Conforto et al., 2014, p. 24). Hence, the emphasis of agile methods is on the execution phase and not on the planning phase (Jayawardena & Ekanayake, 2010, p. 1). By applying an agile approach, which is focusing on simplicity, efficient workflows and reduction of waste, the concept of lean development gets incorporated (Association for Project Management, 2017, p. 6; Conforto & Amaral, 2016, p. 9). To ensure compliance with the values of the concept, the agile method is emphasizing on effective communication within the team and with other stakeholders (Boehm & Turner, 2005, p. 32). Also to constantly embrace change is distinctive of APM (Conforto & Amaral, 2016, p. 3). An incremental, iterative and emergent work progress is aspired in order to retain more flexibility and to fix the detailed scope of single tasks as late as possible, which allows to incorporate changes that might occur up to that moment (Boehm & Turner, 2005, p. 32). This means that the development process of a task is divided into several smaller stages and does not evolve in one big step, which leads to better manageable and more feasible tasks. Due to such small iteration cycles and more viable work tasks, the pressure for conducting work more efficiently and a delivery on time is higher, which consequently leads to increasing employee performance in terms of productivity (Kautz et al., 2014, p. 309).

Another characteristic of APM is that a very close communication with the user is necessary to include their feedback for continuous improvement in all iteration loops (Conforto & Amaral, 2016, p. 9). The concept of direct feedback shall ensure a good communication to increase the customer as well as the satisfaction of the end-consumer and by that lower the cost of production (Brechner & Waletzky, 2015, p. 46). Therefore, APM is aligned with lean management, which focuses on reducing waste, by considering issues as soon as they occur as well as to minimise rework. Additionally, an incremental development results in the delivery of early benefits. Requested features and feedback is collected and prioritized based on urgency and their creation of early benefits (Association for Project Management, 2016, p. 10). By continuously releasing new features and improvements, the customer can benefit from them immediately (Association for Project Management, 2017, p. 6, 9, 10; Brechner & Waletzky, 2015, p. 48).

The team structure in agile teams is defined as self-managed and self-directed, which is connected with a higher responsibility of each team member, whereas the power of one project manager shrinks (Association for Project Management, 2017, p. 9). Enhanced teamwork and effective communication within the team is essential to handle the agile setting. In this scenario the project manager is more focused on coaching the team and is dealing with wider stakeholder management in order to release the workload of the team and to keep them focused on their main tasks (Association for Project Management, 2016, p. 10). Those tasks include self-managed project plan monitoring and frequent updating of activities in order to keep track of the project status and sharing this information with the team (Conforto & Amaral, 2016, p. 12; Conforto et al., 2014, p. 24). In general, visual online or offline boards are used for updating the status, which ensures the accessibility for every team member (Conforto et al., 2014, p. 22). Additionally, very frequent but short stand-up meetings help to keep everyone updated on the status of the project. Occurred problems and faced difficulties get discussed in those set-ups (Conforto & Amaral, 2016, p. 4). While this seems to be time consuming, it helps to prevent to make the same mistakes several times, to learn from
experience made by team members and ensures that others benefit from them. This results in a higher productivity (Kautz et al., 2014, p. 309). Moreover, in such a setting team members have to explain and justify themselves if they did not manage to finish a task. On the one hand, this adds pressure. On the other hand, it builds an incentive for making progress, helps to identify problems in terms of a too high workload or too complex tasks promptly and allows the team to adjust their tasks immediately in order to prevent overruns (Kautz et al., 2014, p. 311).

All the identified characteristics deliver the framework of tools within APM. However, it is rather a description of those characteristics, which makes it seem inapt to talk about specific ‘tools’ in this context, especially when comparing this description with the clear definition of traditional PM tools. Consequently, it seems to be more accurate to use the term ‘framework of tools’ in the context of APM.

### 3.2.3 Usage of APM

The agile method got established in software development projects over the past two decades as an answer for high overruns in cost and time by applying traditional methods of PM (Association for Project Management, 2016, p. 7). Nowadays, this alternative method can be seen as the standard approach of conducting projects in this industry (Hoda et al., 2017, p. 60; Lee & Yong, 2009, p. 204). Furthermore, in other industries, which are operating in a highly dynamic, fast changing environment, requiring innovative processes, the application of APM is common e.g. designing and building activities in information technology, engineering, and new product or service development projects (Association for Project Management, 2016, p. 6). However, the adaption of APM outside the mentioned scenarios is still rather limited even though great potential for customizing the agile approach for other industries is identified (Association for Project Management, 2017, p. 22; Conforto & Amaral, 2016, p. 3). Whether to use traditional practices or to adopt agile methods highly depends on various internal as well as external factors and characteristics. The suitability has to be assessed appropriately to choose the most effective solution for an individual organisation or project (Association for Project Management, 2016, p. 23; Estler et al., 2013, p. 1217). In the following, drivers and enablers for APM as well as challenges get introduced.

Certain circumstances and characteristics can be identified as drivers for APM. A more flexible approach with less initial planning is particularly applicable for projects with a high level of uncertainty and loose requirements (Association for Project Management, 2016, p. 20). In this case, regular feedback loops as well as intensive communication and collaboration can be helpful to steer through this process (Conforto & Amaral, 2016, p. 9). Therefore, APM is especially suitable for innovative development processes (Conforto et al., 2014, p. 21). Additionally, the need for speed to the market (urgency) as well as time and cost constraints are identified characteristics that fit to APM (Association for Project Management, 2016, p. 25). By applying this approach, early benefits are created through regular delivery, thus corresponding to this need (Raval & Rathod, 2014, p. 80). Supplemental drivers can be related to the team structure; Project managers with APM experience more likely adapt this approach while APM in general seems to be more applicable for small (less than 10 team members), collocated, multifunctional teams (Association for Project Management, 2016, p. 11, p. 17; Boehm & Turner, 2005, p. 30; Hoda et al., 2017; p. 2). This defined surrounding enhances the foundation for successful communication, which is essential in APM. Furthermore, the attributes and characteristics of APM are more appealing to younger people, which are rather open for changes and have a higher capability of dealing successfully with them (Association for Project Management, 2016, p. 20).
For APM organisational, project team, process, project type, and other enablers can be classified. Encouraging organisational factors are mainly defined with regard to their size, structure, culture, emphasis on speed, and willingness to adopt APM (Bedoll, 2003, p. 32; Conforto & Amaral, 2016, p. 12; Conforto et al., 2014, p. 25). Project oriented organisational structures as well as small size teams are supportive circumstances, which are more likely to ensure profound communication (Boehm & Turner, 2003, p. 4). Moreover, an encouraging working culture that allows the employees to feel comfortable and empowered is beneficial (Boehm & Turner, 2003, p. 4; Conforto et al., 2014, p. 28). Experience of more than two years in PM of team members and the project manager is identified as enabler for APM. This leads to the conclusion that more experienced personnel is rather willing to adjust the approach of conducting work and to incorporate alternatives (Conforto et al., 2014, p. 28). Additionally, team characteristics like autonomous decision-making, less than 10 people in the team, collocation of the team members, and a high-allocated time to work on a specific project (>75%) are identified as supportive factors (Conforto & Amaral, 2016, p. 12; Conforto et al., 2014, p. 28). Less standardized process formalization is the most frequent designated process enabler for APM (Conforto et al., 2014, p. 28). Furthermore, drivers for APM as stated earlier in this chapter are similar to project type enablers. Thus, the willingness of close collaboration with stakeholders such as users as well as their involvement, a high urgency of the project, and a high level of uncertainty need to be mentioned (Association for Project Management, 2016, p. 20; Conforto et al., 2014, p. 25).

Nevertheless, the usage of APM can also obtain obstacles and be challenging. Especially a wrong mindset of the team members and employees of the organisation will hinder a successful adaptation and unfolding of the agile approach (Drury et al., 2012, p. 1239). Resistance of change, lack of knowledge about the agile method, communication difficulties or lack in effective collaboration averts the right application of APM and therefore will not result in the desired outcome. This resistance towards change is linked to the organisational culture, which either has encouraging or hindering influences on change processes (Estler et al., 2013, p. 1200; Gandomani & Nafchi, 2016, p. 260). Furthermore, it is challenging to not lose track of the organisation’s goals and the overall picture of a project when focusing on small iteration circles (Drury et al., 2012, p. 1248). Considering those challenges, it is very important for an organisation to adjust the used PM approach and methods to the circumstances. Those are project characteristics, the structure of the organisation, and their previous experience (Estler et al., 2013, p. 1217; Zanoni et al., 2014, p. 557). Consequently, both traditional as well as agile PM can be successful and the circumstances have to be critically evaluated in order to choose the most suitable approach for an organisation or project (Estler et al., 2013, p. 1202).

### 3.2.4 APM in practice

In practice, several methods of APM exist and marginally differ in the way of conducting an agile approach. They all address and incorporate the characteristics of APM by applying slightly different frameworks, however boundaries are sometimes blurred (Brechner & Waletzky, 2015, p. 57). The Scrum method evolved to become the most popular method (Rasnacis & Berzisa, 2015, p. 122). Besides Scrum, Kanban and Extreme Programming (XP) are also widespread methods; whilst Kanban is gaining more popularity within the last years, XP was more common to use in the early years after the agile Manifesto (Association for Project Management, 2016, p. 25). However, in practice a method needs to be adjusted to the circumstances such as the organisation, project team and characteristics of the project itself (Rasnacis & Berzisa, 2015, p. 122). In the following, the Scrum as well as the Kanban method are introduced to present the precise application of those most distinctive APM tools.
Within the Scrum method, different roles of the project development team are essential. Next to team members, who conduct the different tasks of the project, at least a product owner and a Scrum master exist; more roles are possible (Auer et al., 2003, p. 37). The product owner is the customer representative, who has essential information about the customer needs and the product vision. He or she ensures that this essential knowledge gets transmitted to the project team in order to consider it within the development and verifies if the delivered products fulfil their requirements. Requests for new features are mainly conducted by the product owner and are stated and prioritized in a product backlog (Auer et al., 2003, p. 37; Kautz et al., 2014, p. 304). In addition, every other team member can obviously also create new feature requests. Queries about customer’s expectations and needs are directed to the product owner (Brechner & Waletzky, 2015, p. 60). The Scrum master is the leader of the project team and resembles the role of a project manager. He or she organizes the tasks, is responsible for stakeholder management, empowers and coaches the team, ensures good quality of the work, and can as well perform tasks of the project development (Kautz et al., 2014, p. 304). Daily Scrum meetings and sprints define the workflow within the Scrum method. Those sprints can have a timeframe between one and four weeks, which needs to be clearly defined beforehand. At the beginning of each sprint, at the so called sprint planning, tasks from the product backlog get assigned to the team members and have to be accomplished by the end of the sprint (Conforto & Amaral, 2016, p. 3). After the testing of the features they either get released or need to be revised in the next sprint, since interruptions during the sprint are avoided (Association for Project Management, 2016, p. 21; Brechner & Waletzky, 2015, p. 58).

The framework of the Kanban method has less restrictions or defined roles and therefore seems to be even more flexible than Scrum. This confirms that the aim of simplicity is distinctive for Kanban, which allows an easy adaption of the method (Brechner & Waletzky, 2015, p. 39). No defined sprints are applied in order to allow more interaction and flexibility; consequently, a task is moved and released whenever it is ready without the need to wait for the end of a sprint. It also allows the implementation of immediate changes, which shall lead to higher productivity (Association for Project Management, 2016, p. 21). Each step of development on the visualisation board in the Kanban method is divided in two columns. This allows distinction between tasks that are already in progress and work that is ready to be conducted, which increases the clarity of the workflow and helps identifying congestion formation (Brechner & Waletzky, 2015, p. 13). Whereas the roles of a product owner and Scrum master are not necessary in Kanban, daily stand-up meetings are conducted to ensure an effective communication (Brechner & Waletzky, 2015, p. 58).

3.3 Entrepreneurship and start-ups

The research area of entrepreneurship is dealing with the formation of new businesses and is highly interconnected with research on entrepreneurs, new venture formation processes, innovation, opportunities, decision-making, location research and start-up theories (Busenitz et al., 2003, p. 285). Therefore, it is considered as multidisciplinary, linking psychology, management, economic geography, social science, and economic science (Bellabara, 2003, pp. 13; Gedvillas, 2012, p. 16; Sahut & Peris-Ortiz, 2014, p. 667). Even though the practical field of entrepreneurship is ancient and has influenced the economy ever since due to the formation of new ventures, the academic discipline has only been evolving for the last seven decades (Kurakato, 2011, p. 10; Kuura et al., 2014, pp. 214). The development of the academic field was enabled through an increasing interest in the topic, which resulted in the emergence of PhD and study programs focusing on entrepreneurship (Kuratko, 2011, p. 12). A dramatic raise in scholars, publications and research on entrepreneurship consequently fostered the development of the academic field (Kuratko, 2011, pp. 11, 14). Distinctive
scholars are Schumpeter, Say, Cantillon, Turgot or Drucker. The upward trend of this young research area is persisting (Busenitz et al., 2003, p. 285), while critics on theoretical shortfall still remain present (Arnold, 2006, p. 3). A range of studies claim definitions and boundaries not to be identified clearly (Busenitz et al., 2003, p. 287, 298). Furthermore, the complex, distinct, unpredictable process of new venture formation makes it hard to establish definite and sophisticated frameworks in this interdisciplinary academic field (Busenitz et al., 2003, p. 287; Pantazis, 2006, p. 65).

Drucker (2015) defines entrepreneurship as the managerial process of creating and managing innovation, whereas he considers innovations as windows of opportunities. Other studies dispute whether innovation and opportunities are created or discovered, which emphasizes the controversy of the research field (Becker et al., 2015). However, transforming innovative ideas into practical and targeted activities, which leads to a new business formation, is the goal of entrepreneurship (European Commission, 2006, p. 20). While innovation can touch on the product, service or process (Burggraf, 2012, p. 15), it excludes ordinary imitative firm formations as an entrepreneurial act (Kollmann et al., 2016, p. 15). This description shows the tight connection with start-ups (Kiznyte et al., 2016, p. 3), which are defined as new, innovative and active business formations (Kollmann et al., 2016, p. 15; Luger & Koo, 2005, p. 17.). Kollmann et al. (2016) identify an age younger than ten years, innovativeness in the business model and/or technologies, and aspiration of growth as distinction characteristics. The age of a start-up can be measured based on the registration date of the company as legal entity (Luger & Koo, 2005, p. 18), while the start-ups’ establishment process can be divided into different phases. The pre-formation phase deals with the transformation of a business idea into a business model and is characterised by planning activities and resource exploitation. The market launching, where the commercialisation of the idea begins, follows this phase. It converts into the phase of growth, while the boundaries of the phases are blurry (Bellabara, 2013, pp. 23; Macheridis, 2009, p. 4).

3.3.1 The role of planning and PM within entrepreneurial activities

Even though the research validating the importance of planning for entrepreneurial activities is not coherent, the majority states a positive impact of planning on the business performance (Brinckmann et al., 2010, p. 24). In the pre-formation phase, the exploitation of the business idea has to be planned and a business plan, which can be considered as written outcome of that planning activity, needs to be developed (Brinckmann et al., 2010, p. 25; Milder & Silberzahn, 2008, p. 480). This planning requires research commitment, a feasibility study, a market analysis, a marketing strategy, financial projections, and the development of the business model (Kiznyte et al., 2016, p. 4). It allows considering different possibilities and consequently results in a detailed and structured analysis of the business model. In general, planning has positive external and internal effects; externally it supports the business position for acquiring financial support and delivers internal clarification regarding its vision and strategy, which can increase the motivation of the team (Kiznyte et al., 2016, p. 5). This is why the common indication of research results claim planning as beneficial (Brinckmann et al., 2010, p. 24). Kiznyte et al. (2016, p. 4) argue that “start-ups with a well written business plan raised twice as much capital during first 12 months”, which influences their chances of survival. However, if entrepreneurs stick while the execution of the plan too tight to that plan, this might also affect the strategic flexibility and responsiveness towards necessary changes. It can result in a more rigid management, from which the new venture might suffer (Brinckmann et al., 2010, p. 25). Additionally, excessive pre-planning can detach the new venture from launching and might cause them to miss their window of opportunity. Consequently, it is important for entrepreneurs to assess the required amount of planning, to
plan and execute concurrently and to be open for adjustments of the initial plan (Brinckmann et al., 2010, p. 37).

In consequence of the examination of planning within start-up companies, linkages in the literature evolved between this research field and projects (Lindgren & Packendorff, 2003). Basically two different approaches exist simultaneously, which focus on different levels of new venture formation. One approach considers the whole start-up as one project (external project-based view); starting from the planning in the pre-formation phase, continuing with the implementation of the business plan and the post-project phase of sustaining the business operations (Kuura et al., 2014, p. 222). Lindgren & Packendorff (2003, p. 86) emphasize on the temporary character of start-ups and justify therefore this project-based view. However, the majority of research does not approve this stretch on temporality since the aim of start-ups is to establish on the market. Therefore, they use a different distinction for the external projected-based view and consider the process of starting up a business including its growth phase until its establishment on the market as project, not its full existence (Ajam, 2011; Kiznyte et al., 2016, p. 12; Kuura et al., 2014, p. 222). The second approach, which exists in parallel, focuses on a lower and narrower perspective, the micro-perspective. This internal projects-based view subdivides the strategy realisation into multiple projects and therefore applies a multi-project approach. In summary, it can be stated that a start-up company is considered as a project, which can be subdivided into multiple projects (Lindgren & Packendorff, 2003). Figure 1 is illustrating this theory and allows therefore a better understanding of the concept. The start-up itself represents the external project-based view, while the individual projects P1, P2, and so on in the preformation phase and implementation & growth phase represent the internal project-based view.

![Figure 1: Project-based view on start-ups (Own illustration, 2017).](image)

The connection between entrepreneurial activities, planning, projects and consequently also PM in practice seems to be blatant (Kuura et al., 2014, p. 215, 223). In the literature several first attempts to link those areas in order to understand their interconnection and provide mutual learning outcomes elaborated (Kuura et al., 2014, p. 219). It is argued that especially in the process of starting up a business (external project-based view), PM techniques should be used additionally to existing business planning techniques in order to increase the efficiency in planning and to conduct more diverse analyses. Especially aspects of risk management, effective stakeholder management, as well as realistic time and cost estimations are proposed to be incorporated from the field of PM (Ajam, 2011; Kiznyte, 2016, p. 1; Kuura et al., 2014, p. 222; Kwak & Anbari, 2009, p. 94). When applying PM methods in entrepreneurial activities, a better assessment, and a more focused and structured conduction of planning will help to not lose the overall picture. Consequently, a positive effect on the business performance is expected (Ajam, 2011; Fister Gale, 2008; Kuura et al., 2014, p. 223).
However, this proposition needs to be validated (Macheridis, 2009, p. 13; Turner et al., 2012, P. 955).

Regarding the internal project-based view, the utilization of PM methods is considered as beneficial supplementary approach of managing the start-up company. This means that for conducting projects within start-ups, various PM methods should be considered (Kuura et al., 2014, p. 222). Nowadays, particularly in software development start-ups, the application of PM methods can be noticed (Kiznyte et al., 2016, p. 5). Especially the implementation of the more flexible APM and lean PM methods is not unusual (Kiznyte et al., 2016, p. 19).

3.3.2 The entrepreneur

Entrepreneurs, which are either single individuals or a group, are the key actors in the dynamic and social process of entrepreneurship (European Commission, 2006, p. 20). The origin of the word entrepreneur derived from French ‘entre’ (between) and ‘prendre’ (to take) and can be explained as a merchant acting between parties in a trading process (Bolton & Thompson, 2004, p. 14). According to the well-known economist and one of the most important scholars in the field of entrepreneurship Joseph Schumpeter, entrepreneurs are innovators that provoke economic growth (Economist, 2014; Tülüce & Yurtkur, 2015, p. 720). Drucker (2015) agrees that the task of an entrepreneur is to innovate and manage innovation. Cantillon characterizes them as the ones that take the risk in the economy, the risk between supplier and customer (Bolton & Thompson, 2004, p. 14). Hence, an entrepreneur is somebody that “habitually creates and innovates to build something of recognized value around perceived opportunities” (Bolton & Thompson, 2004, p. 16). Another thing entrepreneurs have in common is that they have an idea and vision to achieve greater things (Coomber, 2014, p. 45).

Considering the definition of entrepreneurship in chapter 3.3, skills to recognize new opportunities are needed in order to start a new business (Cambridge University Press, n.d.). Multiple sources state that entrepreneurs can be characterized as creative, self-confident, motivated, goal oriented, independent and determined. They take initiative, engage, take calculated risks and responsibility, are opportunity seekers and leaders (Bell, 2015, pp. 39; Bolton & Thompson, 2004; European Commission, 2006, pp. 5; Kazmi, 1999; Kuura et al., 2014, p. 217; Srivastava, 2014). Being adaptable is also a key characteristic to be successful as an entrepreneur (Coomber, 2014, p. 45), together with being able to manage resources and navigate the company through challenges (Bell, 2015, p. 40). The orientation of an entrepreneur is characterized by innovativeness, proactiveness and competitive aggressiveness among others (Gedvilas, 2012, p. 27). Entrepreneurs also recognize the people with the specific skills for the job, they hire hand-picked ones and manage the team by acting quickly and successfully (Bolton & Thompson, 2004, p. 13; Coomber, 2014, pp. 43). Additionally, it is regularly stated that entrepreneurs are well educated (Economist, 2014; Kazmi, 1999, p. 69), prevalently male (Kazmi, 1999, p. 69; Singh & DeNoble, 2003, p. 212), often married and around 25 years of age (Kazmi, 1999, pp. 69). As it can be seen, the list of characteristics of entrepreneurs is long and broad literature is available that describes entrepreneurs. For the purpose of this thesis the investigation is narrowed down on previous work experience of entrepreneurs, which consequently will be portrayed in more detail in the following section.

3.3.2.1 Influence of previous work experience

“The ability to successfully engage in entrepreneurial activities is largely a function of the education, training and practical learning that people experience throughout their careers and
professional lives” (Gabrielsson & Politis, 2012, p. 49). Although entrepreneurs were characterised earlier to be well educated, academic education does not seem to be sufficient (Bolton & Thompson, 2004, p. 25). Learning entrepreneurship in school or at university appears to be too rigid and formal, whilst practice and hands-on experience in entrepreneurship is crucial (European Commission, 2006, p. 9, pp. 14).

Work experience plays a vital role in entrepreneurial activities, since it helps to assess, evaluate and combine resources (Gabrielsson & Politis, 2012, p. 51). Prior work experience can help entrepreneurs to understand customer problems, markets and products as well as competitive resources better to identify inefficiencies and trigger ideas. Hence, it is considered that work experience leads to higher entrepreneurial success (Gabrielsson & Politis, 2012, p. 49). Management skills and experience, for example in marketing, finance or inventory control are vital for entrepreneurs (Kiznyte et al., 2016, p. 3). Supposedly, a deeper functional work experience as well as wide experiences across different industries facilitate a higher number of new business ideas (Gabrielsson & Politis, 2012, pp. 63). Industry specific experience can help in understanding market demand and potential risks of product availability and competitive resources, whereas business function experience assists in planning, organizing, communicating, avoiding issues in production, investments or distribution and understanding resource coordination (Gabrielsson & Politis, 2012, pp. 51). In general, Gabrielsson and Politis (2012, p. 54) claim that the more work experience somebody has, the better performance can be expected, which is called human capital theory reasoning.

Based on empirical research, the average industry specific and managerial experience of entrepreneurs starting their first business should be ideally between five to ten years (Timmons, 1986). While working for another company, one can learn from the mistakes made at someone else’s expense and a role model can inspire one, which maximises the learning experience (Bolton & Thompson, 2004, p. 26). Prior start-up experience is considered to increase the ability of handling the entrepreneurial process from opportunity recognition to opportunity exploitation (Politis, 2008, p. 473). Such prior experience is highly useful for the entrepreneurial learning process in terms of coping with newness, effectual reasoning, failure and problem solving (Politis, 2008, p. 472, p. 476), as well as applying newly combined practices (Manning, 2010, p. 551). It is a “valuable source of learning when it comes to the skills, preferences and attitudes of entrepreneurs” (Politis, 2008, p. 483).

Due to a vast work experience, which generates confidence (Singh & DeNoble, 2003, p. 214), early retirees, those that left their career employment before the traditional age of retiring, often return to the labour market as entrepreneurs and are quite fitting for the role (Singh & DeNoble, 2003, p. 207). They more likely have a strong social and/or work network, which is advantageous when starting a new business (Kuura et al., 2014, p. 221). They can build up on the established network and trust and therefore future collaborations are easier (Manning, 2010, p. 561). Additionally, it has been analysed that early exposure to self-employment, meaning a family background in entrepreneurship, increases the probability of becoming an entrepreneur (Bolton & Thompson, 2004, p. 24; Geldhof et al., 2014, p. 411). There is a high chance of the next generation to follow the first generation, especially because of inheritance of the business legacy, gaining insight in starting and running a business at a young age and experiencing an entrepreneurial mind-set (Kazmi, 1999, pp. 67, p. 76).

Entrepreneurs tend to hire people with specific prior work experience in order to facilitate enhanced understanding of the business environment (Coomber, 2014, p. 44). How does the prior work experience of the entrepreneur affect the management of the enterprise though? One claim is that the longer one works within the specific company, the more rational and
comprehensive decisions are made (Shepherd & Rudd, 2014, p. 343). Habitual entrepreneurs, meaning those that have already founded at least one business before, have a very advanced entrepreneurial mindset and problem-solving ability as well as a talent for coping with shock to take corrective actions in the start-up (Politis, 2008, p. 473). They are more confident to decide under uncertainty and time pressure and see failure as a source of learning (Politis, 2008, p. 477, p. 483).

Moreover, Gabrielsson and Politis (2012, pp. 52) differentiate between generalists and specialists work experience to understand how people act with those experiences. On the one hand, generalists have work experience across different areas, meaning they know a little about a lot of topics. They can come up with novel solutions, have entrepreneurial insights which helps them when solving problems and generating novel innovations. On the other hand, specialists can look back on work experience within specific fields and can call themselves experts within one or a few subjects. They are competent in absorbing new knowledge within their field, are considerably fast in deciding, and recognize patterns to see the complex picture (Gabrielsson & Politis, 2012, pp. 52). Purportedly, entrepreneurs should desire a generalist career path and a project oriented work situation, as it seems more beneficial (Gabrielsson & Politis, 2012, p. 68).

3.3.2.2 Linking entrepreneurs with PM
Kuura et al. (2014, p. 223) claim that project management and entrepreneurship are much more connected in practice than in the academic literature. When looking at the characteristics of entrepreneurs to compare them with the ones of project managers, many resemblances can be detected. Project managers are as well as entrepreneurs experts in multiple fields that take responsibility and act in an authoritarian way, they are strong communicators, coordinators, and organisational planners (Gaddis, 1959). Therefore, the characteristics of project managers and entrepreneurs seem to overlap. “When an entrepreneur starts to implement the business plan they become a project manager” (Kuura et al., 2014, p. 222). Entrepreneurs undertake the role of project managers during various stages in the company such as its starting up, development, renewal, closure or transfer (Kuura et al., 2014, p. 215). The two major tasks of entrepreneurs, as well as project managers, are to care for the project from the idea to the initial implementation, and to handle the post-project phases to sustain business operations (Kuura et al., 2014, p. 222), they have to examine the feasibility, plan, obtain resources and execute the plan (Gedvilas, 2012, p. 25).

In the literature the two research areas of entrepreneurs and PM are linked to some extent. The term of entrepreneur project managers appears and describes as a person that looks beyond scheduling or budgeting and focuses on the bigger picture, leads, motivates, builds teams, is patient, proactive, optimistic, an effective task delegator and great communicator (Srivastava, 2014). They manage projects, which are meant to bring novelty to the environment and can therefore be considered ‘entrepreneurial acts’ since they are also characterized by seriality and temporality (Kuura et al., 2014, p. 22). Nevertheless, Gedvilas (2012, p. 13) criticizes that project managers are often limited in innovation and creativity due to the bureaucratic use of project management.

It can be summarized, that a growing trend towards conducting work through projects can be detected (Gedvilas, 2012, p. 13; Kiznyte et al., 2016, p. 1). However, there seems to be underdeveloped links between the fields of PM and entrepreneurs and various promising research gaps with different focuses could be pursued. PM can bring an additional perspective of looking at entrepreneurship (Kuura et al., 2014, p. 224), especially considering the way entrepreneurs run start-ups with applying PM methods and tools. The previous work
experience of entrepreneurs could have substantial impacts on the usage of PM methods and tools, which is why the influence of those factors will be investigated in this thesis.

3.4 Conceptual framework

The creation of a conceptual framework, which is based upon the theoretical framework presented above, intends to help focusing on the most important key points of the presented theory and it generates the basis for the following steps in the study (Kumar, 2014, p. 57). Figure 2 provides such a conceptual framework, which points out that the two research areas of PM and entrepreneurship are both defined through the main actors that are project managers and entrepreneurs. The literature shows similarities between both actors, which are explained in chapter 3.3.2.2 and this represents first attempts of linking the research areas. While the project managers operate projects, an entrepreneur operates a new firm formation. In order to execute PM and deliver projects, different methods can be applied that help to organize and structure the execution in an appropriate way. In general, it can be differentiated between traditional and agile PM methods. This study aims to find out whether those methods are also applied in the process of launching a business (external project-based view) or in general in different projects within the start-up company (internal project-based view). Furthermore, it intends to investigate on the influence of the former work experience of entrepreneurs especially regarding their contact with PM on the choice of applying PM methods. In general, this framework visualizes the basis for further steps of the study and helps when getting back to the theory in the analysis and conclusion (Bryman & Bell, 2007, pp. 97).

Figure 2: Conceptual framework (Own illustration, 2017).
4 Practical research method

This chapter will present the practical approach of collecting primary data. The design of the research defines the framework of conducting the research (Bryman & Bell, 2007, p. 731; Kumar, 2014, p. 381); more precisely which practical tools are used to collect data (Kumar, 2014, p. 39). Generally, it is crucial to select an appropriate and suitable research design in order to generate valid findings, comparisons and conclusions. Furthermore, the aspired research design needs to be viable and manageable within the given timeframe (Kumar, 2014, p. 39). In the following section, the selected design of the research and the method of choosing and approaching respondents will be introduced. Furthermore, the interview as a data collection tool will be discussed and presented in detail. Additionally, research ethics and the quality criteria of the study will be evaluated.

4.1 Data collection method

In general, the data collection method is highly influenced by the fundamental research paradigm and methodology of the study, which basically restrict the pool of applicable tools to collect data. A qualitative methodology, which is underlying this study, allows among others to conduct case studies, focus group discussions, observations and various types of interviews (O’Gorman & MacIntosh, 2014, pp. 118). In this study, in order to receive a deep insight in the different companies and their decision about applying PM methods and tools, the authors decided on conducting interviews as technique of generating primary, qualitative data. An interview, which can take place face-to-face or otherwise, is an interaction between an interviewer and an interviewee (Kumar, 2014, p. 176). The chosen tool is widespread in qualitative research and enables to socially encounter with participants to reveal privileged insights such as their motivations, beliefs, attitude and feelings on a topic (Bryman & Bell, 2007, p. 472; Wisker, 2001, p. 165). It is considered to be flexible since the structure of questions can be modified and adjusted to the flow of the interview (Boyce & Neale, 2006, p. 3; Bryman & Bell, 2007, p. 474). Moreover, it encourages the interviewees to go into more detail in their responses and consequently leads to rich answers and reveals in-depth information (Rapley, 2004, p. 15; Rugg & Petre, 2007, p. 137). In general qualitative interviews can be distinguished between unstructured and semi-structured (Boyce & Neale, 2006, p. 3). While structured interviews are following a strict order “to maximize the reliability and validity of measurement of key concepts” (Bryman & Bell, 2007, p. 473), they are following a rigid approach and are rather considered as quantitative data collection. Unstructured interviews are more flexible and do not follow a guideline, which allows to gain very deep insights but the conversation can go in all directions, which makes it hard to compare and analyse the received information (Kumar, 2014, p. 192; Wilson, 2012, p. 97; Wisker, 2001, p. 168).

For that reason, this study is conducting semi-structured interviews, which are covering predefined topics and questions following a developed interview guide whilst leaving room for divergence (Bryman & Bell, 2007, p. 474; Wisker, 2001, p. 167). This means that the order of questions can be adjusted, new questions that occurred due to the flow of the conversation can be added, and clarification of misunderstood questions and answers is possible (Bryman & Bell, 2007, p. 474). However, the guiding subject themes that are defining the outline of the interview enable the authors to analyse the data in a more thematic way and to compare answers of different interviewees (Bryman & Bell, 2007, p. 479). Open and closed questions were asked in order to generate the data. A closed question limits the possible answers (Wisker, 2001, p. 140), while open-ended questions do not limit the alternative of responses, do not give any direction and allow deeper insight in thoughts, beliefs or values (Wisker, 2001, p. 141).
Additionally, semi-structured interviews are usually more to the point and less time-consuming than unstructured interviews; therefore, semi-structured interviews are more applicable for conducting business research, which is defined by time constraints on the side of the interviewee. It has to be taken into consideration that entrepreneurs are usually putting much effort into their business and are working a lot in order to keep their start-up company running. This time constraint consequently requires efficient interviews that allow drawing valid conclusions (Bryman & Bell, 2007, p. 480). Nevertheless, this research tool also incorporates some disadvantages that the researchers need to be aware of. Firstly, it is time-consuming to conduct, process and analyse interviews (Boyce & Neale, 2006, p. 3; Wisker, 2001, p. 165). Additionally, the risk of researchers unwillingly biasing their study is given and the quality of the data depends highly on the skills of the interviewers and their interaction with the interviewee (Kumar, 2014, pp. 182). Being aware of this, the authors consequently tried to keep the question structure easy understandable, avoided packing multiple questions into one and refrained from using technical terms that the interviewees might not be familiar with (Wisker, 2001, p. 172). Furthermore, leading questions were prevented (Bryman & Bell, 2007, p. 483). The authors also tried to create a comfortable atmosphere encouraging the interviewee to share his or her opinion and thoughts, to ask the right questions at the right time and to set back personal opinions in order to get the most out of the interview (Boyce & Neale, 2006, p. 4).

4.2 Research context

To be able to answer the research question, the authors chose to contact various different start-up companies in the same industry. Consulting multiple companies with diverse focuses will allow to draw more profound conclusions and to compare differences within start-up companies. The restriction of the context regarding a specific industry and country is providing a more homogenous data basis. Therefore, limiting the research to companies that are in a sense operating on software development allows a deeper understanding in this specific industry context. Especially due to the high importance of this industry in the process of digitisation nowadays, the structures of this industry are very interesting to investigate. Furthermore, the constraint on location allows getting a deeper understanding of a specific market. The selection of Sweden as location was mainly caused by the current place of residence of the authors, which is Umeå. To enable a high amount of face-to-face interactions, which will allow a deeper analysis and avoid misunderstandings, the geographical region was limited to the country Sweden. It also represents a country with increasing entrepreneurial activities, which facilitates further studies in this segment (Andersson et al., 2016, p. 2). Considering the language barriers, they were expected to be rather low due to a general high level of English skills within the society.

4.3 Finding respondents

Choosing a fitting strategy for finding respondents for a research is important to produce considerable and unbiased research results (Gobo, 2004, p. 435; Kumar, 2014, p. 40; Ritchie et al., 2003, p. 77). In quantitative research, samples are mostly chosen randomly from a certain sampling population and make up the basis of interest of a study (Kumar, 2014, p. 382; Bryman & Bell, 2007, pp. 730). However, this is an inappropriate way of finding respondents for qualitative studies such as this one (Ritchie et al., 2003, p. 78). Non-probability sampling is commonly applied in qualitative research as it is appropriate for small-scale and in-depth studies. In that case, units are deliberately selected based upon their
characteristics that are aligned with the context of the study (Bryman & Bell, 2007, pp. 730; Ritchie et al., 2003, p. 78).

For this study, a somewhat mixed technique towards finding and choosing respondents was followed. Primarily, the judgment of the researchers towards achieving the objectives of this thesis and considering who might have the information required and is willing to share it determined who was contacted (Kumar, 2014, p. 244; Ritchie et al., 2003, pp. 78). The selection criteria, meaning the features respondents had to fulfil for the purpose of contributing to the study, were that they are start-ups no older than 10 years, based in Sweden and operating in the IT development sector.

Attending various events of the incubator Uminova was an important step for the researchers to gain access within the start-up community in Umeå. This allowed them to apply snowball sampling, which can be explained as selecting respondents using networks to establish contacts (Bryman & Bell, 2007, p. 200; Gobo, 2004, p. 449; Kumar, 2014, pp. 244). The network in this case was the start-up community in Umeå and the incubators Uminova and Venture Cup; additionally, interviewees were consulted about further possible contacts at the end of each interview to further expand the network. Another part of the sampling strategy was convenience sampling, mostly because of the setting of the thesis. In that sampling approach accessibility, geographical proximity, known contacts and quick approval for participating are important keywords (Bryman & Bell, 2007, pp. 197; Kumar, 2014, p. 244). Since the period for conducting the interviews was roughly one month, those time constraints impacted the process of choosing interview partners and led to convenience sampling. As mentioned before, the context of the study was set to be Swedish IT start-up companies, which also limited the researchers in choosing the interviewees. Especially in the beginning of the process of finding respondents, to exploit the close by geographical region to full extent, local start-ups were contacted. After exhausting all possibilities in the network, online research about start-ups in Sweden and incubator centers aided in contacting a wider range of possible candidates and reaching additional ones.

In general, all of the respondents can be classified as entrepreneurs. They have founded or co-founded a business in the last ten years in the IT development sector in Sweden. The age range of the participants lies between 25 and 45. Further information on them, the company and how they were contacted can be seen in Table 1 in the interview section (chapter 4.4.2). Except for four participants, the researchers had not met their interview partners prior to the actual interview. Those four were encountered briefly at various events and asked for their participation. However, the majority of the entrepreneurs were contacted via their company e-mail address. The e-mails contained a cover letter, which can be seen in Appendix 2, introducing shortly the authors and the purpose of this e-mail as well as the study. Furthermore, the representatives of the contacted companies were asked cordially for their availability in the next weeks to participate in a 30-40 minutes long interview in person at a place of their convenience or via phone if further away. To follow up on the unanswered e-mails the entrepreneurs were called directly if possible, whereby some agreed on meeting the researchers and others declined mostly due to time constraints. In total, 35 companies were contacted in the course of this study, which led to eight interviews in the end. The authors felt that the so-called saturation point of this empirical research was in a sense reached with the collected interviews since they recognized increasing repetition between the answers of different interviewees (Kumar, 2014, p. 248; Ritchie et al., 2003, pp. 83). Additionally, the already mentioned time constraints influenced the authors’ decision to end the data collection process after eight interviews.
4.4 The interview

This chapter will provide an overview of the process of data collection and processing the generated data. To be more precise, the development and structure of the interview guide, the steps of preparation for interviews, the description of the setting and situation itself, as well as the approach of coding and analysing the data will be presented. It therefore provides a clear overview of what the authors considered for conducting research and analysing the data.

4.4.1 Interview guide

An interview guide is “a pre-prepared set of topics/questions, produced with the aim of providing a form of direction for interviews” (O’Gorman & MacIntosh, 2014, p. 122). It provides the interviewers with the questions and topics that the interview should cover and consequently ensures that the interviews are better comparable (Bryman & Bell, 2007, p. 728). Furthermore, the preparation of an interview guide helps to prepare the interview setting in detail and to think about which questions need to be asked that allow drawing conclusions about the research questions and objectives of the study. Additionally, a pertinent order of the topic blocks and questions is defined, which can be adjusted in the flow of an interview (Bryman & Bell, 2007, p. 483). The guide was developed based on the underlying theoretical framework of the study and intends to cover all topic areas that are relevant for the analysis of the utilization of PM methods and tools within start-ups. Feedback from the supervisor and the first interview was incorporated. The initial interview primarily served as a first practice of conducting an interview to ensure the appropriate design of the guide and to reveal potential flaws (O’Gorman & MacIntosh, 2014, p. 121; Silverman, 2013, p. 207). Only minimal adjustments were made and therefore the interview could be included in the study.

Considering the structure of the guide, upfront a general introduction of the interviewers, the objectives of the study and information for the participant about his or her rights were designated (Kumar, 2014, p. 183). Furthermore, he or she was asked for permission to be recorded. The first theme block allowed the interviewee to present his or her start up company and to provide more detailed background information on it. Following this, the background of the interviewee, the entrepreneurial team and their previous contact with PM got inquired. Those two blocks were covering topics that the interviewee is very familiar with and it should be easy and comfortable for him or her to talk about them. Therefore, it helped to start a natural flow of conversation and to create a pleasant atmosphere that is encouraging the interviewee to reveal insights (O’Gorman & MacIntosh, 2014, p. 121). Afterwards, the application of traditional and agile PM for launching the business and within continuous development projects was addressed, whilst the two stages got separated in order to clearly distinguish between them and to avoid blurred or overlapping answers that are hard to analyse. Due to the application of a semi-structured approach of conducting the interviews, those parts could be adjusted to the interview situation and a funnel technique was used. This means firstly interviewees were asked whether they applied PM methods or tools for launching or ongoing projects, which allows a first overview of this topic. On that basis further inquiry regarding the specifically used tools was conducted to gain more insight in the application. In the interview guide traditional tools were divided in scheduling, cost control, risk, resource scheduling, HR, IT, and quality management tools and the interviewees were asked whether they applied any tools to address those areas. Some examples of tools for each area could be provided if necessary, but an open answer of the interviewee was preferred to not bias the answer. To get further insights about applied APM methods, questions were structured based on the in the literature review identified characteristics of APM such as progress visualization, adaption of change, planning requirements, communication strategies, team structures and early benefit deliveries. In general, the focus of the interviews was on
receiving a deep understanding of the entrepreneur’s practical application of PM methods and tools, which is why the interview flow was highly defined by a responsive reaction on the situation. The interview guide served as flexible aid to not lose track in that process. A closing segment formed the ending of the interview guide, which was mainly used to clarify possible questions. For a detailed draft of the interview guide see Appendix 3.

4.4.2 Conducting the interviews

In preparation of each interview, the authors gathered information about the respective start-up company. Online research has been conducted to familiarize with the business model, which enabled the authors to understand the background, to ask more precise questions and to use the interview time more efficiently (O’Gorman & MacIntosh, 2014, p. 121). Additionally, it added to a positive atmosphere due to the fact that the authors encountered the interviewee prepared and therefore with more respect. In general, this is essential in order to encourage the interviewee to reveal valuable information and insights (Boyce & Neale, 2006, p. 4). If possible, both the authors tried to be present at the interviews, which increased the responsiveness and also created a more relaxed atmosphere because silent moments could be avoided more easily, which let the conversation flow smoother. Whenever it was applicable, face-to-face interviews were preferred in order to have the chance to create a positive atmosphere. In general, one should be aware that the setting of the interview influences the interview itself (O’Gorman & MacIntosh, 2014, p. 121). If the respondent was located further away, interviews via phone functioned as alternative.

Beforehand, the respondents were informed about the approximate length of the interview. In order to offer more convenience for the respondent and to make sure that the timing is good for them, they were given the choice to suggest a suitable time. This information about the duration and the scheduling itself is important to ensure that the interviewee arranges enough time and is less stressed, which in the end affects the atmosphere positively. Furthermore, in face-to-face interviews the authors offered to meet in the office of the respective start-up company to increase the convenience. Proposed alternatives were also meeting rooms at the university library or the Umeå city library. In general, by proposing those options the authors tried to perform the meetings in quiet settings with low possibilities of distractions or interruptions to not affect the flow of the interview in any way and consequently not harm the quality of the interview.

In general, the atmosphere during all interviews was very casual and friendly while no interruptions occurred. Some of the interview partners were similar in age to the researchers, which also seemed to be one of the factors why the situation was quite relaxed. All interviews were recorded to transcribe them afterwards, which allows an accurate and more detailed analysis (Kumar, 2014, p. 193). It additionally needs to be stated that none of the respondents’ nor the interviewers’ mother tongue is English, which might have influenced their exact wording or what they intended to say. Even though the general level of English was very high and did not seem to affect the interview quality, two respondents were not as comfortable with the language and sometimes struggled over finding words in English. Further information about the interview situation are provided in Table 1, especially hard facts such as the name and company of the interviewees, the way of contacting them as well as date, duration, and setting of the interview.
### Table 1: Interview situation (Own illustration, 2017).

<table>
<thead>
<tr>
<th>Interviewee, position</th>
<th>Company</th>
<th>Interviewer</th>
<th>Date</th>
<th>Duration (min)</th>
<th>Location</th>
<th>Contact (from where, how?)</th>
<th>How we contacted him</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ricardo Russ, CEO/founder</td>
<td>e-flow</td>
<td>Alex &amp; Lena</td>
<td>7.11.17</td>
<td>60</td>
<td>Umeå university library meeting room</td>
<td>mutual friends, he told us about his start-up</td>
<td>Email to confirm set interview date</td>
</tr>
<tr>
<td>Per Fransson, CEO/founder</td>
<td>Musikmedel</td>
<td>Alex &amp; Lena</td>
<td>9.11.17</td>
<td>90</td>
<td>Uminova, meeting room</td>
<td>Start-up coffee 7.11.17, approached him there</td>
<td>Email to confirm set interview date</td>
</tr>
<tr>
<td>Juha Niemi, CEO/founder</td>
<td>Vacaverde</td>
<td>Alex &amp; Lena</td>
<td>10.11.17</td>
<td>40</td>
<td>Umeå university library meeting room</td>
<td>Ricardo recommended him, we looked the company up online</td>
<td>Email</td>
</tr>
<tr>
<td>Abdullah Yousuf, Founder &amp; Head of Business Development</td>
<td>Strativ</td>
<td>Lena</td>
<td>16.11.17</td>
<td>45</td>
<td>Uminova, Abdullah's office</td>
<td>Per Fransson introduced us to him in person</td>
<td>Email to confirm set interview date</td>
</tr>
<tr>
<td>Daniel Wiberg, Software developer and co-founder</td>
<td>Skillster</td>
<td>Alex &amp; Lena</td>
<td>22.11.17</td>
<td>45</td>
<td>Uminova, meeting room</td>
<td>saw it on door, googled it, Uminova</td>
<td>Email</td>
</tr>
<tr>
<td>Henrik Frienholt, co-founder, CSO</td>
<td>ZunZun</td>
<td>Alex &amp; Lena</td>
<td>23.11.17</td>
<td>35</td>
<td>Telephone interview</td>
<td>Ricardo recommended Alcides Viamontes (CEO), we looked up the company and contacted them then</td>
<td>Email, phone, online contact form</td>
</tr>
<tr>
<td>Miguel Fürst, founder</td>
<td>Lejonapa</td>
<td>Alex &amp; Lena</td>
<td>28.11.17</td>
<td>50</td>
<td>Telephone interview</td>
<td>Venture Cup website, contacted them directly</td>
<td>Email</td>
</tr>
<tr>
<td>Meiju Vartiainen, CEO/founder</td>
<td>Mowida</td>
<td>Alex &amp; Lena</td>
<td>29.11.17</td>
<td>30</td>
<td>City library</td>
<td>Start-up coffee 05.09.17, approached her there</td>
<td>Email, phone, text messages</td>
</tr>
</tbody>
</table>

#### 4.4.3 Processing the interviews

The follow-up of the interview itself is an important process that builds a bridge between data collection and the analysis. Consequently, it is important to define a systematic approach of how to process the gained information in order to manage the richness of the data in a structured way and to ensure comparability for the analysis (Bryman & Bell, 2007, p. 579). Immediately after each interview, the authors conducted a short follow-up meeting to capture the interview situation, to summarize the key statements and to give each other critical feedback about the behaviour during the interview. By doing so, the authors reminded each other about the in chapter 4.4.2 identified principles of conducting an interview and
recognized areas of improvement. This consequently increased the awareness, led to an enhancement in the interview technique and ensured a higher quality of this approach of data collection. Afterwards, the recordings of the interviews were transcribed, applying the online tool oTranscribe. The transcriptions were done while the interviews were still fresh in the mind of the authors, which helped removing ambiguities about certain passages (O’Gorman & MacIntosh, 2014, p. 123).

In order to prepare the empirical data for the analysis, several steps took place for organizing messy raw data into a rich understanding data set (O’Leary, 2010). The process was defined by the application of a thematic analysis. Even though the borders of different analysis approaches are rather blurry and have to be adjusted to the individual research, the thematic analysis seemed to be most suitable for this thesis. It is a “method for identifying, analysing, and reporting patterns (themes) within data” (Braun & Clarke, 2006, p. 79), which is divided by O’Gorman & MacIntosh (2014, p. 145) into several steps. Firstly, the transcriptions of the interviews were examined, which helped the researchers to familiarise with the material. Meanwhile, the data got allocated to predefined theme blocks, which emerged from the conducted research and lead the development of the interview guide as well. Those bigger theme blocks were namely the start-up, the entrepreneur, as well as traditional PM and APM for the process of launching the business and for ongoing operations. Afterwards, the allocated parts of the transcripts were coded. Those codes were developed posterior while screening the transcripts.

In the course of this study as a first step, essential background information and empirical findings of each respondent were arranged and will be presented in chapter 5. This step allows a more structured overview of each respondent and helps to order the empirical findings as well as arguments made in the analysis into a wider context based on the provided background information about the entrepreneur and the start-up. Consequently, information regarding the start-up company itself, as well as the entrepreneur, his or her work experience and exposure to PM will be declared. Furthermore, the applied PM methods and tools of each interviewee will be introduced. The analysis will build up on those findings, while focusing on the decision regarding applied methods and tools. Factors that influenced the decision will be analysed, especially considering the role of the entrepreneurs’ work background and previous contact with PM. In order to be able to conduct the analysis, the empirical findings will in a first step of the analysis be summarized in thematic blocks. Those theme blocks evolved from the literature and the interview guide; namely they are applied PM methods, applied PM tools for launching the start-up, applied PM tools for operating the start-up, traditional PM, APM framework, and prior work experience of entrepreneurs. This concluding summary of the empirical findings based on thematic blocks will help the reader to connect the findings of each respondent into a broader thematic context. Afterwards, the empirical findings will be compared with the existing literature and analysed accordingly to reveal hidden relationships (O’Gorman & MacIntosh, 2014, p. 146). An emphasis will be on the utilization of APM frameworks, which can be justified by the dominance of distinctive APM characteristics within the empirical data. This progression of the data in the analysis is defined by small adjustments of the initial theme blocks based on the richness of empirical findings within that area. It illustrates the adaptability and flexibility of the study, which is not strictly following rigid predefined patterns.

4.5 Research ethics

Informed consent, confidentiality and trust seem to be the main ethical issues in research (Kumar, 2014, pp. 284; Ryen, 2004, p. 231). Diener and Crandall (1978, cited in Bryman &
Bell, 2007, p. 132) state that there are four areas that need to be considered when thinking about ethics, those are to not harm the participants, to collect informed consent, to not invade the privacy of the participants and to avoid the involvement of deception. In order to deal with those issues, the researchers of this study first of all made sure to clarify certain things in the beginning of each interview. The participants were informed about the purpose of the interview and how the collected data will be used in the thesis, namely solely for educational purposes. At the same time, the interviewees were encouraged to answer to their best knowledge and according to their experience.

Additionally, confidentiality was discussed in the beginning when the interview partners were asked for their consent about using actual names in the thesis paper. All of the interviewees permitted the usage of actual company and participant names, which is why the authors decided not to anonymise the data collected. This decision was also based on personal preferences of the researchers and because no issue could be detected against this way of reporting. Due to the fact that studying the internal way of how the company is operated and at the same time the personal experience from entrepreneurs, their work background and age, the topics can be considered as slightly sensitive. For that reason, the interviewees were informed in the beginning of the interview that they do not have to answer any question they feel uncomfortable with. This ensures gathering truthful and credible information. Furthermore, the respondents were asked for their permission to record the interviews that will be used in a confidential way and for educational purpose only. From the recordings, interview transcripts were issued to analyse what has been said, to deliver results and also to prove an appropriate way of information gathering and reporting (Kumar, 2014, pp. 287). The authors offered to send the generated transcripts to the interviewees for their approval and to ensure the validity of the gathered data. Moreover, the proposal of sending the final thesis result was extended. Nevertheless, none of the interviewed parties requested neither of this information.

Avoiding bias has to be considered a very important goal for the researchers (Kumar, 2014, pp. 287). The two interviewers would rely on each other for support to conduct unbiased and appropriate interviews. Due to the fact that some expectations and possible answers for the research question and the research objectives were already starting to build up in the researcher’s thoughts, this was perceived to be challenging. However, having time for reflections in between the interviews was an important learning experience for the researchers and they were continuously keeping in mind how to formulate questions in an unbiased way (Ryen, 2004, p. 231).

As it can be seen, ethical issues seem to be strongly present in the data collection process; however, they have to be considered in every stage of the research process (Steinar Kvale, 1996, cited in Ryen, 2004, p. 231). In the theoretical part of the thesis, the researchers made sure to collect secondary data in an ethical way by carefully dealing with the topics of plagiarism and citation with the help of the thesis manual (Kumar, 2014, p. 289). When choosing the research methodology, the researchers paid attention to pick one that was appropriate for the objectives of the study (Kumar, 2014, pp. 287). The data analysis method was also picked to suit the purpose of the study and to generate respectable and unbiased results.

4.6 Quality criteria

To determine the trustworthiness of a study various criteria should be put in use (Bryman & Bell, 2007, p. 733). In the following, criteria for conducting empirical research will be
introduced and their applicability in this study will be assessed to determine the quality of the study. Validity and reliability are often discussed in qualitative studies since it appears to be difficult to apply them right because of the flexible setting of the data collection methods (Kumar, 2014, p. 212). Guba and Lincoln (1994, as stated in Kumar, 2014, p. 218-219) mention four indicators of validity and reliability in qualitative research that should be considered in that context, namely credibility, transferability, dependability and confirmability. Those four factors seem to form a respectable basis to determine the quality of this study. Credibility resides upon the reliability of the data, methods and validity of the findings (Silverman, 2006, p. 289). The possibility of transferring the findings to other populations than the one studied in this case or to other settings is seen as another quality criteria (Lewis & Ritchie, 2003, p. 266). Trochim and Donnelly (2007, as cited in Kumar, 2014, p. 219) explain dependability as whether the same results could be collected if the same thing was observed twice and confirmability is a criterion for how others could confirm or verify results. Therefore, it can be said that the degree to which the results of a study can be reproduced by other researchers in similar cases or events should be recognized (Bryman & Bell, 2007, p. 731, pp. 40; Gobo, 2004, p. 453).

When crosschecking whether the four criteria have been applied adequately in this thesis, it can be said that the data obtained and the means to do so were carefully evaluated to ensure representable results. The method for collecting the data was chosen to answer the research question and objectives, in correspondence with the available means. The semi-structured setting of the interviews, which varied in time and regarding the exact questions asked, challenged the researchers. However, the unique interaction of the interviewers with the interviewees was highly beneficial for gaining in-depth knowledge, but also required some structure in form of an interview guide to reach credible, transferable, dependable and confirmable results. In that same context, the number of respondents also has to be taken into account. The eight interviews represent a respectable sample and the researchers could gather valuable primary data for answering the research question. Nevertheless, more interviews could have been beneficial in order to support the results further and deliver more evidence. All in all, the researchers believe that for the available means the results collected can be considered reliable and validated. They could most likely be obtained in a similar way again at a different time or with other people involved due to a highly transparent and well-structured research design.

To conclude, Silverman (2006, p. 311) argues that “qualitative research can be made credible if we make every effort to falsify our initial assumptions about our data”. In any case, a very important point is to not be biased, meaning to not conceal or highlight something because of a personal standpoint (Kumar, 2014, p. 9). The authors of this paper did everything in their power to go through the research process in an unbiased way. As discussed before, the process of finding respondents was done without favoring any possible samples but according to availability and fulfilling of the requirements set. Additionally, a data collection mistake can be eliminated since the empirical data collection was carried out based on an interview guide to ensure a structured process to generate results, questions were formulated carefully and the way of interviewing was well considered (Bryman & Bell, 2007, p. 204). In any case, the respondents understanding of questions during the interview and their perception affect their answers. However, due to the characteristics of the research method, clarifying questions and further requests were possible to avoid the influence of misunderstandings.

Last but not least, in the data processing part of the thesis, a thematic approach was applied to analyse the data in an appropriate and structured way. All in all, the interpretation of the data let to thought-through conclusions supported by collected in-depth evidence and considering
the existing literature. That process of data collection and analysis was applied in this thesis to generate trustworthy results.

5 Empirical findings

The following chapter will present the empirical findings of the study. The transcripts of the interviews and predefined themes were used to structure and formulate the findings. Each respondent will be presented separately and in chronological order based on the conduction of the interview. This will offer a more structured overview of each interviewee and will allow putting the made statements more easily into context. The interviewed entrepreneurs and their start-up companies will be portrayed; the launching and growth of the start-up as well as the team structure will be discussed. Furthermore, the entrepreneurs’ work experience, their previous contact with PM and the applied methods and tools in each case will be presented. This will allow drawing connections between that background and applied PM methods and tools within the start-up company in the analysis chapter. Direct quotes will be presented to highlight declarations with great importance to the study and to relate more directly to the experience of the entrepreneurs. Appendix 4 summarizes the empirical findings about the entrepreneurs and their start-up and thus provides a clear overview. Another table can be found at the end of this chapter to provide a summary of the applied tools by each entrepreneur and their prior work experience in connection to PM (Table 2). The applied tools are classified by their purpose thus no specific explanation of each individual tool is provided.

5.1 Ricardo Russo

CEO/Founder of e-flow

E-flow is an event management web service for all kinds of events such as weddings, seminars, company events or birthday parties. It includes a big range of services from managing the ticketing and all the people attending an event to pushing out information before and during an event as well as providing detailed analyses about an event, especially based on algorithms processing qualitative feedback.

5.1.1 Launch and growth of e-flow

In September 2016, the start-up was founded and gradually other people joined the team of e-flow to handle the workload. They had a prototype ready and tested the web service tool with some customers in Belgium, Stockholm and the UK, however they had no serious funding yet. The launch of the final product was planned within 2018, the urgency of launching was acknowledged due to the existence of competitors in similar phases. Even though Ricardo was very confident in the product, e-flow was shut down in August 2017 because of a competitor with a unique selling point of offering a significantly lower price, which e-flow could not compete with.

5.1.2 Team of e-flow

Initially it was only Ricardo, soon after a friend of him joined. A third team member, a coder, entered the start-up company four months after its founding. Between six and eight months in, another coder joined. Ricardo mentioned that this team expansion was necessary to cope with the growth of the business, even though the process of managing it is challenging. Summarizing, four people were working in the end for e-flow in their free time since they are all students, however it was planned to work full time after their studies. They were located in different cities, which is why Ricardo emphasized on the importance of regular
communication and clear roles of each member to not lose track and deal with the challenge of working with a dispersed team.

5.1.3 Work experience and previous contact with PM of Ricardo

Ricardo, a Master student at Umeå University, wanted to be an entrepreneur who creates something “cool and new to solve problems”. A small idea of a seating arrangement tool became bigger and bigger and e-flow was founded. During the foundation phase, he participated in an incubator program at Uminova. Before that, he was not exposed to entrepreneurship, but during a six months long internship in Germany he got in touch with PM. There, he used MSP to deal with milestones, the budget, different stakeholders and to structure the project. Even though MSP seemed beneficial to him, he did not consider it for his own start-up due to the limited scope of the newly founded business. Besides his one-time experience with PM, one other team member of him had some background in PM in connection to marketing. The other two coders have applied APM processes in previous software projects.

5.1.4 Applied tools in e-flow

In the launching phase of the start-up there was not too much planning involved, the only noticeable tool that was mentioned was a Business Canvas. The utilization of this model helped “to have a clear overview [about] what is going to happen” (Ricardo) and to structure the business model as well as to evaluate risks. Furthermore, customer interviews and tests helped to assess risks, prioritize tasks and administer changes. Ricardo mentioned regarding change requests that “if it was a crucial thing to the workflow for example if a button does not work but it is necessary to do the next step of it, then it had to be fixed right away”. For financial planning Excel was used. Generally speaking, Ricardo first applied a version of Scrum, but considered the format of sprints as “too much effort for four people” and switched to a more continuous flow that is rather reminding of the Kanban method. The applied free of charge Kanban tool is called Flying Donut and was the main tool that all the team members used to develop the product, define timelines and keep track of the process as well as to communicate and keep the team updated. Moreover, team meetings were set every Tuesday and Thursday. By applying Flying Donut, e-flow was following an APM method. Ricardo explained that in the future he would like to apply Jira, it has just not feasible in terms of budget for e-flow.

5.2 Per Fransson

CEO/Founder of Musikmedel

Musikmedel is basically a digital library, a website with teaching material (lesson series, videos, PDF documents, games) for music teachers in Sweden from grade four to six. It works as yearly subscription and the content is approximately monthly updated. Musikmedel is a B2B solution, because it is purchased with the budget of the schools, however the marketing works in terms of B2C since the actual customers are the teachers.

5.2.1 Launch and growth of Musikmedel

Per first only had material in a Google site to share it with students, in spring 2015 he created a MVP which was a dropbox file with one explanation video and one lesson to show to possible customers. This led to the actual launch of the business in August 2015. Now, about 40 customers are signed up and use it.
5.2.2 Team of Musikmedel

Per basically works by himself, sometimes he gets help from a friend to make the videos for the lessons. Per is a part-time (60%) music teacher, working on Musikmedel when he is not teaching. For a while he has been looking for help with the programming since he wants to have more time to create user content and he is not an expert in coding. Nevertheless, he has not found a person yet that has the same passion as him and that would also be willing to take a risk since he cannot pay right now. Per acknowledges that once he is expanding the team and he will have more customers, he will need some tools to keep everything structured.

5.2.3 Work experience and previous contact with PM of Per

While Per was a full-time music teacher for three years he recognized the lack of structure and means for developing good music lessons. He considers himself as bad at planning, however very creative and he always had an urge to form a business and work on his own terms. Per had never worked in the corporate world before; the only business experience he got is from keeping the books of his band. By listening to podcasts, reading books and participating in an incubator program at Uminova, he acquired some entrepreneurship and PM knowledge. This is how he heard about Kanbanflow and he liked the ad hoc characteristic of it as it fits his approach.

5.2.4 Applied tools in Musikmedel

Per mentioned that before the launching of the business, there was not much planning involved except for generating a Business Canvas. To evaluate the risks he did some market research however he did not and is still not applying any tools for financial planning which he realizes should be changed in the future. Furthermore, he is planning on applying some APM tool for software development such as Pivotal Tracker and maybe Hubspot for CRM. At the moment his planning structure is very vague, he had applied the online tool KanbanFlow before and is still using it to some extent now, but not that formal. For time management he referenced the Pomodoro timer and writing down five things of importance for the day. In terms of change and customer interaction, he regularly calls his customers to gather feedback, including the free users that tried out Musikmedel. Furthermore, he uses Google Analytics and sends out newsletters to communicate change.

5.3 Juha Niemi

CEO/Founder of Vacaverde

Vacaverde is an animation production company that focuses on stop motion animations for doing commercials in social media (mainly Facebook & Instagram).

5.3.1 Launch and growth of Vacaverde

Juha started developing the idea of filming animation movies for TV clips approximately ten years ago when social media was not that popular yet. The actual launch of the start-up Vacaverde was one and a half years ago and the current customer base is in Spain, Sweden and Finland.

5.3.2 Team of Vacaverde

Juha works full-time, occasional he has help from his wife with the illustrations and the selling process. However, the resources depend on the project, he can expand the team if needed and employ freelancers.
5.3.3 Work experience and previous contact with PM of Juha

The driving force for Juha to found his own company was the creative part and his personal interest in films and building things, however, neither does he enjoy nor is he good at planning. He recognizes that he does not proactively plan, is deadline driven and that he is very chaotic. He previously freelanced in the creative sector and worked at the University and in IT companies, which is where he got in contact with PM, more specifically a tool for tracking the progress within the project and with MSP, which he did not like. Moreover, he took part in an incubator program at Uminova to learn something about entrepreneurship.

5.3.4 Applied tools in Vacaverde

No formal planning could be noticed before and during the launching of the start-up, Juha only mentioned doing a SWOT analysis to analyse risks of the business plan and further stated: “I do not want to plan too much my life. I feel like then I lose freedom somehow”. Nevertheless, he applies Excel for financial planning and in general the tools Evernote and HubSpot infrequently. Furthermore, he collects continuous customer feedback; the frequency depends on the type of project and the customer. In the future, Juha might want to plan a bit more in general, however he is not completely convinced that this will work for him.

5.4 Abdullah Yousuf

*Founder & Head of Business Development of Strativ*

Strativ is an IT consulting service especially for start-ups and SMEs (B2B) in Sweden. Abdullah acknowledged the lack of technical competence to create a website or application and also the lack of budget to invest in software development. At the same time, many skilled computer science engineers in Bangladesh are looking for jobs, which is why he is bringing together demand and expertise in an economical way. Building a reliable bridge with himself as a project manager or back end person in Sweden is the main goal of the company.

5.4.1 Launch and growth of Strativ

Abdullah started developing the idea in 2015, however the company started operating in the beginning of 2016. He recognized the need of building a bridge between start-ups and SMEs in Sweden and computer science engineers in Bangladesh, which is why he founded the business. Since then, the success of the business model led to an expansion of the team in Sweden and Bangladesh, further growth is expected.

5.4.2 Team of Strativ

Abdullah founded Strativ together with a friend, now they are two people in Sweden and seven in Bangladesh. To cope with the growth of the business, the team was expanded. However, because of the dispersed team, regular communication and clear roles of the team members is vital.

5.4.3 Work experience and previous contact with PM of Abdullah

Abdullah’s educational background in business administration, some months of work experience as business developer and communicator between a Swedish and Bangladeshi company, his interest in technology and programming, together with the last two years of work experience within Strativ helped him tremendously to be the project manager that acts as a bridge between the customer and the developers. Considering prior contact with PM itself, he did not have any before the start-up. To manage the software development process, he studied about APM, Waterfall, Scrum and other frameworks and also learned from other
people in the geographical area and the same industry with more experience. This shows that his knowledge on those topics is self-taught or gained through experience.

5.4.4 Applied tools in Strativ

With the use of the tool LivePlan, Abdullah could estimate costs, develop a marketing plan, consider risks and plan the financial situation of Strativ. Especially in the launching phase that tool was used together with a Business Canvas. However, Abdullah mentioned that it is “hard to say for a start-up how much money you are going to earn in the next one year or how much the cost will be”, thus making those estimations and putting too much effort into those calculations can be seen as wasting time by over planning this step. For the ongoing operations, the software development Jira is the mainly applied tool of Strativ. Following Scrum as an APM method, Jira helps to visualize the working process and to keep all team members updated. Abdullah is applying Scrum with one-week sprints and considers it as a method that helps to prioritize and structure the work and additionally defines it “a good way to deliver the fastest way what customers want”. In addition he mentioned that “customers want to see the movement along the work” and the implementation of Jira allows to visualize the working progress. Consequently one can see “this is done, this is upcoming” (Abdullah) and update the customers accordingly. Abdullah believes that this approach also motivates the team and results in more efficient work conduction; “they feel good, accomplished, we did it” (Abdullah). In terms of change management, Abdullah tries to stick tight to the Scrum method and avoids “to bring in the changes during the sprint”. Considering the communication, Google Drive, Slack, Skype and Google hangouts are frequently used to talk to the team or the customers if needed. Moreover, change requests from customers are tracked in the backlog, via Slack or in general meetings.

5.5 Daniel Wiberg

Software Developer and Co-founder of Skillster

The product of Skillster is a driving simulation software that runs on an ordinary PC with the only additional need of a racing wheel and no expensive simulator hardware. The focus of the venture is on high schools and driving schools (private and public) in Sweden and students that are supposed to become truck- or bus drivers. The schools buy a yearly license for the software, which includes customer support of the Skillster team and constant updates.

5.5.1 Launch and growth of Skillster

The start-up was founded in January 2016, approximately half a year later they had the first version of the software ready to sell. Skillster can look back at a gradual growth that got eminent especially in the last half year. Now they have almost 50% of the schools in Sweden as customers and started expanding to Finland in autumn 2017, where they already have one school as customer. In January 2018, they are moving to a bigger office and in addition they are thinking of expanding the team further.

5.5.2 Team of Skillster

Daniel and a former colleague started Skillster together in 2016. Another friend joined one month later. In summer 2017 the three hired a graphic designer to deal with the growth of the business and to get a new set of skills. Now they are four people (two developers, one administrative & sales person, one 3D artist) working full-time in one office. They are thinking of hiring two more developers and one consultant for sales, however this seems like a hard decision for them because they need to completely trust that person. Daniel highlighted that they have a very dynamic and natural team constellation right now, because all of them
worked at the same company before starting Skillster for about ten years. Furthermore, they are currently sitting in one office together. Consequently, they do not have clearly predefined roles, it is more natural according to what everybody does best. Nevertheless, Daniel recognized that new people need to be hired to deal with the business growth and therefore, a more formal method of conducting work is necessary to cope with a bigger and less familiar team.

5.5.3 Work experience and previous contact with PM of Daniel

Daniel had a business on the side before Skillster and always wanted to do what he likes and have control over the product and the company. In his previous job the focus was not on creating the best product but on meeting the budget, which he considers as dissatisfying. All four team members worked in that same company before, which develops and consults on vehicle simulators. Three of them have an educational and work background in IT development, though one of them acts as a CEO/administrator/sales person now. The CEO also held in the prior company the position of a project or team leader. Daniel and the other developer previously used the Waterfall method for the development projects, which according to him was not really beneficial because it was hard to involve the customer and they were mostly dissatisfied with the final outcome. In the software development department internally they followed Scrum but that did not really work for them either. He mentions that this is one reason why they do not follow a methodology right now and work ad hoc, nevertheless, he is thinking about implementing some variant of Scrum or project planning software at some point. In addition, the team got more familiar with entrepreneurship during an incubator program at Uminova.

5.5.4 Applied tools in Skillster

A Business Canvas and the web tool Trello helped Skillster before the launch of the start-up. Their financial planning was and still is done in Excel, however for general planning they use an offline whiteboard in their office and talk to each other in the office on a daily basis. Skillster also applies the tool Pipedrive to keep track of the customer relationship and has a bug tracker system in place. Software updates are also performed regularly and they have a database with customer feedback. Even though Daniel detected some flaws with APM from his previous work, he reflects other parts of APM methods such as close communication and “the freedom that gives developers a way of deciding [and] controlling what they are doing on their days” (Daniel) in self-managed team-structures as beneficial and incorporates them already in an adjusted and flexible way without deliberately following an APM method. In the future, he wants to apply a variant of Scrum for software development and also to deal with the growing team.

5.6 Henrik Frienholt

Co-founder and CSO of ZunZun (Shimmercat)

The product of ZunZun is called Shimmercat. It is a web server that consists of a unique software/technology for creating extremely fast loading times through using real data. The focus of Shimmercat is on e-commerce platforms.

5.6.1 Launch and growth of ZunZun

ZunZun registered their business in 2014, back then they had no product, it was more like a consultancy while they created the product. Right now, they have Swedish customers only, but their interest is set on going international next year.
5.6.2 Team of ZunZun

Two PhD students were developing the company/product, Henrik joined during that phase to develop the business side of the product. Because of the growth of the business, they are seven people now located in their headquarter in Umeå and in offices in Stockholm and Tampa (USA). Regular communication and defined roles of the team members are very important because of the fact that the team of ZunZun is dispersed quite widely.

5.6.3 Work experience and previous contact with PM of Henrik

Henrik considers himself as entrepreneur since he had various companies for 16 years now and never worked in a normal job in that sense; he was always consulting and had his own company. Now in ZunZun he manages marketing and sales. His team members have educational backgrounds in IT, he never finished his education, however he worked with developing teams that used different PM tools before. Also, he worked with and is still using the free of charge PM tools Trello, GitHub and Asana to structure and quickly plan within the start-up company.

5.6.4 Applied tools in ZunZun

The web tool Trello was mentioned as very important before and during the launch of the business, as well as now. In general, also the software development tool Github and a CRM system are used tools in ZunZun. “5 of today” is applied to ensure every team member prioritizes work in an efficient way and represents a powerful communication tool that the company uses, together with Slack. The team is in constant contact, mostly via Slack, with their customers for feedback and every six months they schedule a contract meeting. Financial planning is executed in Excel.

5.7 Miguel Fürst

*Founder of Lejonapa*

Lejonapa, a software as a service (SASS), is a solution for amusement parks so that visitors do not have to stand in long and boring lines. The visitors use their phones to “stand in line” while they can move around freely. The software has to be adapted to each amusement park separately as of now.

5.7.1 Launch and growth of Lejonapa

The start-up was founded in July 2014. As of now, they have a concept that they tested already, but they have neither built the full product nor sold it yet. They are right now focusing on getting to know the customer requirements in more detail in order to build a product according to their potential customers needs and avoid waste, following deliberately the lean philosophy. By doing so, they are concentrating on selling their product. To get closer to their goal, the team is working in collaboration with Swedish amusement parks at the moment and are in contact with others in the US and several other countries in Europe. The final goal should be that Lejonapa is becoming a global solution.

5.7.2 Team of Lejonapa

Initially, Miguel started the company alone, however he was looking for a business partner, even though he did not consider this as an easy task. Miguel stated: “I could not imagine how I would find someone to be honest. It is difficult because that partner would have to take a quite big risk, I could not pay anything and so they would have to work for free basically. And so it is very difficult to find someone...” However, in January 2015 James joined and
Miguel further said “me finding James and us working so well together that is pure luck, nothing else”. It was also very crucial for Miguel to find a partner because of his lack of coding and IT skills, and also to increase the creativity by working in a team. Now the team also has a big IT supplier as partner and they are thinking about cooperating with others.

5.7.3 Work experience and previous contact with PM of Miguel

Previously, Miguel worked for many years in the automotive industry with PM, process improvement and business development. After that, he started doing consultancy work as project manager. In general, he previously worked a lot with Lean and Six Sigma where he also has a PM certificate. Furthermore, he has been working a little bit with Waterfall and the APM method Scrum, which he describes as the preferred method for software development. Miguel’s partner has a long work history in management in big companies in various countries and can also look back on experience with his own company.

5.7.4 Applied tools in Lejonapa

Lejonapa has not done a lot of planning and risk evaluation during the launching phase. The financial planning was performed in Excel. In general Miguel is focusing on the philosophy of lean development, which he considers as an agile approach. Consequently, he tries to reduce waste and to “give value to customers” (Miguel) with every step taken. In order to do so, his tool of choice is Airtable (CRM) while he is also using Excel to develop the product. In the future, Miguel wants to apply Scrum as APM tool for software development and stated that “in general if you talk about software development, an agile method is the one to prefer”. When it comes to communication, the team simply talks in the office and are in continuous contact with customers.

5.8 Meiju Vartiainen

CEO/Founder of Mowida

The purpose of the web-platform called Mowida is to match landlords and tenants, more specifically to match the people with a suitable home all over Sweden.

5.8.1 Launch and growth of Mowida

Due to the fact that Meiju was struggling herself to find an accommodation when moving to Umeå, she began shortly after that experience to write down tips on how to find accommodation and started matching people manually. In 2015, she hired an agency to develop the first platform for whole Sweden and at the same time registered the business. However, it all got too big for her alone and she could not make changes on the website due to her lack of IT skills, which is why she closed the platform in 2016. Right now, she and her business partner are rebuilding the platform and are planning to open it in August 2018. Furthermore, Meiju and her partner will employ more people starting in January 2018, with whom they will move to an office and start working full-time.

5.8.2 Team of Mowida

First, Meiju worked alone while she still had some other side jobs. Right now, the team consists of two people and both of them are working in other jobs at the same time. Meiju mentioned the difficulty of finding a business partner, since that person would have to share her passion and business goals. She acknowledged though, that it is important to recognize that one cannot do everything by oneself and good things can come from expanding the team. Furthermore, despite her reservations, they are soon expanding the team even further, mostly
because of their lack of IT skills. Starting in January 2018, the team will consist then of four people, because two new developers will be hired. All will sit together in an office then, working full-time. Meiju is even thinking about hiring also two students to help them part-time.

5.8.3 Work experience and previous contact with PM of Meiju
Meiju studied Service Management at the University in Umeå, which is why she had to move and realized the problem in the real estate market; to deal with it she started the company. In general, she always wanted to start her own business and was involved in social entrepreneurship before (charity). Multiple jobs, from babysitting to consultancy and lecturing, were essential to pay for the first website of her own start-up company. The actual life experience going through the start-up process however taught her the most in terms of entrepreneurship and PM and she is happy to take all that experience with her to re-open the new platform for Mowida soon. Meiju mentioned that during the development of the first platform she already felt the need of incorporating PM skills and therefore read a lot about various tools and methods. Also, other people recommended her to apply Jira and Pipedrive, which she is already using. Currently she is working with a self-taught designer without PM experience, but design tool experience. Starting from January, two programmers will join the team that already have over 20 years of experience in IT development and are working in an APM framework.

5.8.4 Applied tools in Mowida
Meiju did not apply any PM tools before and during the launching of the start-up, for financial planning she uses Excel or Numbers. In general, the team of two is using Jira right now as their main tool to communicate and schedule tasks. Also, they talk on a daily basis and send text messages. In terms of customer interaction and change requests, feedback has been collected from the first platform and stored in a document right now, ready to be adapted. Additionally, they had some workshops to find out what customers want. The future outlook of Mowida is to further use Jira for visualizing the software development progress whilst applying Kanban as APM method.

5.9 Summarizing the mainly applied tools
To summarize, in the interviewed start-ups are a few tools primarily used that serve multiple purposes. In e-flow, the main tool is called Flying Donut, which helps to process the software and business development, to communicate the standpoint of tasks, to schedule timelines, milestones and deadlines, and to allow transparency as well as a clear overview over the business (Ricardo). Strativ is utilising Jira for the same purpose. Additionally, they are connecting the different projects in Jira with the communication app Slack. This enhances the communication within the team assigned to a project and allows including the customer in this communication channel. Especially due to the dispersed location of the individuals, this channel allows easy access towards each other (Abdullah). Mowida is also applying Jira, but for now it only serves as a scheduling tool that helps to organise tasks, deadlines, responsibilities, updates and provides a better overview of the business (Meiju). Skillster is primarily visualizing their work on an offline whiteboard in their office to manage the upcoming tasks, which is why it can be seen as a scheduling tool. Additionally, a bug tracker system helps the team to keep track of identified bugs and customer suggestions (Daniel). ZunZun is mainly using Github to develop the software in order to provide their service to customers. It delivers an overview of the current development progress, shows milestones, assigns responsibilities to the tasks and therefore functions as a development and scheduling tool. Trello is used additionally for scheduling while Slack ensures a good communication
between dispersed team members and customers (Henrik). Juha from Vacaverde is mainly using the app Evernote, classic notebooks, and the CRM tool HubSpot. In Evernote and his notebooks he is collecting and structuring his ideas and tasks, which is why they function as scheduling tools. HubSpot helps him to remind himself of the contact with his customers, while the development process of filming an animation movie itself is more defined by a creative flow and less through taking planned steps (Juha). Also Lejonapa is applying a CRM tool called Airtable that ensures a good overview and therefore represents a database that enables “control about who should we contact and what was the last thing we said to them” (Miguel). Per from Musikmedel seems to be still experimenting regarding which tool to use that fulfills his needs. So far he tried KanbanFlow, which assisted him in staying focused and to prioritize his tasks. However, he considered it not to be completely suitable because he “never felt that I actually did something, the feeling of being done. So I probably got mentally overburdened with a feeling of not getting to new milestones” (Per). In general it has to be mentioned that the identified applied tools within start-ups are not necessarily specific PM tools, but are tools that facilitate organizing and planning the processes of the business and the company itself.

Table 2 presents a clear overview of the applied tools by each entrepreneur and summarizes therefore the empirical findings accordingly. The applied tools are classified by their purpose thus no specific explanation of each individual tool is provided. Additionally, it adds the information whether the entrepreneur had contact with PM in their prior work experience, which allows drawing connections between this information and the applied tools.
Table 2: Applied tools (Own illustration, 2017).

<table>
<thead>
<tr>
<th>Tools for:</th>
<th>Launching</th>
<th>Risk (mostly before launching)</th>
<th>Financial planning</th>
<th>Generally applied tools (mostly for scheduling &amp; planning)</th>
<th>Communication (within the team)</th>
<th>Change, customer interaction</th>
<th>Tools to apply in the future</th>
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<tbody>
<tr>
<td><strong>Interview partners &amp; work experience</strong></td>
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<td><strong>Ricardo</strong> incubator program, PM internship, team with APM experience</td>
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<tr>
<td>- Not too much planning</td>
<td>- Canvas</td>
<td>- Customer interviews</td>
<td>- Canvas</td>
<td>- APM: Adjusted Kanban</td>
<td>- Flying donut</td>
<td>- Prioritisation</td>
<td>- Jira</td>
</tr>
<tr>
<td>- Canvas</td>
<td>- Customer interviews</td>
<td>- Excel</td>
<td>- Every Tuesday &amp; Thursday a meeting</td>
<td>- Customer feedback (tests)</td>
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<tr>
<td><strong>Per</strong> incubator program</td>
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<tr>
<td>- Canvas</td>
<td>- Not too much planning</td>
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<tr>
<td>- Market research</td>
<td>- No formal planning</td>
<td>- KanbanFlow</td>
<td>- Customer feedback</td>
<td>- Canvas</td>
<td>- Customer feedback (phone)</td>
<td>- APM tool for software development – Pivotal Tracker probably</td>
<td></td>
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<tr>
<td>- Excel</td>
<td>- Pomodoro timer</td>
<td>- 5 things</td>
<td>- Google Analytics</td>
<td>- HubSpot</td>
<td>- CRM – maybe Hubspot</td>
<td>- Financial planning tool</td>
<td></td>
</tr>
<tr>
<td><strong>Juha</strong> incubator program, PM contact in IT companies</td>
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<tr>
<td>- No formal planning</td>
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<tr>
<td>- Risk analysis for the business plan</td>
<td>- Excel</td>
<td>- Evernote</td>
<td>- Continuous customer feedback</td>
<td>- Maybe more planning</td>
<td></td>
<td></td>
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<tr>
<td>- HubSpot</td>
<td>- APM: Scrum</td>
<td>- Jira</td>
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<tr>
<td><strong>Abdullah</strong> incubator program, no prior contact with PM → self-taught</td>
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<tr>
<td>- Cost estimation, marketing plan etc. with LivePlan</td>
<td>- LivePlan</td>
<td>- LivePlan</td>
<td>- Slack</td>
<td>- Change requests from customers in backlog or Slack</td>
<td>- Meetings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Canvas</td>
<td>- Bug tracker system</td>
<td>- Pipedrive</td>
<td>- Skype &amp; Google angouts</td>
<td>- Google Drive</td>
<td></td>
<td></td>
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<tr>
<td><strong>Daniel</strong> previous side business, incubator program, contact of 3 team members with PM/APM before</td>
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<tr>
<td>- Canvas</td>
<td>- Trello</td>
<td>- Offline whiteboard</td>
<td>- Bug fixes right away</td>
<td>- Regular software updates</td>
<td>- Database with customer feedback</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Excel</td>
<td>- Bug tracker system</td>
<td>- Pipedrive</td>
<td>- Talk in the office daily</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
| Henrik  | Previous contact with PM during consultancy services | Trello | Excel | • Trello  
• Github  
• CRM system  
• 5 of today | Slack  
• 5 of today | • In constant contact (Slack) with customers for feedback  
• Every 6 months contract meetings |
|---------|--------------------------------------------------------|-------|-------|------------------------------------------------|-------------------|---------------------------------------------------------|
| Miguel  | PM experience in automotive industry & also PM consultancy service, contact with APM | Not too much planning | Excel | • APM: Adjusted Lean  
• Airtable (CRM)  
• Excel | Talk in the office daily | • Continuous contact with customers | APM tool for software development – Scrum |
| Meiju   | experience in entrepreneurship & PM through 1st platform, APM contact of team members | Not too much planning | Excel or Numbers | Jira  
• Jira  
• Talk daily  
• Text messages | Feedback from first platform  
• Beta customers (workshops) | • Feedback from first platform  
• Beta customers (workshops) | APM tool for software development – Kanban |
6 Empirical analysis

This chapter will first summarize the empirical findings in thematic blocks to put them in a reasonable context and establish a common understanding of the context of the introduced findings of chapter 5. Furthermore, a detailed analysis of the empirical findings will be provided, which will connect and compare them with the theory introduced in the literature review. Furthermore, the decision about whether and which PM methods and tools are considered as applicable in the start-ups and the connection of that with the previous contact of the entrepreneurs with PM will be highlighted. The chapter will emphasise on comparing the traditional PM tools in theory and practice as well as on evaluating the usage and suitability of the APM framework for start-up companies. Additionally, the connection between entrepreneurship and PM as well as the development and implementation of the underlying conceptual framework of the study will be discussed. Overall, this chapter will enable to reach the objectives of the study and to answer the research question “What PM methods and tools do entrepreneurs apply in the process of launching the business versus the operation of the start-up, especially considering their previous work experience and contact with PM?”

6.1 Applied PM methods

In terms of applied PM methods, the respondents either did not (yet) deliberately follow a clearly defined method (Per, Juha, Daniel, Henrik, Meiju) or decided to deliberately follow a clearly defined method (Ricardo, Abdullah, Miguel). In other words, the respondents that follow a PM method embrace an APM method. They tried to find a way to adjust the method towards their needs in order to increase the suitability. Ricardo applies an adapted Kanban method while Abdullah is applying Scrum with one-week sprints and Miguel is focusing on the philosophy of lean development. This approach of adjustment is in line with studies from Jugdev et al. (2013) and Kiznyte et al. (2016) that state applied methods always have to be aligned with the organisation to create a functional management system across the company.

Daniel, Per and Meiju consider deliberately applying an APM method in the future for their software development, while Miguel wants to focus on a more precisely defined APM method than he is doing right now. When their team is growing, they regard it as essential to incorporate a planning structure in order to organize the team more efficiently. For Miguel, the main driver for applying an APM method is the inception of developing software continuously, which they are not doing at the moment. Daniel and Miguel would utilize a version of Scrum, while Meiju is rather thinking about applying a version of Kanban. Miguel believes that the format of sprints energises a team, whilst for Meiju it can result in over planning. Also Daniel is a bit sceptical about the application of Scrum due to the fact that he worked with this framework before and did identify some flaws for himself; he considers it as waste to over plan the development process by estimating a development time for the tasks that usually will depart from the estimation. Nevertheless, he reflects other parts of APM methods such as close communication and independent task conduction in the team as beneficial and incorporates them already in an adjusted and flexible way without deliberately following an APM method. Additionally, he identified the need for a more structured and organized way of conducting work tasks and developing the software within a growing team due to the fact that the team structure will change with this growth. According to Daniel, while their team is now defined by
mutual trust, collaboration and good knowledge of each other’s skills, motivation and work ethics, a growing team will be negatively affect those factors and consequently a method will be helpful for mutual control to ensure efficiency.

One respondent was not yet considering the application of a PM method, which seems to be connected with the scale of the business and the operation within a creative sector (Juha). The start-up company is receiving commissions that lead to projects, which indicates the dependency on single customers. The growth potential of the business and team in the near future therefore can be considered as limited, which can also explain that thoughts about PM methods were not necessary in that stage of the business yet. Furthermore, the creative industry seems to be hard to predict, which makes it hard to plan accordingly and simultaneously to increase the efficiency by doing so.

Connection to theory
In general, it is noticeable that none of the respondents stated to deliberately follow a traditional PM method. This can be influenced by the dominance of APM within software development for which an agile approach seems to be more suitable. Therefore, this absence of traditional PM and the focus on APM for companies operating in the software development industry is in line with arguments made in studies of Alahyari et al. (2017), Association for Project Management (2017), Hoda et al. (2017), as well as Lee and Yong (2009). Additionally, the claim that traditional PM seems to be outdated due to an increasing trend to a fast changing, highly dynamic environment with shorter business cycles can be validated in practice. This finding confirms the observations made in studies of Boehm and Turner (2003), Raval and Rathod (2014), and Serrador and Pinto (2015). Moreover, the business lifecycle stage in which start-ups are operating is defined by launching, business development and growth. This non-established position on the market makes it hard to apply certain traditional PM tools, due to a lack of significant data as well as the prioritisation on more urgent and important tasks. Consequently, this early business stage seems to limit the applicability of traditional PM methods within start-ups.

In conclusion, this section showed that the perception about methods is unique and depended on the individual experience, needs and circumstances of the entrepreneurs as well as the start-up itself. As argued by Estler et al. (2013) and Zanoni et al. (2014), the obligation of adjusting the method to those factors is essential to ensure a successful and efficient application of the method, which could be identified in this study as well. Overall, the need of staying efficient seems to be the main driver within the decision of applying a PM method, while the requirements and needs of the industry itself influence the choice. Certain factors, such as the team size, the location of team members, the mutual knowledge and relationship of each member in the team as well as the stage of the business development seem to be influencing the decision about when to apply a PM method. This aligns with the study of Conforto et al. (2014), who identified certain enablers and drivers that make it more likely to apply APM. They classified those enablers in organisational, process, project team, project type and others. The teams’ knowledge about APM, as well as the size, location and mutual knowledge of team members can be seen as project team enablers, while the stage of the company within the business lifecycle can rather be classified in the category of project type that indirectly influences process enablers. Overall, Conforto et al. (2014) identified an entrepreneurial culture that is connected with flexibility and adaptability as additional enabler of APM,
which can be identified as given in all observed institutions and might influence the application of that method as well.

6.2 Applied PM tools for launching the start-up

In general, all respondents used some tools and planning approaches in order to reflect and illustrate their business model. In the following, those tools and approaches will be assessed separately based on categories of tools from the theory to allow a clear distinction and overview. Even though it is argued in the theory that especially in the process of starting up a business PM techniques could increase the efficiency in planning and allow conducting more diverse analyses (Ajam, 2011; Kiznyte, 2016; Kuura et al., 2014; Kwak & Anbari, 2009), multiple entrepreneurs highlighted that they did not apply any specific PM tools and in general did not plan a lot before launching the business; they even stated it to be hindering to have a too strict and formal plan. Juha, Meiju and Per were especially concerned about too much planning, since planning limits them, it throws them off and they consider it as unrealistic. Abdullah argued that the risk and other factors cannot be properly forecasted due to a lack of experience and it is therefore a waste of time to devote resources on forecasting. The aim to avoid wasting time by not conducting useless work tasks was present. In general, the process of launching seems to be highly driven by the urge to start the business and consequently they prevented taking unnecessary steps in planning. Furthermore, this step is also driven by intuition (Ricardo, Per, Juha, Daniel, Meiju). Therefore, the emphasis of not over planning the set-up before launching the business was found out to be essential (Ricardo, Per, Juha, Abdullah, Miguel, Meiju).

Specific PM risk management tools, such as a RBS, Probability Analysis, Reliability Analysis or Monte Carlo Simulation, are not used within start-ups since none of the interviewees implemented any. Even though multiple sources emphasise on the importance of PM in terms of risk management, effective stakeholder management and realistic time and cost estimations (Ajam, 2011; Kiznyte, 2016, p. 1; Kuura et al., 2014, p. 222; Kwak & Anbari, 2009, p. 94), this study contradicts with the existing theory. Next to missing essential data in order to apply PM risk management tools, the benefits of them seem to be limited for a company that is just starting up. Especially due to the fact that almost none of the entrepreneurs had to invest a lot of money in order to start their business, these tools appear to be unsuitable. The entrepreneurs simply had an idea for a business and went for it to see how it works while the biggest investment was their own time and they were happy to spare that to follow the goal of opening a business. However, if the companies did apply some other less specific tools to estimate risks, they did so in the launching phase of the start-up. It can be said that the risks that start-ups are most concerned about are if the business has a chance to survive, if there is a market for it and how to sell the product, which is why customer interviews and market research were performed in order to understand this risk better. Considering the high failure rate of start-ups in general (Fritsch & Mueller, 2008), this is a reasonable concern that entrepreneurs should pay attention to by applying those risk analyses.

Furthermore, some of the interviewees mentioned using some kind of business plan tool, however, it appears to be difficult to distinguish between a business plan and PM in the launching phase. Both of them aid in that stage to gain an overview of the business idea and the available resources, as well as to understand how to move forward and arrange work across the organisation (Kiznyte et al., 2016, p. 5). The participation in an incubator
program at Uminova influenced the interviewees in terms of the usage of implementing a business model and development tool. Ricardo, Per, Abdullah and Daniel applied a canvas model to gain an overview and structure the business model. The incubator centre Uminova introduces this model in their incubator program and advises the entrepreneurs to use it, which influenced all of them to apply it. This shows that the network and recommendations are influencing the choice of tools.

For estimating **target budgeting**, which is a part of business planning, the most common way was to use Excel for calculations (Ricardo, Juha, Daniel, Henrik, Miguel, Meiju). Abdullah decided to utilize LivePlan instead, which is a paid for application that helps developing financial planning since he was looking for an alternative to Excel in which he considers himself not to be good. Especially regarding defending the idea of the start-up in investor meetings, Abdullah considered the steps of financial and business planning as essential. However, it is hard to estimate costs and profits for a start-up and therefore putting too much effort in such calculations and estimations is a waste of time according to Abdullah. In general though, when looking at this section about budgeting, it becomes evident that it is necessary to include planning to some extent in order to be successful. This aligns with the positive external effects of planning identified in the literature review. Kiznyte et al. (2016) state that planning supports the business position for acquiring financial support, which the findings in the empirical data confirmed. However, it seems to be a balance act of planning just enough and not wasting time by over planning, which entrepreneurs have to conduct. The statement of Brinckmann et al. (2010) about over planning as threat that causes rigidity and inflexibility can be therefore validated as well.

In order to provide a software, the **development of that software** often has to be started before the launch of the product. Sometimes a software prototype or first version is already developed in the launching process. Consequently, APM methods that help structuring the development process were executed in that phase. In connection to that, many entrepreneurs collected feedback from beta customers to ensure being on the right track. However, many entrepreneurs launched their business already before they were providing or launching the software itself. In that case, methods for organizing the development processes were not applied.

**Connection to theory**

Overall, planning ahead in a strict and formal way before launching the business does not seem to be on the top list of priorities of entrepreneurs, even though various sources (Ajam, 2011; Kiznyte, 2016; Kuura et al., 2014; Kwak & Anbari, 2009) indicate a positive effect of applying PM techniques especially in the process of starting up a business. In addition, the results of this research stand in contrast with the characteristics of traditional PM where requirements are defined, planned and forecasted in the beginning of the project (Kiznyte et al., 2016; Sage Business Researcher, 2017). Considering the conducted interviews, it appears to be essential to not waste time on estimating things and planning scenarios that are hard to predict and consequently useless. Especially in the phase of starting up a business, it is hard to rely on estimates due to a lack of experience-based numbers. However, planning helps to structure and evaluate the business idea and model, which consequently can be seen as a stress test that can help to identify flaws and assess the chances of survival. Those findings combine the main positions of the theory, which claim planning to be useful for start-ups (Kinznyte et al., 2016; Milder & Silberzahn, 2008) and at the same time caution against over planning (Brinckmann et al., 2010). As already highlighted by Brinckmann et al. (2010), the thesis
at hand confirms that finding the right balance between those two positions therefore seems to be eminently important. Each start-up is unique and the right balance is dependent on many different factors and circumstances that need to be considered. Consequently, it is hard to define a clear and generalized guideline that ensures that.

While this study confirms Brickmann et al.’s (2010) position that planning before launching the business only seems useful to a certain extent, the entrepreneurs of the study at hand mentioned the need for planning in a later stage of the start-up. When the team and the business itself is growing, structuring and planning is essential to ensure a clear overview and efficiency. This will be discussed to a higher extent in the following chapter. Consequently, the in this study applied distinction between planning before launching the business and for ongoing operations enables to identify differences between the two stages and can be justified as reasonable. This classification derived from the differentiation of the external and internal project-based view introduced by Ajam (2011), Kiznyte et al. (2016), Kuura et al. (2014), as well as Lindgren and Packendorff (2003). In general, it should be considered to apply this distinction in theory more often to allow more precise arguments and statements that do not get blurred due to not separating the stage the business is in.

6.3 Applied PM tools for operating the start-up

All respondents are applying PM tools in order to run their business and conduct their tasks. As summarized and portrayed in the empirical findings in 5.9, it could be observed in this study that mostly one or a few tools are used within a company and usually applied for various purposes. In general, it seems to be essential that the entrepreneurs find the tools that are suitable for the individually requested needs and therefore fit the best to the business, which is also confirmed by Jugdev et al. (2013) and Kiznyte et al. (2016), who stated that the applied methods always have to be aligned with the organisation. Consequently, it is common to experiment with various tools before finding an appropriate match (Per, Daniel, Meiju).

It needs to be pointed out that those respondents operating in the creative sector follow a less structured approach and do plan less. The creativity seems to be restricted by planning and is unpredictable. This unpredictability of creativity makes it hard to plan and can easily result in crashing the made plans, which would result in planning being wasteful. Furthermore, this appears to be connected to the fact that their team consists of a single person, which seem to reduce the necessity of planning. In start-ups with just one entrepreneur this person does not need to update other team members regarding the working progress in order to keep everyone updated; the entrepreneur is in the lead and has a profound overview about the whole business without planning everything to a high extent. Additionally, the scale of the business is limited due to the fact that just one person is operating it, which indicates that it is still manageable to keep an overview without structured planning. This finding leads to the conclusion that further research would be necessary to validate such claim.

In general, as the start-up was growing, the interviewed entrepreneurs acknowledged the benefits and need for planning and applying PM methods and tools. It was getting messier the more people joined and the overview had to be kept to ensure efficient work conduction. The initial reason and intention of the entrepreneurs for considering applying any planning tools were in general to increase the efficiency and productivity as well as to smoothen the workflow within the team (Ricardo, Per, Juha, Abdullah, Daniel, Henrik,
Miguel, Meiju). This also seems to be commonly the reason for the entrepreneurs to apply just one or a few main tools and not various different ones. Additionally, the fact of team members working in different locations increased the need of a tool to communicate the work progress for Ricardo, Abdullah, Henrik and Meiju. For Strativ, additional aspects were main drivers for the utilization of tools, which are namely the interest of the customers to be up-to-date and in general to visualize the working progress, as well as to keep the team motivated and create a sense of accomplishment.

Connection to theory
In general the interviewees agreed with Kuura et al. (2014) that the utilization of various PM tools are a beneficial supplementary approach of managing the start-up company. Overall, one can say that the choice of the utilized tools is influenced by many factors. It was common that recommendations and personal research influenced the decision for a specifically applied tool. Additionally, the cost factor was also essential when choosing a tool since the budget in the start-up phase is limited and the need of cutting down costs is present. This is in line with the study of PMI (2017), which claims the influence of cost on the decision about PM methods and tools. However, the size and location of the team, next to the factor of how well the team members know each other, also seem to have an impact on whether PM methods and tools were considered as necessary or not. The findings of this thesis are supported by Conforto et al. (2014), who identified drivers and enablers for APM. In a bigger team where tasks are divided and interconnected, the visualization of the working process and the use of scheduling tools for doing so appear to be essential to ensure an efficient workflow. The increasing size of the team impacts how well team members know each other and implicitly trust each others work ethics. At a certain point tools to control the work progress appear to be useful, while they seem to be unnecessary within small teams where the members know each other well. In one of the conducted start-ups for example up to this point their natural team dynamic made it unnecessary to plan in more detail. They know each other for a long time and therefore trust each other, and they also sit at the same location, which gives them the opportunity to communicate directly with each other at any given time. Nevertheless, the need for further research arises considering if there is a threshold in terms of team size that requires the application of some methods and tools. Regarding the location of the team, dispersed teams appear to have a stronger need for applying PM methods and tools to structure the communication and workflow within a team to ensure efficiency.

To summarize, the made claims indicate that the utilization of PM methods and tools is dependent on the scale and stage of the start-up as well as on the size and location of the team working within the start-up. Additionally, the mutual knowledge and trust of the team members influences the application of PM methods and tools. Therefore, it would be interesting to investigate start-up companies that have already reached a certain predefined scale, stage and size and to compare the results in order to support this statement.

6.4 Traditional PM
In the theoretical chapter of this thesis, the tools of traditional PM have been clearly structured into functions of time planning and scheduling, cost control, risk, resource scheduling, HR development, IT support, and quality control. Also, the interview guide was based upon those categories. Nonetheless, the results of this study show that such a clear distinction in not viable in start-up companies. Mostly, the entrepreneurs used one
tool to cover various topics as previously mentioned in chapter 5.9 and 6.3. The reason for that is according to the interviewees to have a better overview, to structure it in one tool only and not waste time on updating multiple tools as well as to avoid over planning. Furthermore, resource constraints in terms of employed people, budget and time led the entrepreneurs to focus on core things and most crucial tasks. Organizing various tools with entries, charts and tasks seems therefore burdensome and a waste of valuable time. Concluding, sorting the traditional tools into certain categories appeared to be useful in the theory, however in practice it is not that easy to make a clear distinction and it also seems to be too rigid. Moreover, most of the entrepreneurs immediately connected PM to time planning and scheduling, however after talking with them it was getting clearer that in the tool they are applying multiple functions are covered and organised.

**Connection to theory**

As mentioned in the theory chapter, it is vital to know how to apply tools accordingly (Jugdev et al., 2013, p. 536; Milošević & Iewwongcharoen, 2004, p. 3). In terms of traditional PM tools, it has to be mentioned that some of them do not seem to be applicable at all in start-ups. The in traditional PM very common and considerably valuable Gantt Charts, Work Breakdown Structures (WBS), Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM) as well as the software of Microsoft Project (MSP) were not applied by any of the respondents (Gelbard et al., 2002, p. 467; Jugdev et al., 2013, p. 537; Kenley & Harfield, 2014, p. 887; Milošević & Iewwongcharoen, 2004, p. 3; Shi & Blomquist, 2012, p. 504). The main reason for the unsuitability of the tools is the early stage and small size of the venture. However according to a study by Voropajev and Scheinberg (1992), various tools exist for every project phase and different company sizes, which is why different methods and tools are applied by the interviewed entrepreneurs. Furthermore in this context, especially the budget seems to be too tight for the application of some traditional tools, which is why free of charge applications are used preferred in the start-ups. Another reason for the unpopularity of traditional PM is that mostly no formal departments in start-ups exist, people simply do everything and the scope of the business is still manageable; therefore a too rigid application of traditional tools does not seem suitable. Additional, the context of the industry might influence this finding.

Finally, it has to be stated that it is difficult to make a clear distinction between traditional PM and APM, because some basics of the traditional method in terms of scheduling for example exist in APM as well. Additionally, since everything is more flexible nowadays, the traditional approach is not deliberately applied and valid anymore; APM seems to be the preferred method.

**6.4 APM framework**

As already mentioned in the empirical findings and in chapter 6.1, the start-up companies that deliberately applied a PM method all followed an APM framework. Furthermore, the teams that considered applying any method in the near future also favoured an APM method. Several factors seem to impact this obvious preference of APM methods.

**Connection to theory**

Firstly, the statement that a fast changing, highly dynamic environment with shorter business cycles makes the more flexible approach of APM methods highly valuable nowadays seems to be applicable. This confirms the position of Boehm and Turner...
(2003), Raval and Rathod (2014), as well as Serrador and Pinto (2015). Secondly, the software development industry itself is characterised by continuous development of the products and is dependent on the customer satisfaction, which consequently requires incremental development and a high customer interaction in order to avoid dissatisfaction, rework and waste of time, resources and money (Gandomani & Nafchi, 2016, p. 257; Jayawardena & Ekanayake, 2010, p. 1). These requirements are rather met by the APM method than traditional PM methods and justifies why Miguel believes that “in general if you talk about software development, an agile method is the one to prefer”. Consequently, this study confirms the arguments of Alahyari et al. (2017), Association for Project Management (2017), Hoda et al. (2017), as well as Lee and Yong (2009) regarding the suitability of APM for the software development industry.

Especially the characteristics of customer interaction, incorporation of change and early benefit realisation due to incremental development could be identified in practice, which supports the theory that states the increasing utilization and need of APM within a flexible world (Boehm & Turner, 2003; Raval & Rathod, 2014; Serrador & Pinto, 2015). The interaction with customers or potential customers was for all start-ups essential and highly valuable in order to meet their expectations, to develop in the requested direction and to minimize the risk of rework. To understand the customers’ needs and requirements is a crucial principle for all of them. The customer interaction is highly connected with the incorporation of change within the development process. More contact with customers will provide more feedback and consequently also more change requests. Additionally, the standpoint of the start-up within its lifecycle and the general business idea is influencing the frequency of updated releases. In general, requested changes get evaluated based on criticality and then integrated in the development process. Changes, adjustments and more precise determinations about the further development process also occur when the initial planning is rather vague. Some entrepreneurs especially seem to be more driven by a vision and not a clear structure, which is in line with the characteristics of APM defined by Conforto et al. (2014). The realisation of early benefits within the development process provides the customer with regular deliveries of further developed software that they can use.

The mentioned reasons for applying APM led to the assumption that APM gets to some extent even intuitively applied because it suits the fast changing environment better and therefore tends to be more applicable. This can be reinforced by the observation that all respondents tried to integrate the customer feedback within the process of developing the product due to the need to be close to the customer. Furthermore, this led in the most cases to the embracement of change during the development process and less initial planning. An incremental development process with the delivery of early benefits through regular delivery is another indicator for the usage of APM. Based on the discovery of incorporation of APM characteristics within start-ups it can be assumed that applying specific APM methods such as Scrum or Kanban would put the approach into a structure, which could lead to a higher efficiency in the workflow. Nevertheless, it has to be mentioned that the in the theory identified characteristics of APM seem to be rather general and therefore suitable for many projects nowadays. This is also a reason for the intuitive application of something related to an APM framework within all contacted start-up companies. In general, it can be stated that the business environment seems to have a high impact on the deliberate or unintentional choice of an APM framework, while the influence of the former work experience and exposure to PM seems to be negligible.
The influence of the entrepreneur's background regarding PM will be further discussed in the following section.

6.5 Prior work experience of entrepreneurs

As it has been described in the literature review, prior work experience gives the entrepreneurs confidence, helps them to make more rational and comprehensive decisions especially under uncertainty and time pressure and in general aids when solving problems (Politis, 2008, p. 473, p. 477, p. 483; Shepherd & Rudd, 2014, p. 343; Singh & DeNoble, 2003, p. 214). When it comes to previous work experience of the entrepreneurs of this study, it can be observed that half of them started their business during or soon after their schooling, while the other half had considerable experience in the labour market before. Some of them worked with PM before and therefore either applied similar methods and tools in their start-up or refrained from using them because of different goals and resources available in this new setting. On the contrary, others have not heard about PM prior to launching the venture and only during the start-up process read up on it and received recommendations from people within their network about beneficial methods and tools. This supports the theory, which states that entrepreneurship is determined through learning by doing (European Commission, 2006).

Connection to theory

The literature claims that prior work experience can help entrepreneurs to understand customer problems, markets and products as well as competitive resources better, which in general enables them to assess and understand the business environment better (Gabrielsson & Politis, 2012, p. 49). Regarding previous work experience and contact with PM, one can say that this allowed the entrepreneurs to consider PM in a first step and to evaluate the suitability for the own business based on more profound knowledge about the topic. Consequently, it can be expected that the experience introduced them to flaws and benefits of the applied PM methods and tool, which enabled those entrepreneurs to make their decision regarding the application of PM methods and tools based on experience. Nevertheless it has to be mentioned that even though some of the entrepreneurs were in their prior work exposed to PM before, they mostly did not apply the tools they used there. The reasons for applying tools were more driven by the budget, the team size and location and recommendations rather than prior work experience with PM.

It can be summarised that the prior work experience of the entrepreneurs does not have a clear and noticeable effect on which PM methods tools they apply. However, prior contact with PM affected the entrepreneurs in their initial consideration of PM methods and tools, although the decision for or against them was in the end made either way, especially depending on the available resources and the scope of the start-up.

7 Conclusion

This chapter will give an overview of the findings of the conducted study to emphasise the contribution in increasing knowledge about the usage and relevance of PM methods and tools within start-up companies, with regard to the prior work experience of the entrepreneur. Furthermore, this conclusion serves to discuss the stated objectives and answer the proposed research question. The following section will be organized based on the objectives of the study. Highlighting the connections of the research topics PM and
entrepreneurship is an additional aim of this section. Furthermore, the theoretical and practical contributions of the study as well as the limitations and future research options will be discussed later in this chapter.

Identification of PM methods and tools used within start-ups for launching the business and for operating the business

To increase the knowledge about the usage of PM methods and tools within start-up companies, meaning to identify PM methods and tools used for launching and operating the newly founded business, was one of the objectives of the study. Through the conducted interviews it could be discovered that especially in the launching phase of the start-up, planning is only necessary to a certain degree and PM is not commonly applied; however, in the process of growth, PM plays a more vital role. To handle the growth of their business efficiently, most of the start-ups applied an APM method, whilst they limited the use of tools to one or very few in order to not lose track and keep everybody on the same page. The applied tools fulfil multiple tasks from scheduling time to controlling resources, developing the product and communicating with the team as well as to keep an overview of what is happening.

In general, because of present surroundings of the business environment and fast changing requirements especially in the software development industry, there is a need for being more flexible and integrating the customers actively. It could be seen that many of the interviewed start-ups are applying an adjusted form of APM to do so, while others define their development process by common APM characteristics, which indicates the unknowing application of an agile framework to some extent. Due to the fact that the APM characteristics are highly aligned with the characteristics of today’s environment, they seem more suitable for many projects. Also, because of the common connection between the IT development sector and APM as well as due to the suitability of this approach for the industry, many start-ups were following this framework. To fit the needs and goals of the entrepreneurs and their companies, adapted methods and tools of APM were applied, whereas recommendations and personal research determined which specific ones were chosen most of the time. The findings of the popular and also reasonable application of APM justify questioning if traditional PM is not applicable for start-ups or even outdated. It appears that especially in the IT sector and considering the limited resources of start-ups particularly in the beginning stage, traditional PM is unsuitable. None of the traditional PM tools mentioned in the theory chapter, which are supposedly commonly used, were applied by any of the respondents, however they work with APM which fits their needs and means in a much better way.

Increase the understanding of the influence of previous work experience of entrepreneurs on whether and which PM methods and tools are applied in start-ups

Connecting the usage of PM methods and tools to the previous work experience of the entrepreneur was another objective of this study. The researchers wanted to understand if there is a connection between those factors, meaning if the entrepreneurs’ exposure to PM at his or her prior work has an impact on whether and which PM methods and tools are applied in their start-ups. Even though the existing theory in the field implies a positive effect of prior work experience in general on managing a business and in the long run the success of a business, the authors could not generate clear and certain results in terms of the effect on PM methods and tools used. Some of the interviewed entrepreneurs were in contact with PM before starting their own business, but do not specifically and deliberately use any PM methods and tools they had prior experience with in their start-up now. Especially the variation in scope and stage of the former
business compared to the own start-up revealed differences in the suitability of prior applied PM methods and tools for the new ventures. Unquestionably, the entrepreneurs with prior contact were more aware of PM and thus researched and inquired for applicable methods and tools, which led to a more thought through decision of applying PM methods and tools. Furthermore, previous contact with PM enabled the entrepreneurs to evaluate the suitability of various PM methods and tools based on a more thorough knowledge about the topic. Nevertheless, the choice of a specific method or tool cannot be directly traced to the previous contact with PM. More obvious reasons for the selection of PM methods and tools were the budget, scope and stage of the start-up company, rather than the work experience of the entrepreneurs. In addition, the size of the team as well as the location of the team members and the familiarity of each other influenced the usage of PM methods and tools. The bigger the team and the more dispersed and less familiar the team members are, the more substantial is the need to implement certain tools.

Further exploration of the connection between entrepreneurship and PM

In terms of connecting entrepreneurship and PM, this study can be seen as highly valuable. The connection between the characteristics and tasks of entrepreneurs and project managers was highlighted in the theory section of this thesis and also the conceptual framework portrayed this eminent link. Moreover, the perception that starting and developing a business can be considered a project (external project-based view) and also the ongoing business of a company can be managed through projects (internal project-based view), made the connection between the two research areas become even clearer. At the same time, it has been stated in the theory that planning is essential within start-ups. Therefore, it seems natural to apply PM. Considering the results of this study where even though many of the entrepreneurs mentioned that there was not much initial planning conducted, due to the urgency to enter the market, the low financial risk for the entrepreneur, the general desire of starting the business and being innovative, and the fear of losing creativity, they acknowledged the importance of planning in the growth process of the start-up. In general, finding the balance of planning enough but not wasting too much time on planning appears to be vital, which is why the more flexible approach of APM seems to be fitting. It appears, depending on the industry, the location of the team members and the size of the team, the emphasis on applying PM change. This is why it is important to connect the research area of entrepreneurship and start-ups with PM in order to increase the awareness, which allows considering PM and assessing its suitability better.

Summarizing, a strong connection between entrepreneurship and PM can be recognized and in an altered version of the conceptual framework as seen below this is once again highlighted together with the other results of the study in terms of specific PM methods and tools. In general, through interviewing eight start-up companies in Sweden in the IT development sector, the aim of this study was to answer the following research question.

What PM methods and tools do entrepreneurs apply in the process of launching the business versus the operation of the start-up, especially considering their previous work experience and contact with PM?

Considering the results of this study, it has to be mentioned that there does not seem to be a strong connection between the entrepreneurs’ work background and the usage of PM methods and tools to launch and operate their start-up. However, previous exposure to PM gave the entrepreneurs thought-provoking impulses on the decision about applying
PM in general and some direction towards specific methods and tools. Throughout the course of the research, some commonly applied methods and tools especially within the base of APM could be identified and more prominent reasons for applying such could be detected. The driving factors for choosing any method and tool were the stage and scope of the start-up itself, the budget, the team, the general preference of the entrepreneur or recommendations from within the industry. Furthermore, the industry itself and the business environment in general were strong reasons for applying APM. The conceptual framework proposed in chapter 3.4 has been updated with the mentioned results of the study, which are marked in blue as it can be seen below (Figure 3). The figure shows the methods and tools applied in the launching phase and the ongoing operations of the start-up, as well as the factors influencing the choice.

![Conceptual framework including results](Own illustration, 2017)

7.1 Contributions

The results of this study both contribute to the theory generation in the fields of entrepreneurship and PM, as well as they allow practical implications. Subsequently, those contributions will be explained in detail.

7.1.1 Theoretical contributions

By investigating on the utilization of PM methods and tools within start-ups and assessing the influence of the entrepreneurs’ prior work experience on this decision within this thesis, one of the first attempts of linking the research fields of PM and entrepreneurship is conducted, which is beneficial for both areas of study. This linkage enables connecting knowledge and concepts of both areas by increasing the field of application of PM and considering additional aspects in the field of entrepreneurship. By doing so, the role of planning and PM in start-ups was observed. Overall, this enriches
the theoretical research in both areas and room for future research was revealed which will be further discussed in the following chapter.

The distinction between planning before launching the business and for ongoing operations applied in this study helps to identify differences between the two stages and can be justified as reasonable due to the fact that it allows making more precise arguments and statements that do not get blurred due to not separating the stages the business is in. The findings of the study showed that a company acts in various ways and has different needs in those two stages. Therefore, this distinction should be considered more often in future research to receive more profound results.

7.1.2 Practical contributions

The positive effects of start-ups on the economic development, employment numbers, competition, innovation and structural development within a country highlight the importance of enhancing research in this area in order to increase the understanding of the business field. This can contribute to raising the chances of survival of start-ups, which would consequently allow exploiting the positive direct and indirect effect of start-ups to a higher extent. This utilization of positive effects of start-ups has a high contribution on society due to the creation of new jobs, the increase of competition and the structural development, which can lead to a positive economic development.

Furthermore, the results of the study show that in the launching phase as well as in the early beginning of the start-up, planning appears to be necessary up to a certain degree, while the role of PM was identified to be negligible due to the fact that the effort of applying PM methods and tools did not seem to be efficient in that stage of the business. However, in the process of growth mainly APM is utilised in order to manage the growth process efficiently. The industry, team size and location of the team members appear to influence this observation. By this acknowledgement, the awareness of PM within the topic area of entrepreneurship gets raised and as the study claims, this will allow entrepreneurs to consider PM and assess its suitability for the own business better. Consequently, the ascertain findings can help other start-ups to manage the challenge of growth in a better way by considering PM as solution of increasing efficiency. This managerial implication for entrepreneurs of considering PM in the growth process might increase the chances of survival and will consequently lead to more sustainable entrepreneurship.

Moreover, the finding of utilization of APM in the process of growth is beneficial for project managers functioning as entrepreneurs and will prevent them from applying PM in the launching phase or focusing on traditional PM. This managerial implication of prevention of over planning increases the efficiency and contributes to sustainable entrepreneurship. Additionally, the results of the study provide a valuable insight for incubators and economic promotion, who can spread the message of applicability of PM for managing business growth and advice start-ups accordingly. This will also increase the awareness of PM for entrepreneurs and allow them to consider PM and assess its suitability for their start-up company better.

Concluding, it can be seen that the results of the study have practical and theoretical contributions in the fields of entrepreneurship and PM. Entrepreneurs, project managers and incubators can learn from the findings of this research on how to plan accordingly in
the different stages of a start-up and what PM methods and tools can be implemented to ensure a smooth business development and success. Furthermore, it enriches the theoretical body and linkage of the research areas PM and entrepreneurship.

7.2 Limitations and future research

Despite the authors’ effort of providing a well-conceived method and study, there are several limitations that will be introduced in the following. Additionally, the attempt of linking the two research areas of PM and entrepreneurship enables suggesting options for future research.

Due to the focus of the study on the identification of PM methods and tools within start-ups and the influence of prior work experience on the decision of applying them, the examination of the coherence of start-up survival and applied PM methods and tools is neglected in this study. However, the findings indicate that PM methods and tools should be applied to manage the growth process of the start-up better; this is why future research should investigate on the coherence of PM and the chances of start-up survival in order to evaluate the importance of PM in start-ups in a more profound way. Additionally, this exploratory study provides first research attempts in this area and further quantitative research in the area would add supplementary validation of the findings on a broad scale.

The focus of the study on the specific industry of software development addresses a growing industry with increasing importance in the era of digitization. Subsequently, the results are valid in the sector of software development, while comparable research in other branches would be beneficial in order to examine and compare the results of different industries. This would be especially interesting due to the fact that the study already provides first hints for differences between industries by revealing different patterns for businesses that are interconnected with the creative sector. Consequently, future research in other industries is highly recommended, which would allow a comparison between industries.

While all the start-ups of the empirical study were very young (younger than three years), they were all in different stages of their business development and therefore provided a diverse observation group. Some were still developing their product and have not entered the competitive market yet, while others were already in the growing phase of the business. This heterogenic observation group makes it harder to draw general conclusions. These differences in the stages of start-ups can be explained through the time constraints of the study, which required a fast collection of empirical data. Additionally, difficulties in finding more respondents did not enable the authors to select the respondents in a narrower way. However, due to the finding that the importance of planning and PM increases with the growth of the business, it is advised to specify the observation group in future research more distinctively by focusing on start-ups which have already launched their product and are in their growth phase. This focused selection of respondents, which are indicated by the results of this study, would allow a more specific investigation of start-ups in this stage of the business lifecycle. In this context, due to the finding that in young and not well-established companies traditional PM is not applied, further research regarding a threshold about when it is beneficial to apply traditional PM methods and tools in companies would be useful.

Furthermore, a dominance of respondents from Umeå has to be acknowledged due to the approach of connecting with various start-ups through the incubator Uminova.
Consequently, start-ups from the southern part of Sweden are underrepresented in this study. Considering high start-up activities in the south that are expected to increase the competition in the geographical area, a focus of future research in this area can be justified. Comparing whether PM methods and tools are more likely to be applied in start-ups of this region in order to face the higher competition is an interesting approach of conducting future studies. Moreover, researching about this topic in other countries could generate valuable results for the areas of PM and entrepreneurship and would allow comparing country specific findings.

The findings of the study regarding the influence of the standpoint of the start-up within its business cycle, the size and location of the team as well as how well team members know each other in connection to the utilization of PM methods and tools arises the need for further research. An investigation about defining thresholds for the mentioned factors could be conducted to allow more detailed clarifications. Summarizing, this study exposed several limitations, which occurred due to the focus on answering a specific research question and applying a certain research method that led to defining a manageable scope of this study. However, those limitations offered suggestions for further research, while the generated findings contribute to the connection of the research areas of PM and entrepreneurship and reveal valuable insights.
Reference List


## Appendices

### Appendix 1 - PM tools and techniques from PMI BoK (PMI, 2017)

<table>
<thead>
<tr>
<th>Tools &amp; techniques in every project integration management stage</th>
<th></th>
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</thead>
</table>
| **1. Develop project charter** | - expert judgment  
- data gathering (brainstorming, focus groups, interviews)  
- interpersonal and team skills (conflict management, facilitation, meeting management)  
- meetings |
| **2. Develop PM plan** | - expert judgment  
- data gathering (brainstorming, checklists, focus groups, interviews)  
- interpersonal and team skills (conflict management, facilitation, meeting management)  
- meetings |
| **3. Direct and manage project work** | - expert judgment  
- project management information system  
- meetings |
| **4. Manage project knowledge** | - expert judgment  
- knowledge management  
- information management  
- interpersonal and team skills (active listening, facilitation, leadership, networking, political awareness) |
| **5. Monitor and control project work** | - expert judgment  
- data analysis (alternatives analysis, cost-benefit analysis, earned value analysis, root cause analysis, trend analysis, variance analysis)  
- decision making  
- meetings |
| **6. Perform integrated change control** | - expert judgment  
- change control tools  
- data analysis (alternatives analysis, cost-benefit analysis)  
- decision making (voting, autocratic decision making, multicriteria decision analysis)  
- meetings |
| **7. Close project or phase** | - expert judgment  
- data analysis (document analysis, regression analysis, trend analysis, variance analysis)  
- meetings |

### Tools & techniques in every project scope management stage

<table>
<thead>
<tr>
<th>Tools &amp; techniques in every project scope management stage</th>
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</table>
| **1. Plan scope management** | - expert judgment  
- data analysis (alternatives analysis)  
- meetings |
| **2. Collect Requirements** | - expert judgment  
- data gathering (brainstorming, interviews, focus groups, questionnaires & surveys, benchmarking)  
- data analysis (document analysis)  
- decision making (voting, multicriteria decision analysis)  
- data representation (affinity diagrams, mind mapping) |
<table>
<thead>
<tr>
<th>Tools &amp; techniques in every project schedule management stage</th>
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<tbody>
<tr>
<td><strong>1. Plan schedule management</strong></td>
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<td>- expert judgment</td>
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<td>- data analysis</td>
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<tr>
<td>- meetings</td>
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<tr>
<td><strong>2. Define activities</strong></td>
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<tr>
<td>- expert judgment</td>
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<tr>
<td>- decomposition</td>
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<tr>
<td>- rolling wave planning</td>
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<tr>
<td>- meetings</td>
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<tr>
<td><strong>3. Sequence activities</strong></td>
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<tr>
<td>- precedence diagramming method</td>
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<tr>
<td>- dependency determination and integration</td>
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<tr>
<td>- leads and lags</td>
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<tr>
<td>- PM information system</td>
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<tr>
<td><strong>4. Estimate activity durations</strong></td>
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<tr>
<td>- expert judgment</td>
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<tr>
<td>- analogous estimating</td>
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<tr>
<td>- parametric estimating</td>
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<tr>
<td>- three-point estimating</td>
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<tr>
<td>- bottom-up estimating</td>
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<tr>
<td>- data analysis (alternatives analysis, reserve analysis)</td>
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<tr>
<td>- decision making</td>
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<tr>
<td>- meetings</td>
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<tr>
<td><strong>5. Develop schedule</strong></td>
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<tr>
<td>- schedule network analysis</td>
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<tr>
<td>- critical path method</td>
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<td>- resource optimization</td>
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<tr>
<td>- data analysis (what-if scenario analysis, simulation)</td>
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<tr>
<td>- leads and lags</td>
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<tr>
<td>- schedule compression</td>
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<tr>
<td>- PM information system</td>
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<tr>
<td>- agile release planning</td>
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<tr>
<td><strong>6. Control schedule</strong></td>
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<tr>
<td>- data analysis (earned value analysis, iteration burndown chart, performance reviews, trend analysis, variance analysis, what-if scenario analysis)</td>
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<tr>
<td>- critical path method</td>
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<tr>
<td>- PM information system</td>
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<tr>
<td>- resource optimization</td>
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<tr>
<td>- leads and lags</td>
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<tr>
<td>- schedule compression</td>
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</table>

Tools & techniques in every project cost management stage

<p>| <strong>1. Plan cost management</strong> |
| - expert judgment |</p>
<table>
<thead>
<tr>
<th>Tools &amp; techniques in every project quality management stage</th>
<th></th>
</tr>
</thead>
</table>
| **2. Estimate costs** | - expert judgment  
  - analogous estimating  
  - parametric estimating  
  - bottom-up estimating  
  - three-point estimating  
  - data analysis (alternatives analysis, reserve analysis, cost of quality)  
  - PM information system  
  - decision making (voting) |
| **3. Determine budget** | - expert judgment  
  - cost aggregation  
  - data analysis (reserve analysis)  
  - historical information review  
  - funding limit reconciliation  
  - financing |
| **4. Control costs** | - expert judgment  
  - data analysis (earned value analysis, variance analysis, trend analysis, reserve analysis)  
  - to-compete performance index  
  - PM information system |

### 1. Plan quality management
- expert judgment  
  - data gathering (benchmarking, brainstorming, interviews)  
  - data analysis (cost-benefit analysis, cost of quality)  
  - decision making (multicriteria decision analysis)  
  - data representation (flowcharts, logical data model, matrix diagrams, mind mapping)  
  - test and inspection planning  
  - meetings

### 2. Manage quality
- data gathering (checklists)  
  - data analysis (alternatives analysis, document analysis, process analysis, root cause analysis)  
  - decision making (multicriteria decision analysis)  
  - data representation (affinity diagrams, cause-and-effect diagrams, flowcharts, histograms, matrix diagrams, scatter diagrams)  
  - audits  
  - design for X  
  - problem solving  
  - quality improvement methods

### 3. Control quality
- data gathering (checklists, check sheets, statistical sampling, questionnaires and surveys)  
  - data analysis (performance reviews, root cause analysis)  
  - inspection  
  - testing/product evaluation  
  - data representation (cause-and-effect diagrams, control charts, histogram, scatter diagrams)  
  - meetings

### Tools & techniques in every project resource management stage

#### 1. Plan resource management
- expert judgment  
  - data representation (hierarchical charts, responsibility assignment matrix, text-oriented formats)
<table>
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<tr>
<th>Section</th>
<th>Tools &amp; Techniques</th>
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</table>
| **2. Estimate activity resources** | - expert judgment  
- bottom-up estimating  
- analogous estimating  
- parametric estimating  
- data analysis (alternatives analysis)  
- PM information system  
- meetings |
| **3. Acquire resources** | - decision making (multicriteria decision analysis)  
- interpersonal and team skills (negotiation)  
- pre-assignment  
- virtual teams |
| **4. Develop team** | - colocation  
- virtual teams  
- communication technology  
- interpersonal and team skills (conflict management, influencing, motivation, negotiation, team building)  
- recognition and rewards  
- training  
- individual and team assessments  
- meetings |
| **5. Manage team** | - interpersonal and team skills (conflict management, decision making, emotional intelligence, influencing, leadership)  
- PM information system |
| **6. Control resources** | - data analysis (alternatives analysis, cost-benefit analysis, performance reviews, trend analysis)  
- problem solving  
- interpersonal and team skills (negotiation, influencing)  
- PM information system |

**Tools & techniques in every project communications management stage**

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<tr>
<th>Section</th>
<th>Tools &amp; Techniques</th>
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| **1. Plan communications management** | - expert judgment  
- communication requirements analysis  
- communication technology  
- communication models  
- communication methods  
- interpersonal and team skills (communication styles assessment, political awareness, cultural awareness)  
- data representation (stakeholder engagement assessment matrix)  
- meetings |
| **2. Manage communications** | - communication technology  
- communication methods  
- communication skills (communication competence, feedback, nonverbal, presentations)  
- PM information system  
- project reporting  
- interpersonal and team skills (active listening, conflict management, cultural awareness, meeting management, networking, political awareness)  
- meetings |
| **3. Monitor communications** | - expert judgment  
- PM information system |
**Tools & techniques in every project risk management stage**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Techniques</th>
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<tbody>
<tr>
<td>1. Plan risk management</td>
<td>- expert judgment</td>
</tr>
<tr>
<td></td>
<td>- data analysis (stakeholder analysis)</td>
</tr>
<tr>
<td></td>
<td>- meetings</td>
</tr>
<tr>
<td>2. Identify risks</td>
<td>- expert judgment</td>
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<tr>
<td></td>
<td>- data gathering (brainstorming, checklists, interviews)</td>
</tr>
<tr>
<td></td>
<td>- data analysis (root cause analysis, assumption and constraint analysis, SWOT analysis, document analysis)</td>
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<td></td>
<td>- interpersonal and team skills (facilitation)</td>
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<td></td>
<td>- prompt lists</td>
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<td></td>
<td>- meetings</td>
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<tr>
<td>3. Perform qualitative risk analysis</td>
<td>- expert judgment</td>
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<tr>
<td></td>
<td>- data gathering (interviews)</td>
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<td></td>
<td>- data analysis (risk data quality assessment, risk probability and impact assessment, assessment of other risk parameters)</td>
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<tr>
<td></td>
<td>- interpersonal and team skills (facilitation)</td>
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<tr>
<td></td>
<td>- risk categorization</td>
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<td></td>
<td>- data representation (probability and impact matrix, hierarchical charts)</td>
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<td>- meetings</td>
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<tr>
<td>4. Perform quantitative risk analysis</td>
<td>- expert judgment</td>
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<tr>
<td></td>
<td>- data gathering (interviews)</td>
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<td></td>
<td>- interpersonal and team skills (facilitation)</td>
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<td>- representations of uncertainty</td>
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<td>- data analysis (simulations, sensitivity analysis, decision tree analysis, influence diagrams)</td>
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<tr>
<td>5. Plan risk responses</td>
<td>- expert judgment</td>
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<tr>
<td></td>
<td>- data gathering (interviews)</td>
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<td></td>
<td>- interpersonal and team skills (facilitation)</td>
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<td>- strategies for threats</td>
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<td>- strategies for opportunities</td>
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<td>- contingent response strategies</td>
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<td>- strategies for overall project risk</td>
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<td>- data analysis (alternatives analysis, cost-benefit analysis)</td>
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<td></td>
<td>- decision making (multicriteria decision analysis)</td>
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<td>6. Implement risk responses</td>
<td>- expert judgment</td>
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<tr>
<td></td>
<td>- interpersonal and team skills (influencing)</td>
</tr>
<tr>
<td></td>
<td>- PM information system</td>
</tr>
<tr>
<td>7. Monitor risks</td>
<td>- data analysis (technical performance analysis, reserve analysis)</td>
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<td></td>
<td>- audits</td>
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<td>- meetings</td>
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**Tools & techniques in every project procurement management stage**

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<th>Stage</th>
<th>Techniques</th>
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<tbody>
<tr>
<td>1. Plan procurement management</td>
<td>- expert judgment</td>
</tr>
<tr>
<td></td>
<td>- data gathering (market research)</td>
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<td>- data analysis (make-or-buy analysis)</td>
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<td></td>
<td>- source selection analysis</td>
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<td></td>
<td>- meetings</td>
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<td>2. Conduct procurements</td>
<td>- expert judgment</td>
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<td></td>
<td>- advertising</td>
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<td>- bidder conferences</td>
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<td>Tools &amp; techniques in every project stakeholder management stage</td>
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<td>---------------------------------------------------------------</td>
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<td><strong>1. Identify stakeholders</strong></td>
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<td>- expert judgment</td>
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<tr>
<td>- data gathering (questionnaires and surveys, brainstorming)</td>
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<tr>
<td>- data analysis (stakeholder analysis, document analysis)</td>
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<tr>
<td>- data representation (stakeholder mapping/representation)</td>
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<tr>
<td>- meetings</td>
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<tr>
<td><strong>2. Plan stakeholder engagement</strong></td>
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<tr>
<td>- expert judgment</td>
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<tr>
<td>- data gathering (benchmarking)</td>
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<tr>
<td>- data analysis (assumption and constraint analysis, root cause analysis)</td>
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<tr>
<td>- decision making (prioritization/ranking)</td>
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<tr>
<td>- data representation (mind mapping, stakeholder engagement assessment matrix)</td>
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<tr>
<td>- meetings</td>
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<tr>
<td><strong>3. Manage stakeholder engagement</strong></td>
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<tr>
<td>- expert judgment</td>
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<tr>
<td>- communication skills (feedback)</td>
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<tr>
<td>- interpersonal and team skills (conflict management, cultural awareness, negotiation, observation/conversation, political awareness)</td>
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<td>- ground rules</td>
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<td>- meetings</td>
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<tr>
<td><strong>4. Monitor stakeholder engagement</strong></td>
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<tr>
<td>- data analysis (alternatives analysis, root cause analysis, stakeholder analysis)</td>
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<tr>
<td>- decision making (multicriteria decision analysis, voting)</td>
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<tr>
<td>- data representation (stakeholder engagement assessment matrix)</td>
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<tr>
<td>- communication skills (feedback, presentations)</td>
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<tr>
<td>- interpersonal and team skills (active listening, cultural awareness, leadership, networking, political awareness)</td>
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<tr>
<td>- meetings</td>
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</tbody>
</table>
Appendix 2 - Cover Letter

Dear company X,

we are two students at Umeå University working on our Master Thesis, where we are investigating on the usage of Project Management within start-up companies. For that reason we are looking for entrepreneurs who are willing to participate in an approximately 30-40 minutes long interview. While looking through the start-up community in the area, you caught our interest and we were hoping you could spare some time for us. More detailed information are provided in the following:

Master thesis on utilization of Project management (PM) methods & tool within start-ups
- are PM methods & tools implemented by entrepreneurs?
- which ones do they use?
- why did they decide for those or decide not to apply PM at all?
- how is this influenced through their former work background?

Those are the questions we would like to answer with our Master thesis and we are looking for suitable interview partners who are willing to share their experience with us!

How long would the interview take? Approximately 30-40 minutes
How would it take place? At the place of your convenience or via phone call
When would the interview take place? Preferably within the next two weeks
Any requirements I have to fulfil? It does not matter how many people you are in your start-up, but it would be important that your business idea is in a broader sense related to the development of any kind of software
Who should I contact? Just reply to this email, also if you have any further questions, do not hesitate to contact us.

Many thanks in advance & we would appreciate your participation.
Best regards,
Lena & Alexandra

Lena, Umeå University
anbo0203@student.umu.se

Alexandra, Umeå University
alsp0005@student.umu.se
Appendix 3 - Interview guide

Opening:
- purpose of thesis
- info about recording, usage of actual names, sustainable usage of material (for academic reason; university)
- please answer all questions to your best knowledge and understanding
- language, mother tongue
- if you have any questions in between or afterwards, please do not hesitate to interrupt
- if you are interested, we can inform you about our findings and send to you our thesis if you want

Main part:
→ the start-up
- idea of start-up (business model)
- since when: launching (registration)
  - in which status is the start-up: before launching (when is launch planned)
  - registration/base (country, city)
- how many founders
- how many employees (full time?)
- growth

→ the entrepreneurs:
- why would you say you are an entrepreneur? (strengths/characteristics)
- work experience in general
  - how many years (ask about age)
  - in what kind of companies (start-up or corporate company)
  - what jobs
    - positions
    - functions
    - responsibilities
  - are you applying things/tools that you used in former work (on purpose not applying) - why/why not?
  - usage of PM: details (where, what methods, how long)
- knowledge of PM
  - work experience: confrontation with it
  - tools already used
  - certificates
  - literature (PMI, APM, BoK…)
  - workshops related to topic
- team members with PM knowledge (how many, what department, applying what tools/methods)

Applied PM methods & tools
→ management of launching the business
- what tools/techniques did you use to manage launching of business
- each tool deliberately (ask them open; otherwise ask specifically about the missing tools they did not name):
- why are you using it?
- did you work in your prior job with that tool or where did you hear from that tool? did you introduce that tool or somebody else in the company?
- what benefits does it bring?
- do you consider the tool as valuable? does it improve your performance?
- any scheduling tools
  → for example: PERT (Program Evaluation and Review Technique), CPM (Critical Path Method), WBS (Work Breakdown Structure), Milestones, Gantt Charts, MSP (Microsoft Project), DSM (dependency structure matrix), Monte Carlo Simulation, PDM (precedence diagramming method)
- any cost control tools
  → for example: Coding System, Comparative Tools, a Cost Management Plan, Contingency Plans, Life Cycle Cost Analysis, Activity Based Costing, Cost-Benefit Analysis, Control Charts, Sensitivity Analysis, Decision Trees, EVM (Earned Value Mgmt.))
- any risk tools
  → for example: RBS (Risk Breakdown Structure), Probability Analysis, Reliability Analysis, Monte Carlo Simulation)
- any tools for resource scheduling/responsibilities
  → for example: Procedure Manual, RAM (Responsibility Assignment Matrix), RACI Charts (responsibility, accountability, consultancy and informing), OBS (Organisational Breakdown Structure))
- any specific tools for
  - HR, team development
  - IT support tools
  - quality mgmt (e.g. Six Sigma)
- others that you can think of?
- specific tools developed in the company?

→ ongoing projects within the company
- each tool deliberately (ask them open; otherwise ask specifically about the missing tools they did not name):
  - why are you using it?
  - did you work in your prior job with that tool or where did you hear from that tool? did you introduce that tool or somebody else in the company?
  - what benefits does it bring?
  - do you consider the tool as valuable? does it improve your performance?
  - any scheduling tools
    → for example: PERT (Program Evaluation and Review Technique), CPM (Critical Path Method), WBS (Work Breakdown Structure), Milestones, Gantt Charts, MSP (Microsoft Project), DSM (dependency structure matrix), Monte Carlo Simulation, PDM (precedence diagramming method)
  - any cost control tools
    → for example: Coding System, Comparative Tools, a Cost Management Plan, Contingency Plans, Life Cycle Cost Analysis, Activity Based Costing, Cost-Benefit Analysis, Control Charts, Sensitivity Analysis, Decision Trees, EVM (Earned Value Mgmt.))
- any risk tools
  → for example: RBS (Risk Breakdown Structure), Probability Analysis, Reliability Analysis)
- any tools for resource scheduling/responsibilities
  → for example: Procedure Manual, RAM (Responsibility Assignment Matrix), RACI Charts (responsibility, accountability, consultancy and informing), OBS (Organisational Breakdown Structure))
- any specific tools for
  - HR, team development
  - IT support tools
  - quality mgmt (e.g. Six Sigma)
- others that you can think of?
- specific tools developed in the company?

→ management of software development
- do you consider the SD as a project within your start-up?
- how do you manage/structure SD
  - applying APM?
  - how do you split up tasks
  - are you using specific tools to do so/follow patterns or structure
- usage of a specific method? (Scrum, XP, Kanban)
  - how did you know about the method
  - have you applied the method before somewhere else
  - why did you decide to go with that method
  - did you adjust it to start-up/circumstances (how)
- how do you visualize the standpoint of progress
  - offline/online
  - specific app/tool
  - when/how do you move task (immediately to next stage or start/accomplished per stage)
- how do you incorporate change (how flexible are you)
  - always possible/ only at certain stages of
- do you use iteration cycles of development? (sprints)
  - how long are they
- how much initial planning/how much evokes while development (stretch on)
- many strict requirements or rather loose requirements?
  - high uncertainty
  - autonomous decision-making
- have you ever worked in the setting/structure of APM
  - what was your experience with that
- how do you interact with customers/users (feedback)
- communication within (development) team
  - how often stand-up meetings to talk about/update on progress/difficulties faced of SD?
  - how do you update each other?
- are early benefits delivered? (continuously releasing new features and improvements, the customer can benefit from them immediately)
- team structure: self-structured and self-managed? or one responsible manager?
- defined roles of the project development team (product owner, scrum master)
- need for speed to the market (urgency)?
  - based on competitors
- cost constraints?
- how would you define your working culture? (encouraging, comfortable)
- how do you ensure to not get lost in detail/ keep the overall picture in mind?

Closing:
- After this interview, do you have a different idea about utilization of PM (do you use it, might it be helpful, or too time consuming/expensive/no expertise)
- do you want to add anything
- Possible contacts that you can recommend?
## Appendix 4 - Interview partners and their start-ups

<table>
<thead>
<tr>
<th>#</th>
<th>INTERVIEWEE</th>
<th>START-UP</th>
<th>LAUNCH &amp; GROWTH</th>
<th>TEAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ricardo Russo, CEO/Founder</td>
<td>Event management web service for all kinds of events (weddings, seminars, company events, birthday parties etc.) including a big range of services: 1. Manage ticketing and all the people attending an event 2. Push out information before &amp; during event 3. Analytics of event, especially qualitative</td>
<td>Formed September 2016  Prototype ready, customers already in Belgium, Stockholm and UK (tested it), no serious funding yet  Launch of final product was planned within 2018 → urgency because of competitors  Shut down in August 2017 because of stronger competitor</td>
<td>Initially only Ricardo + another friend soon + a coder 4 months in + another coder 6-8 months in  In the end 4 people at different locations, all working in their free time on it since they are students. It was planned to work full time after studies</td>
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<td>2</td>
<td>Per Fransson, CEO/Founder Musikmedel</td>
<td>Website with teaching material (lesson series, videos, PDF documents, games → digital library) for music teachers in Sweden from grade 4 to 6  Yearly subscription, approx. monthly updates of content  B2B solution (budget of schools), marketing B2C (customers are teachers)</td>
<td>First only material in Google site to share with students  Spring 2015: MVP, dropbox with one explanation video &amp; one lesson to show  August 2015: Launch of business  Now 40 customers are using it</td>
<td>Per by himself, sometimes help from a friend with making the videos  He is a part-time (60%) music teacher, working on Musikmedel when he is not teaching  Looking for help with programming now, he wants to have more time to create user content</td>
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<td>3</td>
<td>Juha Niemi, CEO/Founder Vacaverde</td>
<td>Animation production company, focus on stop motion animations for doing commercials in social media (mainly Facebook &amp; Instagram)</td>
<td>Started developing idea approx. 10 years ago for TV clips, no social media to the extent of now, actual launch of the company 1.5 years ago  Now customers in Spain, Sweden &amp; Finland</td>
<td>Just Juha full-time  Occasional help from his wife (illustrations, selling)  Resources depend on project, expansion if needed (freelancers)</td>
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<td>4</td>
<td>Abdullah Yousuf, Founder &amp; Head of Business Development Strativ</td>
<td>IT consulting service especially for start-ups and SMEs (B2B) in Sweden  Lack of technical competence to create a website, web or mobile application and budget to hire people for software development. At the same time many skilled computer science engineers in Bangladesh looking for jobs → bring together demand and expertise in an economical way; building reliable bridge with a project manager or back end person in Sweden</td>
<td>Idea started in 2015  Started with a real team in the beginning of 2016</td>
<td>Started with just him and a friend  Now 2 people in Sweden, 7 people in Bangladesh</td>
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<tr>
<td></td>
<td>Name</td>
<td>Company/Role</td>
<td>Description</td>
<td>Start Date</td>
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<tr>
<td>5</td>
<td>Daniel Wiberg</td>
<td>Skillster</td>
<td>Driving simulation software that is run on an ordinary PC with the only additional need of a racing wheel and no expensive simulator hardware. Focus on high schools and driving schools (private and public) in Sweden and students that are supposed to become truck- or bus drivers. Yearly license fee for software, support and constant updates included. Established in January 2016, approx. half a year later they had the first version of the software ready to sell. Gradual growth, more in the last half year; Have almost 50% of the schools in Sweden as customers; Started expanding to Finland in autumn 2017, have one school already there now. Are moving to bigger office in January and are thinking of expanding the team. Daniel and a former colleague started together in 2016 + another one joined 1 month in + hired a graphic designer in summer 2017. Now 4 people (2 developers, 1 administrative &amp; sales person, 1 3D artist) full time in one office. Are thinking of hiring 2 more developers and 1 consultant for sales.</td>
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<td>6</td>
<td>Henrik Frienholt</td>
<td>ZunZun (Shimmercat)</td>
<td>“Shimmercat” webserver: Unique software/technology for creating extremely fast loading times. Uses real data for optimising loading time. Technology interacts with the website very fast, considers connection used, where customer is from etc. Focus on e-commerce platforms. Registration in 2014. Back then they had no product, it was more like a consultancy while they created the product. Right now Swedish customers only, but interest in going internationally next year. 2 PhD students were developing the company/product, Henrik joined during that phase to develop the business side of the product. Now 7 people in the headquarter in Umeå, in Stockholm and Tampa (USA).</td>
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<td>7</td>
<td>Miguel Fürst</td>
<td>Lejonapa</td>
<td>Software as a service (SASS): solution for amusement parks so that visitors do not have to stand in long &amp; boring lines → use phone to “stand in line” while moving around freely. Has to be adapted to each amusement park. Started in July 2014. Have a concept, tested it, but have neither built the full product nor sold it yet. Work in collaboration with Swedish parks now and in contact with US and several countries in Europe, should be a global solution. Initially just Miguel, friend joined in January 2015 for coding and being creative together. Now 2 people full-time in one office. Big IT supplier as partner now, thinking about cooperating with others.</td>
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<td>8</td>
<td>Meiju Vartiainen</td>
<td>Mowida</td>
<td>Web-platform for matching landlords and tenants → matching the people with the right home in whole Sweden. Started in 2014 all by herself, writing tips how to find accommodation, matching people manually etc. In 2015 started developing the first platform for whole Sweden and registered the business. Closed the first platform in 2016. Rebuilding the platform right now to open it in August 2018. First alone, working in other jobs besides. Right now together with a partner, both working other jobs at the same time. Starting in January 2018 with team of 4: 2 new developers. All will sit together in an office working full-time. Probably also adding 2 students to the team.</td>
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