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UNDERSTANDING AND VALIDATING PRODUCT-MARKET FIT OF ENTERPRISE SOFTWARE PRODUCTS

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ABSTRACT

Juho Kuiko: Understanding and Validating Product-Market Fit of Enterprise Software Products
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Product-market fit is a concept that describes how well a product meets the needs of a significant market. Reaching a point of sufficient product-market fit has been considered critical to startup success and in determining the time to scale the business, that is preparing to serve a large customer base. While there is some literature about experimentation in relation to recognizing product-market fit, the methods of that remain at a somewhat abstract level. As a result, that can be difficult to execute especially in the context of complex enterprise software, where the developed products are complex and integrated into a network of different systems. Consequently, there has been limited knowledge about related practical actions, and the related process of understanding the product-market fit of a product has remained unclear.

The objective of this study was to conceptualize more clearly how product-market fit can be recognized and validated. The results were aimed to provide a framework for approaching the concept in a more structured fashion. Ultimately, this was designed to help in expanding an established company to new product areas in an efficient manner, where the role of product-market fit is recognized as a basis for scaling decisions. Also, considerations about the nature of product-market fit in practice were examined. Finally, concerns related to product-market fit from the context of operating with software-as-a-service model were investigated.

The study was executed with a constructive research approach in collaboration with a software company. Data collected for the study consisted of 11 interviews from professionals working in software companies or in the startup field. Four of these interviews were from within the company this study is produced in collaboration with and seven were from external companies. The interviews focused on recognizing product-market fit and engaging in customer collaboration. Also, a literature review of related concepts was conducted. The solutions and answers to research questions were synthesized by combining information and seeking commonalities in different interviews and the literature. The results were presented to the software company to validate them.

As a result of the study, methods for recognizing product-market fit are presented: especially the importance of customer collaboration is highlighted extensively, and the role of customer needs is elaborated. Four different types of product-market fit knowledge are presented and different methods for producing these are presented, largely pertaining to customer collaboration. Indicators of product-market fit are also presented and the qualitative nature of especially leading indicators is recognized. Lastly, the findings are presented in visual frameworks aimed at clarifying product-market fit knowledge and product-market fit validation. Future recommendations for companies are also given to recognize the role of product-market fit.

Keywords: product-market fit, enterprise software, software-as-a-service, customer collaboration, customer needs

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

TIIVISTELMÄ

Juho Kuiko: Yritysohjelmistojen markkinasopivuuden ymmärtäminen ja todentaminen
Diplomityö
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Tuotteen markkinasopivuus (engl. product-market fit) on käsite, joka tarkoittaa tuotteen vastaamista merkittävän markkina-alueen tarpeisiin. Riittävän markkinasopivuuden saavuttamista on pidetty kriittisenä tekijänä menestykseen startup-yrityksessä. Toisaalta tätä on myös pidetty oleellisena tekijänä ohjaamaan oikea-aikaisia laajentumispäätöksiä, joissa siirrytään valmistautumaan suuremman asiakaspohjan palveluun. Vaikka kirjallisuudessa on käsitelty jonkin verran kokeilujen roolia suhteessa markkinasopivuuden tunnistamiseen, kyseiset toimintatavat ovat melko epäkonkreettisia. Lisäksi kokeilu voi olla haastavaa monimutkaisten yritysohjelmistojen kontekstissa, jossa kehitettävät tuotteet ovat monimutkaisia osia laajemmassa ohjelmistojen verkostossa. Näistä syistä tietoa markkinasopivuuden liittyvistä käytännön toimista on ollut rajallisesti. Lisäksi myös laajempi prosessi koskien markkinasopivuuden ymmärtämistä on ollut epäselvä.

Tämän diplomityön tavoitteena oli selvittää, kuinka markkinasopivuutta voidaan tunnistaa ja todentaa. Tulosten tarkoituksena oli tarjota viitekehys, johon nojaten markkinasopivuutta voidaan lähestyä strukturoidummalla tavalla. Perimmäinen työn tarkoitus oli avustaa vakiintuneita yrityksiä laajentumaan uusille tuotealueille tehokkaalla tavalla, jossa tuotesopivuuden rooli tunnistetaan skaalaus päätösten pohjana. Lisäksi tutkittiin markkinasopivuuden luonnetta käytännössä. Tutkimuksen kontekstina oli ohjelmisto palveluna -malli, josta aiheutuvia vaikutuksia markkinasopivuuteen myös tarkastellaan.

Tässä tutkimuksessa käytettiin konstruktiivista tutkimusotetta ja se suoritettiin yhteistyössä ohjelmistoyrityksen kanssa. Tutkimukseen kerättiin dataa 11 haastattelussa, joissa haastateltiin asiantuntijoita ohjelmistoyrityksistä sekä startup-yritysalalta. Neljä haastatelluista oli yhteistyöyrityksestä, kun taas loput seitsemän olivat muista ulkoisista yrityksistä. Haastatteluissa keskityttiin markkinasopivuuden tunnistamiseen ja asiakkaiden kanssa tehtävään yhteistyöhön. Lisäksi työssä tehtiin kirjallisuuskatsaus asiaan liittyvistä aiheista. Työssä esitettävät ratkaisut ja vastaukset tutkimuskysymyksiin muodostettiin yhdistelemällä tietoa haastatteluista sekä kirjallisuudesta. Tulokset esitettiin yhteistyöyritykselle niiden vahvistamiseksi.

Työn tuloksena esitetään tapoja tunnistaa tuotteen markkinasopivuutta: erityisesti asiakasyhteistyön merkitystä korostetaan sekä asiakastarpeiden roolia selvennetään. Lisäksi tunnistetaan neljä markkinasopivuuteen liittyvää tietoa-alueita sekä erilaisia tapoja tuottaa näitä tietoja pääasiassa asiakasyhteistyön avulla. Työssä esitetään myös indikaattoreja markkinasopivuuden tunnistamiseen ja tunnistetaan etenkin ennakoivien indikaattorien kvalitatiivinen luonne. Työn lopuksi tulokset tiivistetään viitekehyksiin, jotka selvittävät markkinasopivuuteen liittyvää tietoa sekä markkinasopivuuden todentamista. Lisäksi annetaan joitakin suosituksia yrityksille markkinasopivuuden roolin tunnistamiseen.

Avainsanat: tuotteen markkinasopivuus, yritysohjelmit, ohjelmisto palveluna, asiakasyhteistyö, asiakastarpeet

Tämän julkaisun alkuperäisyys on tarkastettu Turnitin OriginalityCheck -ohjelmalla.

PREFACE

Completing this thesis marks the end of my formal studies, at least for now, and five years of university education to the day. Writing the thesis had its ups and downs: sometimes the amount of information felt overwhelming but on the other hand that made connecting the dots all the more rewarding. Overall, it was a challenging but also an educational journey. Besides the actual subject of the thesis, the process taught perseverance, confidence, and critical assessment. I believe it has prepared me better for what lies ahead.

Regarding researching and writing this thesis, I'd like to thank Tiina and Laurence for the help with getting started in the beginning and for their continued interest and support during the writing process. Thank you to professor Miia Martinsuo for guidance in many aspects and the comments on different versions of manuscripts. I am also grateful for the flexibility and freedom allowed by the company, with whom the study was done in collaboration. Lastly, thank you to everyone who shared their insight about the researched topics.

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LIST OF ABBREVIATIONS

B2B	Business-to-Business
CAC	Customer Acquisition Cost
CLTV	Customer Lifetime Value
CRM	Customer Relationship Management
ERP	Enterprise Resource Planning
GUI	Graphical User Interface
IT	Information Technology
KPI	Key Performance Indicator
MVP	Minimum Viable Product
NPD	New Product Development
NSD	New Service Development
PMF	Product-Market Fit
PSS	Product-Service System
QoS	Quality of Service
RFP	Request for Proposal
SaaS	Software-as-a-Service
SAM	Serviceable Available Market
SCM	Supply Chain Management
SOM	Serviceable Obtainable Market
TAM	Total Available Market
TCO	Total Cost of Ownership
UVP	Unique Value Proposition

1. INTRODUCTION

1.1 Background

Enterprise software applications are different programs used in supporting organizations' core processes (Davenport 1998; Boillat & Legner 2013). They are extremely important to companies, as these applications continuously affect their operations (Davenport 1998; Trott 2017, p. 138–140). Typical enterprise software applications include Enterprise Resource Planning (ERP), Supply Chain Management (SCM) and Customer Relationship Management (CRM) systems (Boillat & Legner 2013). Their commonality is that they offer large potential business benefits by making operations more transparent, allowing clearer management, and providing support for decision-making (Davenport 1998; Trott 2017, p. 139; Jacobs et al. 2018, p. 18, 24–29). On the other hand, their complexity and integration requirements can also cause difficulties in system implementation and upkeep (Rettig 2007).

One method of reducing software and hardware maintenance efforts and costs is the Software-as-a-Service (SaaS) model. This is a method of delivering software by providing the customer with not only the software product but also the computing utility it runs on. This shifts the responsibility of hardware maintenance. (MA 2007) It also affects the revenue model, by making utilizing a recurring subscription model (Dubey & Wagle 2007). This approach can allow the customers to focus on their core competencies and utilizing the software (Nieuwenhuis et al. 2018).

Although defining SaaS exactly is difficult (Mäkilä et al. 2010), its usual benefits include a lower Total Cost of Ownership (TCO) for the customer (Waters 2005), more frequent software update cycles and higher quality (Waters 2005; Choudhary 2007), and less complex Information Technology (IT) infrastructure (Nieuwenhuis et al. 2018). The benefits are made possible, at least partially, by utilizing economies of scale and avoiding customer-specific customization (Sun et al. 2008). However, due to the business-critical nature of enterprise software and its importance to the company, even SaaS applications will have to be configured based on the requirements of each customer. This includes data integration, modules, business rules (Davenport 1998; Tsai & Sun 2013), and usually this configurability is rather high in enterprise SaaS (Sun et al. 2008).

Product-Market Fit (PMF) is a concept that means how well a product solves the needs and wants of customers in a significant market (Cooper & de Brentani 1991; Andreessen 2007). This is a very important consideration in product management, as having a good

Product-Market Fit (PMF) is one of the most significant factors in finding business success (Cooper & de Brentani 1991). Indeed, finding PMF for a product is central when developing a product or starting a company (Andreessen 2007; Ries 2011).

The point when PMF is achieved is an impactful one, that can shift what the main of focus of a company should be (Andreessen 2007; Ries 2011, p. 222–223; Gupta et al. 2020). Attempting to scale the product up before PMF is reached can have adverse effects and waste resources (Leslie & Holloway 2006; Eisenmann et al. 2013). However, determining how good a product's PMF is or whether it is good enough for scaling is difficult (Cooper & Vlaskovits 2010, p. 37; Leppänen & Hokkanen 2015; Ghezzi 2019). Often this is approached by experimenting with iterations of Minimum Viable Product (MVP) or prototypes with customers in a quick feedback loop. From these experiments, deductions about PMF can be made. (Cooper & Vlaskovits 2010; Ries 2011; Blank 2020; Hampel et al. 2020)

However, there seems to be a difficult relationship between the prevailing method of experimentation and enterprise SaaS applications. If a product requires implementation and integration, resulting in resource expenses both for the software provider and the customer, rapid and recurring experimentation is difficult (Frederiksen & Brem 2017; Ghezzi 2019). In established companies, this experimentation is further undermined by lacking knowledge about how experimentation can be conducted to support innovation in that context (Hampel et al. 2020).

The question then becomes, how can an enterprise software provider validate the PMF of a new product and determine whether it is ready for scaling? Currently, there is little practical research into the matter. Furthermore, the connections between PMF and many other concepts, such as New Product Development (NPD), are unclear. In this thesis, the aim is to understand PMF as a concept and to investigate methods that can be used to get insight into an enterprise software product's PMF.

1.2 Target Company and Need for Research

This thesis is done in cooperation with a target company and the subject for the thesis is an assignment from them. The target company is a large European software company developing its own products in the enterprise software market. It has relatively quickly transformed from a small startup into a rather large international company. Still, the company values a certain startup mentality, describing itself as a 'grown-up startup'.

The target company offers a variety of different applications and application components designed to optimize retail processes, such as demand forecasting, ordering, planogram planning, and workforce management. However, the company has a core competence area in SCM, specifically providing a demand forecasting and order replenishment sys-

tem with SaaS model. This means estimating future sales quantities in the customers' business based on a variety of factors and providing the optimal purchase orders for the customers' ordering needs, among other things.

The target company competes in the same market area with multiple international companies. Despite being smaller than many of its competitors, the target company has been successful in competing in the sought-after retail software integrations, especially in its SCM core competence area.

The sales around the company's software are characterized by the project nature of each implementation. Every sale requires a comprehensive integration to existing data management software, such as ERP and inventory management systems. This means that the implementation requires significant effort from the software provider, but also the customer.

As a result of this relatively high integration barrier, there is a limited amount of opportunities for sales. Only companies with sufficient IT resources, existing IT infrastructure, and willingness to participate in the integration can be targeted with sales. On the other hand, if a potential customer already has an existing SCM system, changing it can require significant effort. This can be described as the software vendor having 'lock-in power' (MA 2007). All of these factors mean that there is a limited amount of sales opportunities for the target company's products. Furthermore, these opportunities are highly competed by different software providers.

In order to keep growing, continuing to find new sales opportunities, and offering new solutions to both new and existing customers, the company is looking into diversifying its product offering. There are many types of needs in regards to retail software and at the moment there is some knowledge about how the offering could be expanded and what sort of software there is a demand for. However, it is difficult to validate the PMF of a particular new product, especially when expanding outside of the company's core competence area, where there is significant uncertainty.

1.3 Research Objectives and Questions

The objective of the thesis is to find and define methods of estimating and validating PMF for new enterprise SaaS products. The focus is especially on established companies, that are developing new products to their portfolio. By answering the research questions listed below, the thesis aims to aid product management operations in distinguishing PMF by providing tools for a more structured approach. Ultimately this results in possibilities for more efficient company expansion. At the same time, the thesis contributes to supplementing the lacking practical research in regards to evaluating PMF, especially in a complex enterprise context.

The research questions are:

RQ1 How do enterprise software companies perceive Product-Market Fit in practice and what implications does it have to enterprise software development?

RQ2 How are companies validating Product-Market Fit for new-to-the-company or new-to-the-world enterprise software products?

RQ3 What characteristics do the contexts of being an established company and operating with SaaS model provide to Product-Market Fit validation for a new product?

The scope of the thesis is limited to only include Business-to-Business (B2B) markets, more specifically enterprise software. Therefore, applications aimed at consumers are not specifically addressed, although this topic might be touched at some points. It should also be noted that the context of this study is especially in the SaaS business.

Furthermore, it should be highlighted that the topic of the thesis is about validating and estimating PMF. This means confirming or refuting whether PMF exists for a product when the product already exists at least on some level. Furthermore, the scope does not include exploring the market for completely new ideas. However, these concepts are somewhat intertwined: the conception of a product's PMF starts taking form at a rather early stage, as will be discussed later.

1.4 Thesis Structure

This thesis consists of six chapters, that are further divided into sections and subsections. In this chapter, a basis for the thesis was laid. The definitions of basic concepts in the context of this study were provided and along with further basic background information. Also, the target company was introduced and the real-life use case of the study results was shown and therefore the necessity of the study was argued for. Finally, the research problem and questions were formulated.

In chapter 2 a literature review is conducted to get an understanding of the subjects at hand. The context of the study is clarified by investigating characteristics of enterprise software and SaaS in an enterprise context. PMF as a concept is investigated and its effects elaborated. Additionally, methods for validating or estimating PMF are presented. Also, some frameworks for NPD are shown, and their connection to PMF discussed. Finally, an initial framework for validating PMF based on literature is presented.

In chapter 3 the research methodology of this thesis is presented. The constructive research approach is presented and the applicability of that and other methodology choices in this study are argued for. The process of performing the study is presented based on the constructive research steps and the particular actions taken in this study are presented. Specifically, interviews that were used in gathering empirical data are described

and their analysis explained. Finally, the method of validating the findings through discussions with product leads in the target company is presented.

In chapter **4** the empirical findings from the interviews are presented. First, findings related to the concept of PMF in the context of this study are presented, as well as needed information to understand PMF better. Next, different methods of producing this knowledge are investigated. In this regard, elaborations about customer collaboration are made. Lastly, found indicators for PMF are shown. In general, different aspects discussed in the interviews are raised, evidence in the form of quotes is presented, and the emerging themes are dissected.

In chapter **5** answers to the research questions are discussed based on the results, new reflections from arising themes are made, and causes for the results are contemplated. Connections to literature are also noted. First, the types of elements that make PMF are discussed and four proposed types of PMF knowledge are presented. Next, the different knowledge creation methods and the types of knowledge they create are elaborated upon. At the same time, ways to validate PMF are discussed. Also, the considerations related to the context of this particular study are discussed. Lastly, the results are condensed into frameworks for understanding and validating PMF and future recommendations are given.

Finally, in chapter **6** the results iterated one more time to summarize the contributions of the core findings. Main contributions revolve around making PMF a more structured concept by presenting elaborations to related knowledge and methods to produce this knowledge. Also, the limitations related to the findings are discussed and their reliability is assessed critically. Lastly, the need for future research is recognized and possible future topics are briefly discussed.

2. LITERATURE REVIEW

2.1 Enterprise Software and Linkages to Software-as-a-Service

2.1.1 Enterprise Software

'Enterprise software' or 'enterprise systems' are applications that are used in companies' core business operations that aim to model organizational processes and consolidate information flow within the companies (Davenport 1998; Boillat & Legner 2013; Nieuwenhuis et al. 2018). The aim of these is to control complex business processes (Rettig 2007) and solve related problems (Nieuwenhuis et al. 2018). For example, ERP systems can do this by processing transactions and providing support for decision-making (Jacobs et al. 2018, p. 18).

The role of enterprise systems means that the applications can be extremely business-critical and the daily operations of a company can be highly dependent on these (Davenport 1998; Jacobs et al. 2018, p. 16–22). On the other hand, they can offer large business benefits by providing intelligent decision-making support, making operations clearer and more effective by defragmenting information, allowing a more holistic view of operations, and making the processes more transparent and manageable (Davenport 1998; Trott 2017, p. 139; Jacobs et al. 2018, p. 18, 24–29).

Enterprise software can include for example ERP, CRM and SCM systems (Boillat & Legner 2013). Other activities that can be included in an enterprise system are financials, human resources, manufacturing operations, logistics, sales, and marketing (Davenport 1998). It should be noted that most B2B software applications are *not* enterprise software: only the ones that have a critical role in guiding and modeling business processes. Other types of B2B software include for example communications platforms, data storage applications, survey tools, and even email.

Enterprise software elements can all be included in a comprehensive ERP system (Davenport 1998; Ceccagnoli et al. 2012), but these are more often a collection of interconnected systems that allow information flow between them (Hine et al. 2009; Nieuwenhuis et al. 2018). The ERP system still often acts as the enabler and backbone for integrated activities across a company's functional areas, to which other applications can be integrated to enable for example more intelligent and specialized decision support (Jacobs et al. 2018, p. 16–19). Jacobs et al. (2018, p. 22–23) stress the importance of efficient

data integration across systems and although they discuss this purely from ERP point of view, the same underlining can likely be made to enterprise systems in general.

Enterprise systems are often modular, allowing selecting only needed modules for each case (Davenport 1998; Jacobs et al. 2018, p. 17). This modularity can also be seen as enterprise software being a consolidating platform that can be extended with different applications (Ceccagnoli et al. 2012; Jacobs et al. 2018, p. 17). In the cloud computing context this can be called 'enterprise SaaS + PaaS', which allows other developers to build value-adding content on top of the primary software (Boillat & Legner 2013; Nieuwenhuis et al. 2018).

Enterprise software characteristically can be applied to very different business environments. This means that they are designed to be a generic solution that adopts the best practices of the related business field, which are defined by the vendor. Therefore, an enterprise system is also actually a way of doing business. Consequently, there is limited support for proprietary processes. (Davenport 1998; Trott 2017, p. 139) This might mean the need to change business processes to fit the software (Davenport 1998) or to a more complex IT landscape where there are multiple interconnected systems completing different processes in their way suited for each specific case (Rettig 2007).

In any case, efficient usage of enterprise software is highly data-intensive and requires integration between IT systems and business functions (Trott 2017, p. 140; Jacobs et al. 2018, p. 17). Enterprise software are also inherently complex and require expertise to manage (Davenport 1998; Rettig 2007).

This places enterprise software in a challenging position regarding implementation (Davenport 1998; Rettig 2007). The complexity of software and difficulty of fitting the software with the business processes pose a risk. The depth of the software means it has effects on the whole company strategy, culture, and organization, which can cause issues if conflicts between the existing practices and the practices imposed by the software arise (Davenport 1998; Trott 2017, p. 140). Furthermore, the implementation can be very expensive and its success uncertain (Davenport 1998; Rettig 2007). This means that the attainable benefits and potential risks need to be evaluated carefully (Davenport 1998).

To combat the issue of cumbersome complexity in enterprise software, Rettig (2007) proposed focusing on service-oriented architecture, where each modular system provides a service that can be modified based on business goals. It is important to stress that despite its name, this is not directly comparable to SaaS, which can be seen as a delivery method or a business model (see subsection 2.1.2).

Despite this important distinction, SaaS can be seen as an enabler for providing more straightforward enterprise software solutions. This is because the shift to cloud-based enterprise software allows a less complex and more standardized IT infrastructure

(Nieuwenhuis et al. 2018). Furthermore, enterprise SaaS shifts the burden of maintenance to the vendor (Dubey & Wagle 2007), allowing the enterprise customers to focus on their core business (Nieuwenhuis et al. 2018).

Possibly due to these reasons the enterprise software has started to shift towards SaaS from traditional licenses (Dubey & Wagle 2007; Rymer et al. 2012; Boillat & Legner 2013). The progress has been slower than in some other software segments (Dubey & Wagle 2007; Boillat & Legner 2013), possibly due to the critical nature of enterprise software and concerns about security and reliability (Rymer et al. 2012).

2.1.2 Characteristics of Software-as-a-Service in Enterprise Context

SaaS is a method of delivering software products that has seen a rise in the past 20 years. In contrast to traditional off-the-shelf software products, SaaS system is usually stored off-site from the customer and accessed via the internet, payments are based on smaller recurring fees rather than one-time licenses, and the development cycles are faster. (Waters 2005; Dubey & Wagle 2007; MA 2007) For the customer, this allows taking a more relaxed approach to software maintenance. On the other hand, the software vendor gets a more constant stream of revenue over time, as pricing is usually based on subscription or transaction numbers. (Dubey & Wagle 2007; MA 2007) The total cost of software is also more transparent (Waters 2005).

Perhaps the most everyday example of SaaS application is an email application that is accessed via a web browser. This is an application that is accessed remotely without the need for any installations locally, albeit there is also the option to install a client application. Of course, enterprise software is different, but there are examples of those as well. Some enterprise SaaS applications noted in literature are NetSuite, Salesforce, and Microsoft Dynamics AX (subsequently rebranded to Microsoft Dynamics 365) (Boillat & Legner 2013; Nieuwenhuis et al. 2018).

The exact definition of SaaS is not clear or definite in literature. However, most authors approach the definition through the delivery method of the software. Sun et al. (2007) note that in SaaS the software is accessed remotely, usually via the internet. Dubey & Wagle (2007) also highlight the delivery method, even equating terms 'online delivery of software' and 'software as a service'. Waters (2005) also notes that SaaS is seemingly part of the customer's IT system and they have administrative control, but the software is actually in the vendor's data center. This definition is also supported by MA (2007), but an additional definition is offered through responsibilities shared between the vendor and customer: The vendor delivers the software and computing utility, and the customer has no responsibility in the upkeep of the system.

This definition of remote access and a combination of hardware and software in the same service seems to be prevalent. However, specifically in enterprise SaaS there is also a possibility of deploying the software in private cloud (Rymer et al. 2012; Boillat & Legner 2013; Nieuwenhuis et al. 2018). This means cloud infrastructure that is dedicated exclusively for a single organization, that can be managed by the organization themselves on-site (Hogan et al. 2011, p. 15; Rymer et al. 2012). If this is the case, it seems that providing the technical infrastructure might not be a necessity in enterprise SaaS, although it seems to be usual. This consideration highlights the method of accessing the software remotely, rather than the responsibility of infrastructure.

This relates to multi-tenancy, which many authors also include as part of SaaS definition (Mäkilä et al. 2010), and which is indeed usual in SaaS (Sun et al. 2007). Multi-tenancy means that multiple customers can access the same software instance, where some computing resources are shared while also ensuring privacy between tenants (Krebs et al. 2012). However, Mäkilä et al. (2010) argue that multi-tenancy is rather a technical convenience related to SaaS, than an actual core part of it. Krebs et al. (2012) also note that *some* SaaS solutions use multi-tenancy, implying that it is not necessary.

Some papers also note inability to customize the product as a defining feature of SaaS (Tyrväinen & Selin 2011; Rönkkö et al. 2011, p. 57). This is because economies of scale and high scalability are a large part of SaaS competitiveness (Waters 2005; Boillat & Legner 2013). These same things apply to enterprise software in general to an extent, as the solution should be able to serve different types of customers as a starting point (Davenport 1998). However, many customers still have some personalized requirements for the solution (Sun et al. 2007). This discrepancy is a challenge, and according to MA (2007) this is the reason German enterprise software company SAP believes there can be movement back towards in-house systems. However, it is also noted that the standardization of SaaS still allows configuration. This can be supported by self-service channels. (Sun et al. 2007; Tsai & Sun 2013). Especially enterprise software can be configured based on modules and business rules (Davenport 1998).

In this discussion, it is important to note the difference between configuration and customization. Generally, the dictionary definitions of these are rather similar, but in SaaS context they can be used to mean very different things, although their usage can be confusing (Sun et al. 2008) and some authors seem to use them as synonyms. The distinction and applicability of these terms in SaaS applications is shown in table 1.

Tsai & Sun (2013) discuss application configuration and customization in enterprise SaaS context, and notes that they often allow changing Graphical User Interface (GUI), workflows, service selection and configuration, data, and Quality of Service (QoS) based on usage needs. They add that the customization can be done by developers, consultants, or users and there might be tools inside the system to recompose the software to specific

Table 1. Configuration and customization in software-as-a-service (adapted from Sun et al. 2008)

	Configuration	Customization
Definition	Setting pre-defined parameters or changing application function within a pre-defined scope	More complex amendments that usually require source code changes
Usage in enterprise SaaS	Yes	Possible, but heavily discouraged due to high costs and complexity
Usage in SaaS in general	Dependent on the complexity of software	No

business needs. Based on this, it seems that different applications allow different levels of configuration, and the point for needing developer customization differs. Sun et al. (2008) call this 'configurable limit', which is the extent to which the functionality of the application can be altered without customization. They continue that it is in the interest of the SaaS vendor to avoid customization and push the configurable limit as high as possible. This is to allow a wide range of use cases while avoiding maintenance of custom code. A higher configurable limit, therefore, allows more flexible use of the software in different circumstances.

Due to the importance of enterprise software even customized changes are possible, but they significantly add to the complexity of the system (Davenport 1998; Rettig 2007; Sun et al. 2008). System integrators and other implementation partners play a key role if these customizations are needed (Boillat & Legner 2013). Therefore, it might be too radical to say that there is no customization in SaaS, especially when it comes to the enterprise context. Furthermore, it should be noted that high configurability is important and is usually built into enterprise software applications. The goal seems to be to keep the core of the application the same for each customer but allow changing the details of executing the service as easily and widely as possible.

Partially due to the limited or directed customization, many sources mention quick or affordable implementations and integrations as a defining factor of SaaS (e.g. Waters 2005; Rönkkö et al. 2011, p. 62). However, this is not always the case, as SaaS application functionalities can differ a lot, which affects the needed connections to other applications (Sun et al. 2007; Tsai & Sun 2013). As discussed earlier, especially enterprise software usually requires some sort of integrations and other implementation (Davenport 1998; Rettig 2007). Still, there are some indicators that enterprise SaaS systems can be more efficient to implement in comparison to their traditional counterparts. This can be due to reduced need for internal technical configuration, scalable nature of SaaS, evolved role

of resellers and integrators, and enhanced customer support. (Boillat & Legner 2013; Nieuwenhuis et al. 2018)

In an example of CRM software implementation Dubey & Wagle (2007) estimate enterprise SaaS implementation costs to be around two thirds of similar traditional software. In contrast, in some cases SaaS implementation can be almost instantaneous (Waters 2005). However, these sort of instantaneous implementations seem to mainly regard consumer-oriented SaaS, where integration to other systems is not needed. It is quite natural to assume that heavy integrations mainly concern enterprise applications, where different systems exchanging data are more plentiful and business processes affect application usage. In fact, enterprise software cannot be viewed as a single entity, but as a part of a larger network of systems (Hine et al. 2009). Depending on the use case, the system might have to be integrated in regards to GUI, processes and data (Sun et al. 2007), which are very necessary in the enterprise context. Therefore, it seems that enterprise SaaS applications usually require some form of implementation.

Many authors also mention the revenue logic of SaaS as a defining feature. SaaS is based on recurring revenue logic that is carried out with fixed rates or charging based on usage (Sun et al. 2007; MA 2007; Rönkkö et al. 2011, p. 57, 61). For customers, this means shifting from high up-front payments of licenses into more spread-out payments (Rönkkö et al. 2011, p. 57). Still, there can be some implementation fees in SaaS too, but these are generally lower than in traditional software installations (Dubey & Wagle 2007).

Boillat & Legner (2013) investigated the revenue model in enterprise SaaS specifically. They found that in this context revenue can be based on:

1. user and/or company subscriptions
2. pay-per-use functionalities, workflows or transactions
3. fees for support, configuration, implementation, and other professional services which are not necessarily recurring.

This recurring payment model makes the TCO in SaaS more transparent in comparison to licensed software, as the payments are contractually defined. The cost of the software itself is usually higher in SaaS than in the traditional software model. However, the difference is maintenance responsibilities and the delivery method usually means that TCO is still lower in SaaS. (Waters 2005; Dubey & Wagle 2007) This is illustrated in figure 1.

With these recurring payments it might feel like the customer is just 'renting' the software in SaaS, while traditional software delivery allows buying it. However, the ownership model in them is actually rather similar. The vendor owns the software code but the customer owns the data and has control over the processes in both cases. (Waters 2005) Therefore, it could be argued that the revenue model around the software is essential in distinguishing between the two.

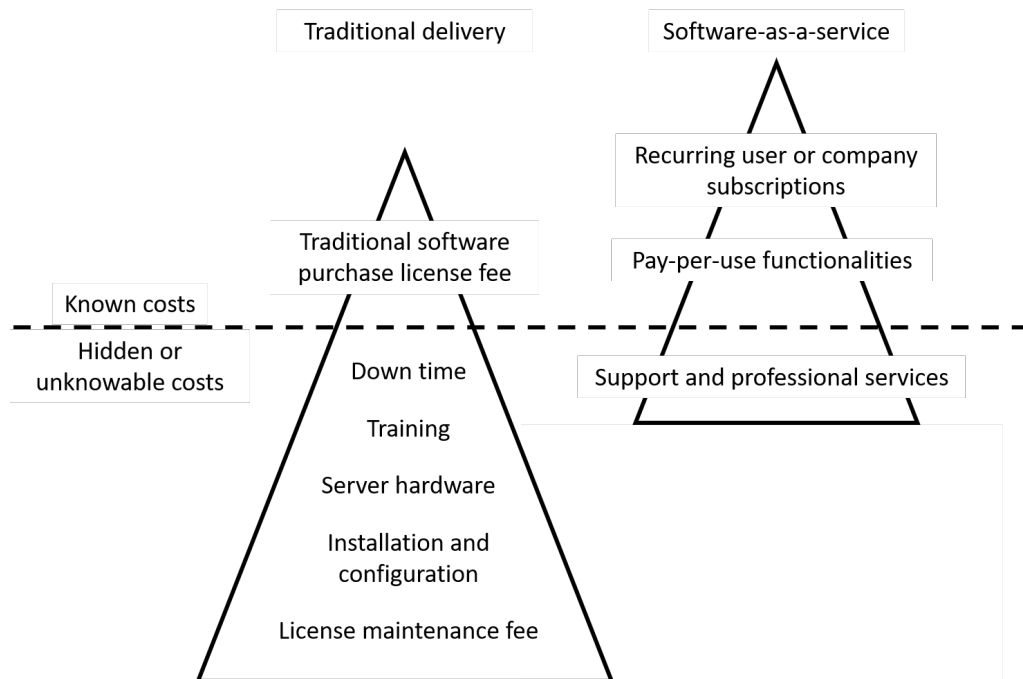


Figure 1. Visibility of costs in enterprise software-as-a-service and traditional software (adapted from Waters 2005 and modified based on Boillat & Legner 2013)

The recurring fees also incentivize the vendor to improve the software continuously to keep customer attrition (also known as ‘churn’) low (Rönkkö et al. 2011). The deployment of updates can also be more efficient (Waters 2005). This means that the vendor can and even must keep improving and fixing the software in an efficient way. The customer receives better service levels and the vendor constant revenue. It can in fact be argued that SaaS produces outright higher quality and social welfare (Choudhary 2007). MA (2007) furthermore argues that SaaS companies should make the costs as exiting the use of software as low as possible, as this can increase the market share and similarly allow the vendor to prove their offering’s value.

According to a survey made by Mäkilä et al. (2010) the characteristics of “pure SaaS” are unclear. According to their survey, there are different approaches within SaaS companies to characteristics typically attributed as defining SaaS. For example, in around 78 % of the analyzed pure SaaS companies the product was accessed via a web browser (13 % cases unclear) and in around 61 % of cases the product was not tailored for customers (30 % cases unclear). This can mean that the characteristics of SaaS can differ based on the context of each application. Mäkilä et al. (2010) also recognize that the SaaS criteria used in their study might be incomplete.

This difference in details is also recognized in the literature. Tyrväinen & Selin (2011) list SaaS criteria compiled from multiple other sources. They list the following six elements:

1. Software is used with a Web browser or other thin client making use of standard internet protocol.

2. A standardized software product is provided with no customization.
3. There is no need to install software to the customer site.
4. Deployment requires no major integration or installation.
5. Customers pay for use of the software rather than licenses.
6. The same multi-tenant installation is provided for several customers.

These elements have been addressed already and as has been noted, they are somewhat contested. However, it is important to note the wording of some of these elements: they include some uncertainty conveyed through words such as 'or other', 'no need', and 'no major'. It seems that SaaS might have to be defined through its capabilities, not necessarily the exact manifestation of these in each case. This is underlined by the different types of SaaS applications: consumer and enterprise-oriented applications have very different operational environments, both in usage and in a technical sense. Mäkilä et al. (2010) very similarly note that it is difficult to describe SaaS with a simple list of criteria. They continue that while it might be possible to define SaaS in a technical sense, identification in a business context should reflect the obtainable business benefits, such as more flexible integration, development, and pricing.

It is indeed possible that SaaS cannot be defined completely accurately, as it is a relatively new concept in a quickly evolving operational environment. Turner et al. (2003) do not attempt to define SaaS in detail but note that "SaaS focuses on separating the possession and ownership of software from its use." However, as was noted earlier, the ownership of the programs is not in fact different in SaaS and traditional software (Waters 2005). Therefore, this idea could be developed further and it could be stated that SaaS aims to separate the physical data storage location of the program from its use. This is a concept all points of view seem to agree upon.

Based on these considerations, it can be formulated that enterprise SaaS has the following elements:

1. Software is installed on a remote server, that is usually run by the vendor
2. End users access the software via an internet connection and do not require separate software installation
3. Payments are mainly based on recurring fees, although some non-recurring service fees are also possible
4. The software is highly scalable in the targeted market and is usually designed to have tools allowing configuration and even some customization.

It has now been established what is enterprise software and SaaS. The context of this thesis is at the intersection of the two. To illustrate this, the position is highlighted in figure

2. It should be noted that the figure is by no means an exhaustive illustration of different software types, but one highlighting enterprise SaaS.

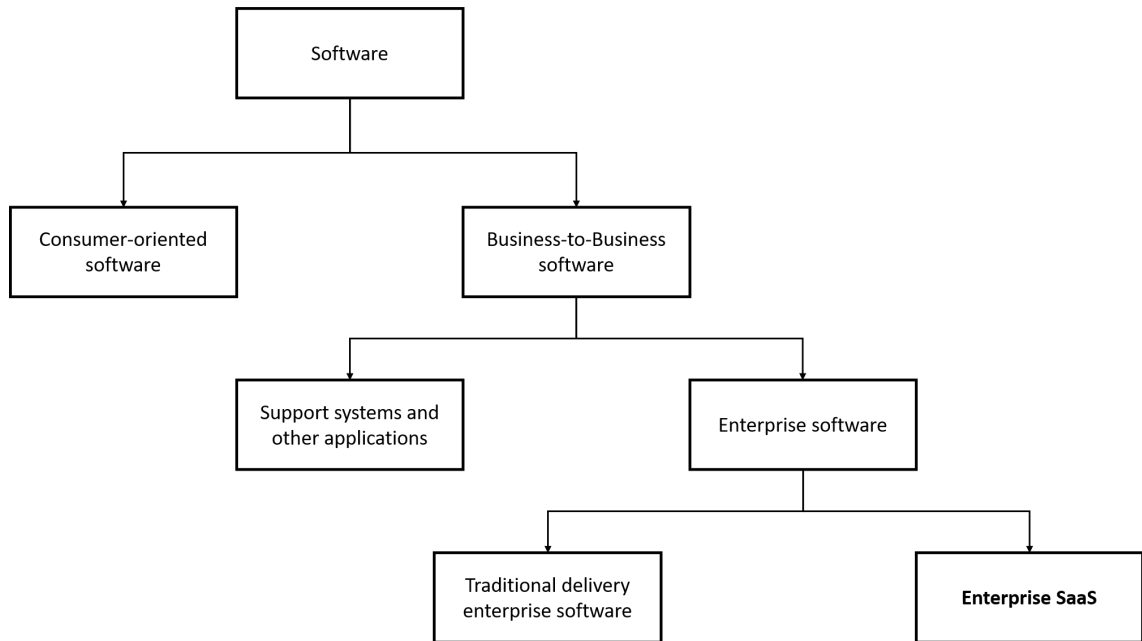


Figure 2. Position of enterprise software-as-a-service

2.2 Product-Market Fit

2.2.1 Definition and Effects of Product-Market Fit

The concept of Product-Market Fit (sometimes also written as ‘product/market fit’) is rather simple, albeit abstract. It is the level an offering by a company solves the needs and wants of customers (Cooper & de Brentani 1991). This involves understanding customer problems and providing solutions that customers want to effectively solve those (Maurya 2012, p. 8; Gupta et al. 2020). Some also underline, that in order for there to be PMF, the market has to be sizable enough to provide growth possibilities (e.g. Andreessen 2007; Cooper & Vlaskovits 2010, p. 37). The exact wording of this concept changes a bit from source to source, but there seems to be a rather good consensus about the meaning.

PMF is closely related to another concept called ‘problem-solution fit’. This is the concept of having a problem worth solving and the possibility to solve it. Some consider this as a precursor for PMF. (e.g. Maurya 2012, p. 8; Gupta et al. 2020) On the other hand, some use the terms almost interchangeably (e.g. Blank & Dorf 2020, ch. 3).

Some definitions of PMF are listed in table 2. Based on these sources, PMF defines whether potential customers need the product or not. The main difference of the definitions seems to be that some only consider how well a product is suited for a market, while others also consider the viability of the said market. These seem to be the two

main elements of PMF: fulfilling customer needs and market viability. On the other hand, Eisenmann et al. (2013) approach this via business models, where PMF is achieved when the business model is confirmed to work. This, therefore, includes not only fulfilling customer needs and finding a viable market, but also the method of successfully exploiting the combination of the two through value capture. In the context of this thesis, the fit between product features and customer needs is the most relevant, which also seems to be the main concern in most definitions.

Table 2. *Definitions of Product-Market Fit*

Source	Definition
Cooper & de Brentani (1991)	The degree to which a service meets customer needs and wants
Andreessen (2007)	Being in a good market with a product that can satisfy that market
Fitzpatrick (2010)	The product on offer is a good match to the needs of the target market
Cooper & Vlaskovits (2010, p. 37)	Product showing strong demand by passionate users representing a sizable market. Result of three criteria being satisfied: <ol style="list-style-type: none"> 1. The customer is willing the pay for the product 2. The cost of acquiring a customer is less than what they pay 3. The market is large enough to support the business
Blank & Dorf (2020, ch. 7)	Comprised of three factors: <ol style="list-style-type: none"> 1. Answering to a problem or need that is urgent or vital to lots of customers 2. Solving the problem or filling the need at price customers will gladly pay 3. Having enough customers 'out there' to deliver a sizable business opportunity
Blank (2020, ch. 2)	Match between product features and the ability to solve customer problems and needs

The approach of considering market viability as part of PMF is strongly argued for by Andreessen (2007), who notes that good people and products are just enabling success in a great market. Furthermore, he argues that an acceptable product might succeed in a great market, while a great product will not in a bad market, meaning that the market matters most. In regards to service marketing, Gummesson (1978, p. 92) embodies this by noting that “there is no sense in solving the wrong problem in an excellent way.”

Therefore, it can be argued that the narrower view of PMF that only considers satisfying customer needs is lacking: this is not enough to achieve business success if there is no big enough market to grow in. The wider definition makes PMF a more strategic concept

and this connection to market is further supported by Blank & Dorf (2020, ch. 7), who connect PMF to business models by using the business model canvas by Osterwalder & Pigneur (2010) as shown in figure 3.

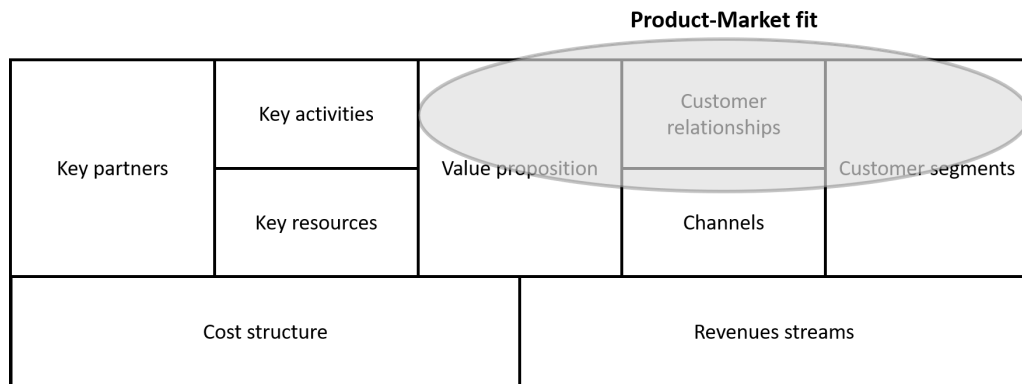


Figure 3. Positioning of PMF in business model (adapted from Blank & Dorf 2020, ch. 7)

Based on the definition of PMF, Brown (2009, as cited in Dennehy et al. 2019) defined that a product must meet three criteria to reach PMF:

1. Desirability: What people want
2. Feasibility: What is functionally possible
3. Viability: What is likely to become a sustainable business model.

These criteria overlap with each other. PMF is achieved in the area where the three meet. (Dennehy et al. 2019)

In the consumer context, a rather similar concept of ‘jobs to be done’ has been proposed. This is a theory in which consumption is directed by ‘jobs’ in people’s lives: requirements from spending time in a queue to finding career paths. In order to produce new successful products, companies must understand the ‘jobs’ and how to fulfill them better than existing solutions. (Christensen et al. 2016) Of course, in enterprise context the these jobs are very different, as discussed in 2.1.1. One still can see the connection of understanding customer need as the basis of innovation, and although Christensen et al. (2016) mainly address consumer products, they note that the concept also applies in B2B context.

It should also be noted that some seem to consider PMF as a sort of ‘boolean’ value: either it is reached or not. Others on the other hand consider it a scale, where ‘good enough’ fit is reached at some point. The former is present is for example Ries (2011) and Eisenmann et al. (2013), while the latter is supported by for example Cooper & de Brentani (1991). Viewing PMF as only having two possible discrete values, however, does seem rather lacking. Even though a product has not quite made it yet in regards to PMF, surely there is a larger domain of how close the product is to reaching traction. It is possible this is a semantic issue: PMF can be seen as a larger scale, but when good

enough fit is reached, the product can be seen as having PMF. This could explain the confusion.

Ries (2011, p. 219–221) links PMF to ‘engines of growth’. Those are different focuses for growing a startup and there are three of them. In this connection, PMF depends on which engine the company uses to grow. First is the sticky engine, where the company aims to attract customers and keep the retention rate as high as possible. (Ries 2011, p. 209–212). This is often the engine of growth used by SaaS providers (Maurya 2012, p. 160). The second engine of growth is the viral engine, where the goal is to increase the number of friends each customer recruits (Ries 2011, p. 212–215). The applicability of this in the enterprise context seems questionable, and examples of using this include for example social media networks (Maurya 2012, p. 160). The third one is the paid engine, where the aim is to increase the proportional margin between Customer Acquisition Cost (CAC) and Customer Lifetime Value (CLTV). While a company can have elements from multiple engines, usually only one should be the focus. (Ries 2011, p. 215–219)

Low PMF means there is no need for the product, and hence no demand. Lacking PMF will likely result in business failure (Cooper & de Brentani 1991; Andreessen 2007). Cooper & de Brentani (1991) researched 106 different new service products in the financial sector and found that PMF strongly correlates with business success, while poor PMF often resulted in business failure. Having good enough market fit, therefore, seems crucial in business success. Andreessen (2007), who some (e.g. Ries 2011, p. 219–220) credit as the creator and others as the popularizer (e.g. Maurya 2012, p. 155) of the term ‘product-market fit’, perhaps a bit exaggeratedly argues that product-market fit is the only thing that matters in a startup context.

Recognizing the point when PMF is reached can be considered essential to the company’s development. This is seen to relate to the concept of scaling, that is to grow the business by investing in customer acquisition, focusing on expanding staff and infrastructure resources, and generally preparing to serve a larger customer base (Eisenmann et al. 2013; Blank & Dorf 2020, ch. 2). The idea that a start-up should not scale until PMF is reached is central in lean startup methodology. Premature scaling can cause loss of development agility, customer confusion, and slower feedback reaction. (Eisenmann et al. 2013) Furthermore, scaling too early can waste resources on a sales force that is not capable of selling the product just yet (Leslie & Holloway 2006). Therefore, premature scaling can cause both increased resource spending and lower development progress in the future (Leslie & Holloway 2006; Eisenmann et al. 2013) and consequently lower efficiency in development. Point of reaching PMF can be considered so impactful, that a startup’s life cycle can be divided to pre-PMF and post-PMF parts (Andreessen 2007; Gupta et al. 2020).

2.2.2 Relation between Strategy and Product-Market Fit

We have now established that PMF is a central part of developing successful products. This means that it is quite inevitable that the concept is intertwined with other business concepts as well. Perhaps the most apparent connection is to NPD, which is addressed in its own subsection **2.3.1**. This subsection focuses on the connection between PMF and strategy.

Ries (2011, p. 22–23) notes that a product is built based on strategy, which in turn is based on vision. He lists that the strategy in this context includes business model, product road map, perception of partners and competitors, and idea about who the customer is. Cooper (1983) also lists a number of product and market aspects that are important to strategy in NPD, such as degree of product differentiation, innovativeness, quality level, market size, competitive situation, and market synergy to the company.

The exhaustive listing of strategic elements in NPD might not even be possible, but these strategic considerations are relevant especially in the wider concept of PMF where market viability is assessed. This is because strategic decisions act as a basis for development (Ries 2011, p. 22) and they can affect NPD outcomes (Cooper 1983). Furthermore, it should be noted that the strategy can change along the development process in multiple ways, in an event called ‘pivot’. These pivots are planned and fundamental changes in the way a company operates, who it targets, what sort of product it offers, and how it collects revenue. (Ries 2011, p. 149–178) In other words, a pivot is a change in direction based on information gained during the development and it can be seen to reset the situation and made assumptions of the product (Bosch et al. 2013; Frederiksen & Brem 2017). As a result, a pivot can be a point of discontinuity also in understanding PMF, as the surrounding operational environment and related customer needs can change in this event.

Corporate strategy, business strategy, research, and technology strategy all affect developing products in some way (Trott 2017, p. 322–324) and are of course entire vast research fields of their own. This wide a subject, or rather a set of subjects, cannot be discussed in this thesis very extensively. Tyrväinen & Selin (2011) specifically address strategies in SaaS markets in a ‘four-leaf clover’ model, but the focus of this is in supporting marketing and sales strategies, rather than the development of products. Notably, however, they find typical relationships between the vendor’s business model, target customers, and customer relationships. While these considerations might not be directly relevant in developing a product to reach PMF from the product perspective, it is possible that this model could still be useful in designing a suitable business model.

From the point of view of PMF the concept of ‘business arenas’ seems to be a suitable strategic reference framework to describe the linkage to markets. Arenas are areas where

customer needs, market, and company capabilities meet. In other words, they are some combination of customers, customer needs and technology, that can be used to guide product development efforts. (Cooper 1987) The connection of these business arenas to PMF is rather clear, as both address the connection between a product and market needs.

Cooper (1987) divide business arenas into dimensions and several components. The first dimension describes arena attractiveness, which is roughly analogous to market viability, which was discussed earlier. The second dimension is business strength, which describes the capability to create capable products and provide unique value. These aspects are partially related to answering customer needs, although certainly, the scope is larger. Based on a survey for industrial companies active in NPD, Cooper (1983; 1987) found elements of business arenas in successful new product programs. These are adapted below:

Arena attractiveness

- Market attractiveness
 - The size of the market in the number of prospects and in monetary value is large.
 - The market has long term potential and is growing quickly
- Technological sophistication
 - Current products in the arena are high technology products
 - The arena is characterized by leading and state of the art technology and has products with sophisticated technology

Business strength

- Technological synergy
 - Familiar production processes
 - The company has applicable R&D and engineering capabilities that fit the arena
- Marketing synergy
 - The company has applicable salesforce, channels of distribution, and promotion capabilities that fit the arena
- Differential product advantage
 - Anticipating that the company's future products can have a major impact on customer use behavior

- The company's future products are unique and will fulfill customer needs better than competing products

The elements in successful market arenas can be seen to synergize with the concept of PMF. Market arenas are linked to PMF in figure 4. Here it is shown that the two main elements of PMF can be seen as cross-sectioning the two main elements of successful arenas. The two dimensions of successful market arenas (arena attractiveness and business strengths) are shown in the vertical axis, while the two dimensions of PMF (customer needs and market viability) are on the horizontal axis. The formed quadrants contain the components of attractive arenas and can be approached with different analysis methods.

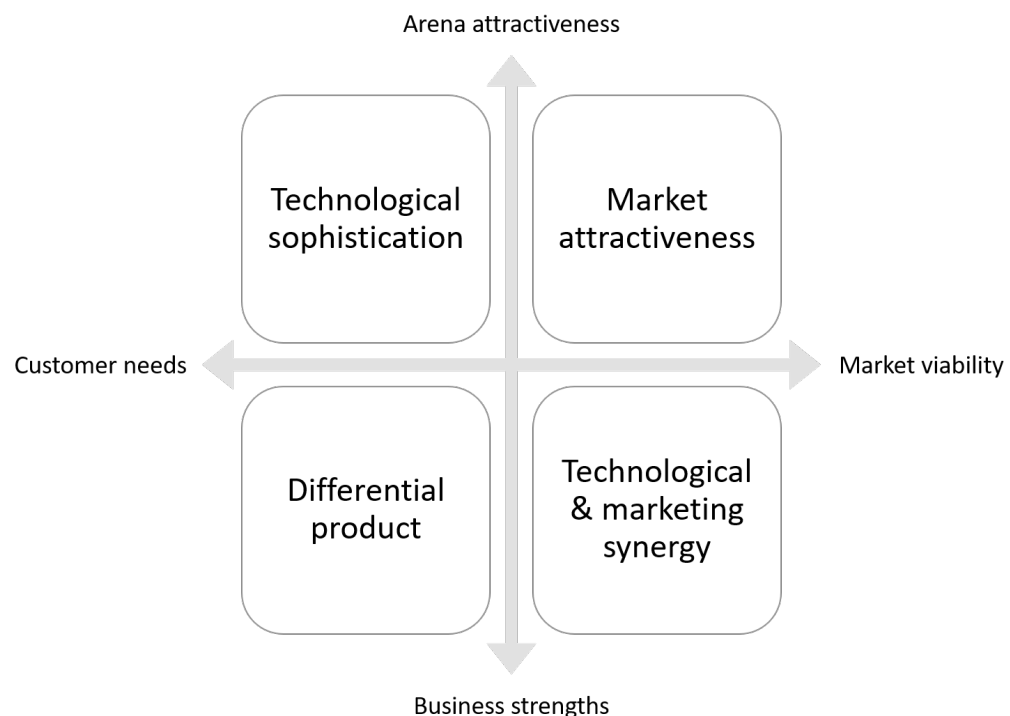


Figure 4. Cross-section between product-market fit and successful market arena characteristics

An applicable framework regarding the technological sophistication of an arena is innovation adopter categorization by Rogers (1983). He segments market actors into five categories based on their interest and willingness to adopt new innovations. The categories are innovators, early adopters, early majority, late majority, and laggards, with opinion leadership and willingness to adopt new innovations decreasing from first to last (Rogers 1983, p. 245–251). Combining the concept of adopter categories and technological arena sophistication, an arena seems to be more attractive if the number of innovators, early adopters, and early majority customers within that market is proportionally large.

Differential product advantage seems to be rather similar to the concept of Unique Value Proposition (UVP). The value proposition describes what value the product creates and for whom it does this (Eisenmann et al. 2013; Maurya 2012, p. 29–31). The 'unique' part

describes how the product differs from other competing products (Maurya 2012, p. 29). In other words, UVP describes how the customers' problems are solved with the technology or product and why it is better than the current way of solving that problem.

Recognizing market attractiveness requires analyzing the market's size and growth speed. This, again, might not be a simple task and the specifics of this cannot be discussed here. Usual ways of representing market size for a new product are Total Available Market (TAM), Serviceable Available Market (SAM) and Serviceable Obtainable Market (SOM). TAM is the total size of the targeted market, SAM the size addressed segment within that market, and finally SOM the size of that segment the company can realistically capture. (Berthelsen & Brant 2018) Berthelsen & Brant (2018) use the term 'market segment opportunity' instead of SOM but the former does not appear to be common and their meanings seem very similar.

Finally, there is the element of recognizing technological and marketing synergy. Cooper & Edgett (1999, p. 131) discusses synergies as leveraging the company's core competencies through strengths, resources, expertise, experience, and delivery capabilities. New products that leverage existing capabilities and relationships are more likely to succeed, although these aspects are not strictly required to have success (Cooper 2011, p. 94–97). This aspect seems intrinsically situation and company dependent, as there can be a nearly endless number of competencies and methods of leveraging them with new products.

2.2.3 Startups and Experimentation

It should be noted, that many authors address PMF in startup context (e.g. Ries 2011; Maurya 2012; Eisenmann et al. 2013; Blank & Dorf 2020). This is natural, as after all developing new solutions and achieving PMF is (or at least should be) central to a startups' operations (Andreessen 2007; Ries 2011).

However, these concepts seem to be applicable to many companies. In this thesis, the main focus is on creating completely new products. This process might not be very different from a startup. In fact, the term startup does not necessarily say anything about the company size but can be defined as "human institution designed to create a new product or service under [...] extreme uncertainty" (Ries 2011, p. 27).

Therefore, any offering development can be seen as a startup if the conditions are uncertain, which the expansion to a completely new product implies. Indeed, even larger companies can use internal startups to develop new products (Leppänen & Hokkanen 2015; Edison et al. 2018). According to a survey of 170 executives, 82 % of large public companies use at least some elements of the lean startup approach (Kirsner 2016).

Using startup methodologies in established companies is therefore certainly possible, but there are also challenges to this. Kirsner (2016) highlight two main challenges. Firstly, in larger companies startup mentality undermines the existing frames and positions in a company: there are risks to marketing, brand, and authority of decision-makers. The second challenge he highlights is the hand-off between new product development and rollout. If the new offering seems insignificant in comparison to existing products, as it probably initially does, it might not receive the attention it needs after the most active phase of development has ended. Leppänen & Hokkanen (2015) describe this problem of new ideas not getting enough attention as ‘vanishing into the ocean of mediocrity’.

These potential issues are also supported by Edison et al. (2018). They also raise more potential issues, such as policies slowing down development and lack of freedom. These can manifest in the form of existing processes, that can be difficult to follow for a startup. Also, in corporate environments, there might be expectations of predictability, for example in the form of revenue forecasts. (Eisenmann et al. 2013) These go against the very definition of a startups, which act under uncertainty (Ries 2011, p. 27). Furthermore, conflicts between serving existing customers and potential new customers might arise (Edison et al. 2018).

Potential methods to combat issues with internal startups in established companies seem to revolve around giving the startup more autonomy and freedom from general guidelines. Also, strategy and enough resources for innovation and experimenting can help these startups. (Leppänen & Hokkanen 2015; Edison et al. 2018) Specifically in established companies the internal startup can still benefit from access to existing customers and accrued expertise (Edison et al. 2018).

Another concept that many sources bring up when discussing PMF is MVP. The exact definition of this is rather unclear (Frederiksen & Brem 2017). However, the idea of MVPs is to provide a way to test a product with minimum effort. These can take the form of prototypes or simpler presentations of the product. The exact form or complexity of MVP differs and cannot be formulated universally, but often a rather simple solution is possible. (Ries 2011, p. 77, 93–98)

Indeed, MVP is a product with the smallest possible set of features, which are driven by the product vision (Blank & Dorf 2020, ch. 3). Eisenmann et al. (2013) further elaborate this by stating that MVP is the smallest set of features required to test a hypothesis. Therefore, the exact form of MVP can depend on what sort of verification is sought and how far the development is.

Unlike the final product, MVP is therefore also a method of learning along the development process: it allows testing design, technical and business hypotheses (Ries 2011, p. 93–98). To be effective and usable, MVP must be measurable and actionable. In other words, testing it must provide some feedback about the product it represents and a ba-

sis for further development. (Ghezzi 2019) Through these characteristics, Ghezzi (2019) highlights four characteristics of an MVP:

1. They resemble or embody the business idea of the final envisioned product
2. They are actionable
3. They are measurable through testing
4. They are less wasteful than full prototypes.

At the same time, Ghezzi (2019) notes that in B2B setting MVPs cannot be ‘too minimum’, because these have to compete with existing offers at least on some level. This presents a discrepancy in the MVP logic: it must be lean, economical, and quick to develop, but in B2B it must also be rather mature. This problem is also highlighted with one startup comment in the article by Ghezzi (2019):

“We serve companies with complex systems, so it’s kind of hard for us to isolate key functions and test them on their own; what happened when we applied the lean approach was that we ended up by creating a full prototype – and its budget was far from being cheap or lean.”

This is especially relevant in the enterprise software business because as discussed before these are complex systems that require a high level of integration and implementation. This means that the application of MVP practices can be challenging. There seems to be little to no research into how effective MVP experimentation can be conducted in these circumstances. This is further undermined by lacking research into experimentation in established companies (Hampel et al. 2020).

Although the concept of MVP is vague, the iterative product development it relates to has a strong basis in research. It should still be noted, that there is lacking evidence to support the efficiency of MVP experimentation, but there also has been no research going against this. (Frederiksen & Brem 2017) The concept is however used widely in practice. At the same time, building MVPs and designing informative and effective tests around these has proven to be challenging. (Ghezzi 2019)

Frederiksen & Brem (2017) aptly notes that the concept of MVP becomes very similar to designing an experiment, which is an entire comprehensive research field of its own. Lack of details in implementing actual MVP practices has been criticized (Frederiksen & Brem 2017) especially in B2B context (Ghezzi 2019), which seems to indicate that research into the linkage between design of experiments and MVP is lacking.

2.3 Validating Product-Market Fit in Enterprise Software Context

2.3.1 New Product and Service Development Frameworks

Validating PMF is especially relevant when introducing new products, as this situation includes uncertainty. The needs of the market are at least partially unknown (Ries 2011, p. 27–29). What exactly is ‘new’ in this context is discussed in multiple sources. Cooper & Edgett (1999, p. 11–13) recognizes six new types of new services in decreasing order of magnitude: new-to-the-world, new service line, addition to an existing service line, improvements to an existing service line, repositioning, and cost reduction. This thesis focuses on the first two.

Many new product development processes include validating the product as one or more activities. Often this includes also validating PMF, although this term might not be explicitly used. In ‘new product process’ Cooper & Kleinschmidt (1986) find 13 in developing new product. Notably, three of these can include validating market-fit: customer tests, test market, and pre-commercialization business analysis. Using test markets was found to have a positive impact on new product business performance. Furthermore, the study notes that preliminary market assessment is among the most crucial new product development activities.

Later this process was defined into a clearer stage-gate model (Cooper 1988). This is a sequence of stages, which are separated by gates. Each stage includes a set of activities to develop the product, while gates provide go/kill decisions. Importantly, one of the phases includes validating the product or customer acceptance. (Cooper 2011) This model has become something of a baseline for new product development, although it has also faced criticism (Ries 2011, p. 112; Blank 2020, ch. 1).

These models were initially mainly built for physical product innovations but have since evolved and been applied to services too (Cooper & Edgett 1999, p. 23, 157–158). There are differing schools in regard to how this connection between NPD and New Service Development (NSD) should be considered (Coombs & Miles 2000). Some studies have highlighted that while the development processes are different, NSD and NPD have many similarities (Nijssen et al. 2006), especially in technology-intensive realm (Jaakkola et al. 2017). On the other hand, models aimed specifically NSD have also been proposed (e.g. Alam & Perry 2002), although framework development for NSD has been somewhat limited (Yip et al. 2012).

There has been extensive discussion regarding what is a service and what separates it from physical products or goods (e.g. Zeithaml et al. 1985; Lovelock & Gummesson 2004; Vargo & Lusch 2004b). Services have traditionally mostly been seen as tradable products that are not physical (i.e. goods). Therefore services and goods have been

seen as mutually exclusive. (Vargo & Lusch 2004b) However, in an influential article, Vargo & Lusch (2004a) proposed a new more service-centered approach to markets, where services are seen as (p. 2) “application of specialized competencies (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself”. They have elaborated that this can manifest directly or indirectly as the provision of goods (Vargo & Lusch 2004b).

Vargo & Lusch (2004b) further elaborate that in fact, economic transactions are fundamentally about services through direct services and indirect distribution of goods. As a result, the value of economical exchanges can be seen to shift from the product itself to its consumption. This makes the customer much more central in determining and producing value. (Vargo & Lusch 2004a)

These concepts are seen well in enterprise SaaS, where the sold service is in fact a distribution method of a product, as discussed in subsection 2.1.2, and value is created through consumption of the product via this service. Still, because SaaS has elements from both traditional services and products, a wide variety of development frameworks can be applied in its context. Despite this distinction, SaaS applications will henceforth be addressed as ‘products’ in this thesis for the sake of clarity and readability, similarly to how Ries (2011, p. 28) defines a product: “Any source of value for the people who become customers. Anything those customers experience from their interaction with a company should be considered part of that company’s product.”

Some have also classed such combinations of products and services as ‘solutions’ (Foote et al. 2001) and some frameworks for distinctly solution development have been proposed (Yip et al. 2012). One such new solution development framework has been proposed by Huikkola & Kohtamäki (2020). While this process does not directly mention PMF, it does emphasize building MVP and validating that externally. This sort of external validation is also the starting point of the customer development model by Blank (2020). This model focuses on making sure PMF is achieved.

Ries (2011) presented a methodology for building a startup named ‘lean startup’. It is not a product development model per se, but a collection of tools and models aimed at making startups more successful. The main principle of the lean startup is to make innovation more responsive with a feedback loop, where products are built, tested, and learned from gradually, leading to improving the MVP iteratively. A very similar method of collaborative prototyping has also been formulated by Bogers & Horst (2014).

Overviews of some mentioned models are shown in appendix A. The specifics of these development models are outside of the scope of this thesis, but it should be noted that they all include some sort of validation for PMF, although not all of them specifically mention the term. This has at least three implications:

1. It can be said with relative confidence that PMF validation is a central part of developing SaaS solutions.
2. There are some existing tools that can be benchmarked for this use.
3. PMF is not something that should be measured at the end of the development process. Instead, ensuring it should be a distinct part of an iterative development cycle.

At this point, it should be noted that some frameworks and tools discussed in this thesis talk of 'customers' and customer collaboration. In NPD context the term does not necessarily include only actual paying customers. Instead, especially in this context, the term can be used to refer to entities that are influential to the sale and use of the product (Millier, as cited in Coviello & Joseph 2012). In this thesis, the term customer is also used widely and specifically includes prospects, unless the context in the usage states otherwise.

2.3.2 Actions to Produce Information about Product-Market Fit

This far the concepts related to validating PMF have been established. It has been noted, that PMF is a vital part of new product success. Furthermore, this is taken into account in some frameworks concerning new product development. However, while the concept of PMF is rather clear, as well as its effects, measuring it is more difficult (Cooper & Vlaskovits 2010, p. 37) and it is difficult to evaluate whether a new product truly has market attraction (Leppänen & Hokkanen 2015). Defining suitable tests for this has also been found to be difficult in practice (Ghezzi 2019). The question of whether a product has PMF has even been described as the most difficult in the development process (Blank 2020, ch. 3).

On the other hand, it has been argued that once PMF is reached, it is evident (Andreessen 2007; Ries 2011, p. 220). Andreessen (2007) describes these evident signs as clear market success, where customers keep piling up. However, it could be argued that such explosive growth might not happen before allocating sufficient resources to sales even if the product has PMF. Reaching PMF was seen as a prerequisite for this sort of scaling in subsection 2.2.1, which causes a discrepancy: starting to focus on sales cannot be both a prerequisite and result of reaching PMF. Furthermore, it seems likely that there are some other states than simply having PMF or not having it. For example, if PMF is seen as a scale, then a product can have zero, a little, or almost enough PMF. Therefore, just looking at market success seems a rather one-dimensional viewpoint.

Although recognizing PMF does not seem straightforward and there are some conflicting propositions, there are some more elaborated approaches to this, mainly stemming from the literature around startup movement in the past 15 years. The limited amount of aca-

demographic sources is likely a result of the origin of the concept of PMF: it has been popularized by the startup literature. However, the lean startup literature (specifically Ries (2011)) has been shown to have rather strong scientific backing (Frederiksen & Brem 2017; Ghezzi 2019). These approaches are also very widely adopted in practice, especially in order to achieve PMF (Ghezzi 2019).

Still, the related concepts are underresearched and their linkages to other managerial frameworks and effectiveness remain somewhat unclear (Ghezzi 2019). Especially the role of experimentation and related methods used in established companies remains unclear (Hampel et al. 2020), which is especially relevant to the topic of this thesis. As discussed earlier, they can contain internal startups, but these have significant challenges.

In this subsection, we will address what actions are needed to produce data about PMF. In the next subsection, tools to process this raw information into understanding about PMF are presented.

A common theme from the tools used to measure PMF is that it cannot be measured in a void. The concept is not absolute and cannot be measured by evaluating the quality of the product alone. Blank (2020) conveys this with the phrase “get out of the building”. This is an idea similar to the concept of *genchi genbutsu* from lean management. Ries (2011, p. 88) further elaborates that “facts [...] about customers, markets, suppliers and channels exist only ‘outside the building’.” Cooper (2011, p. 463) also shares the same view: “[In-house testing] says little about whether product works under actual use conditions, and whether it delights the customer.” Testing customer reactions, getting information from the market, and developing the product based on this are highlighted by many others too, such as Cooper & Vlaskovits (2010), Coviello & Joseph (2012), Maurya (2012), Eisenmann et al. (2013), Dennehy et al. (2019), Gupta et al. (2020) and Hampel et al. (2020).

This is logical because PMF is not about how excellently the product performs its functions, but about how well its functions suit customer needs. The question, therefore, becomes, what exactly should be done ‘outside the building’ to measure and validate PMF. This idea relates closely to product co-production and value co-creation.

In a service-centered market view, the customer is seen as having a central role in creating and defining value and products (Vargo & Lusch 2004a). As a result, a discussion into creating value with customers has sparked in the past 15 years. This is called value co-creation, where the customers have an active role in producing and consuming value. One part of value co-creation is co-production, which means working with customers or involving them in product design through facilitation and sharing of knowledge and expertise. (Ranjan & Read 2016) Mahr et al. (2014) investigated customer co-created knowledge in European companies, and found that customer co-creation had a positive impact on successful outcomes. They found that through this interaction companies can

gain knowledge about customer needs and feedback about prototypes. This is at the very core of PMF.

Another aspect to consider in customer collaboration based on multiple sources is that when testing the product and PMF, one should use iterations of MVP, instead of striving for a final product. There are multiple reasons for this. Waiting until the product is fully developed can lead to unexpected unpleasant results, as there has been no feedback received along the way (Cooper 2011, p. 472). MVP testing also allows the company to learn along the way to achieve the best possible end product. Furthermore, each iteration of MVP should be designed to verify business hypotheses and improve actionable that can guide further decision-making. (Ries 2011, p. 93–97, 117–136) Learning through iterations also extends to learning how to sell the product (Leslie & Holloway 2006). This sort of iterative thinking is considered instrumental by many authors in the startup context (e.g. Ries 2011; Maurya 2012; Blank 2020).

This means that PMF validation should not be just one single step in the chain of events in developing a new product. Instead, it is a recurring activity that should be done as the product develops. According to Cooper (2011, p. 484–485), testing should be done when there is uncertainty about the market acceptance and there are still expenses to be incurred by the development. Both uncertainty and upcoming expenses are higher the earlier testing is started. Therefore, PMF validation should be seen as a tool for steering the product's development.

A prevalent issue with using MVP validation activities is the reluctance to show it to the customers (Cooper 2011, p. 474). Sometimes companies can be ashamed to show low-quality and lacking products, and the employees themselves might have a strong passion to strive for the best possible result from the beginning. This mentality is something to avoid and MVP should be seen as a tool for learning instead of a final output. (Ries 2011, p. 106–107; Dennehy et al. 2019) On the other hand, lacking products can cause issues to branding, but that can be mitigated by utilizing different brands for new products (Ries 2011, p. 111–112).

In the stage-gate model, stage 4 is testing and validation. The aim of this stage is to make sure that the product behaves as it should in customer use and that the product is acceptable and in fact better than the current alternatives. (Cooper 2011, p. 473–474) The latter two of these aspects are of interest to us, as they effectively describe PMF: if the product is liked in customer use, it must be at least desirable and feasible. Indeed, these tools are aimed at providing information about customer reactions, proving operations functionality, and testing marketing mix (Cooper & Edgett 1999, p. 117), which are related to PMF.

Some of the tests in this stage are technical and financial, and only indirectly concern PMF. However, there are also actions that can be used to measure PMF (Cooper & Edgett 1999, p. 117; Cooper 2011, p. 474–485):

- Preference tests
- User tests and field trials
- Market tests

These sorts of operations are supported by Blank (2020, ch. 4), who writes: “The way you validate your business model and whether you truly have product/market fit is by selling it to customers.” However, he also elaborates *who* the product should be sold to in the beginning to validate PMF. He names this group ‘earlyvangelists’ (derived from ‘early adopter’ and ‘evangelist’) who are a specific important group of potential customers, that can help at the beginning of the product’s life cycle. The characteristics of earlyvangelists are shown in figure 5. The amount of earlyvangelists needed differs based on market and product type, but in enterprise software, just a few ones can be enough (Blank & Dorf 2020, ch. 7).

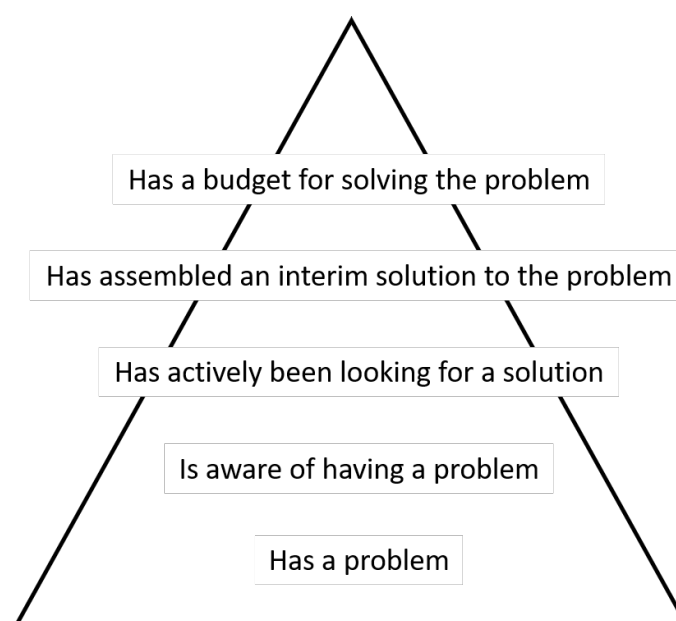


Figure 5. Characteristics of earlyvangelists (adapted from Blank 2020, ch. 3)

The earlyvangelist concept is similar to that of ‘lead users’ by von Hippel (1986). Lead users are potential customers whose needs are ahead of the general marketplace by some months or years. They also benefit greatly from solutions to their needs. Therefore they reflect the needs of the market in the longer term and are especially important in high-technology fields. Collaborating with lead users can therefore both provide important insights, but also help in foreseeing future needs of the market. (von Hippel 1986) This concept has been developed further by Morrison et al. (2004), who proposed the metric of ‘leading edge status’ as a measurement of differentiating lead users. They

found that users with high leading edge status expect high benefits from innovations, are perceived to be leading edge by themselves and by others, and generate ideas and prototypes ahead of others. These aspects seem to correlate with some characteristics of earlyvangelists.

This concept is also similar to ‘innovators’ by Rogers (1983, p. 249): they are the first adopters of new innovations, who are eager to test new ideas and have substantial wealth, technical knowledge, and tolerance for uncertainty. Their motivation to test new solutions can stem from a genuine interest in new technology. Rogers (1983, p. 251–261) also lists a large number of generalizations about innovativeness of different actors. For example, higher education, social status, social participation, and orienting outside one’s social system relate positively to innovativeness.

Only earlyvangelists should be the initial target of sales, not ‘mainstream’ customers. They might be ready to buy a product at its early stage. There are multiple possible reasons for this, including perceived competitive advantage, political reasons, and even just ‘bragging rights’, though the last one seems dubious in B2B context. The value from these customers is the feedback they provide, not necessarily the revenue they provide. (Blank 2020, ch. 4) It should however be noted, that they still naturally do not do business for purely unselfish reasons, but they are ready to pay something for early access to have direct access to the product’s total vision (Blank & Dorf 2020, ch. 3–4) and they can see the potential competitive advantage that can provide (Blank 2020, ch. 4). To them, possibilities to solve their problems better in the future is more important than choosing an established solution (Cooper & Vlaskovits 2010, p. 30), even when this includes uncertainty.

To iterate this thought, the relation with earlyvangelists is symbiotic: they get a solution for their existing problem, while the company gets feedback, including verification for PMF. Earlyvangelists might even get enjoyment for helping with the development of the product (Cooper & Vlaskovits 2010, p. 30), which of course also allows them to steer the product features into a direction of their liking.

When investigating customer co-created knowledge, Mahr et al. (2014) found that collaboration with lead users is more likely to produce knowledge about new insights, while collaboration with customers with close relations is attributed with lower costs. Very similarly (Coviello & Joseph 2012) suggest that tight relationships promote information flow, but loose ones aid in innovation. Chen et al. (2011) investigated co-production in IT companies and similarly found that ‘affective commitment’, that is a sense of belonging, importance, and friendship, significantly affects successful co-production.

Mahr et al. (2014) deduce that involving multiple customers with either close relations or lead user status seems beneficial. Coviello & Joseph (2012) similarly suggests utilizing a portfolio of customers with differing levels of closeness to the vendor. Mahr et al.

(2014) also propose that customer co-created knowledge is most useful in regards to development within the company's current business domain, although it can still be useful in promoting and validating information even in radically new products. In regards to this, Coviello & Joseph (2012) find that lead users contribute to successful NPD especially in major innovation.

Therefore, it seems that collaboration with close companies is easier and more cost-efficient, but produces different knowledge than collaboration with lead users. Even more generally speaking, customer collaboration with totally new or major innovations can be more challenging, due to customer problems with understanding and envisioning the new innovation (Trott 2017, p. 562–563).

On the other hand, it has been argued that customers can have a central part also in major innovation. Coviello & Joseph (2012) researched the role of customers in major innovation in six B2B technology companies. They found that customers were able to support major innovation through providing latent needs, acting as early customers, and providing critique. Therefore, likely customers can have a role also in major innovation, but their role might be different. Instead of direct ideas, their role can be seen as a source of yet-to-be satisfied needs and feedback.

Gupta et al. (2020) supports this interpretation, by noting that initially, the customers of the startup highlight problems and expect the startup to map a solution matching these. They continue (p. 15): "Thus, initial startup phases involve a better understanding of their [customer's] problem domains". They also note that later, after PMF has been reached, as the startup grows and the customers evolve in using the product, the communication shifts from needs towards features. Gummesson (1978) also similarly notes customers can express their needs on different levels: some have a very clear explicit problem definition, while others cannot define the problem but can communicate the implications. In the initial startup phases, it seems that understanding these implications is crucial and consequently understanding the customer needs is central. Focus and discussion on features should likely come only later.

This concept is also somewhat supported by Leslie & Holloway (2006), who recognize that initially only few customers are willing to buy the product and they require some incentive to do that. They call this the 'initiation phase', where the sales personnel should focus on gaining information about how customers use the product. They argue that gaining more experience initially will benefit the company financially in the longer term.

Finding the correct earlyvangelists is important in order to gain relevant feedback (Ghezzi 2019). Blank (2020, ch. 3–4) argues that the earlyvangelists can be found with sufficient effort and contacting potential customers: getting just a small portion of the contacts interested is enough if there are enough contacts made. However, finding suitable earlyvangelists has been found to be challenging in practice. It has been suggested, that in

B2B context earlyvangelists should be identified by identifying key decision-makers within the existing customer base. (Ghezzi 2019) It has also been shown that leading edge status correlates positively with organization size, budget, service range, and performance, among other things (Morrison et al. 2004), which could prove useful in identifying lead users or earlyvangelists.

To gather information about PMF, Rachleff (in Maples Jr. 2019) presents proof of concept trials. This is very similar to extended user trials, which can be also called beta tests or field trials, by Cooper (2011, p. 478–479). In these, a product is given or loaned to a customer, and feedback about its strengths, weaknesses, and frequency of use is collected, as well as improvement suggestions. The objective of these is to determine, among other things, customer interest and features that the customer likes the most.

Blank & Dorf (2020, ch. 6) describe a very similar test called ‘high fidelity MVP test’ specifically for web applications. In these, MVP is made available to a limited number of customers. During the test, data about customer willingness to purchase/register, engagement, retention, and referral should be collected. Of course, not all metrics apply to every case: a business end-user likely does not recommend the product to a friend. Still, data for example about how long the software is used per sitting, how many actions are made, and their reactions can be collected.

Cooper (2011, p. 474–475) also suggests a lighter version of user trial called ‘preference test’. In this, potential customers are merely *exposed* to the product, but they are not given access to it in their own environments. With this, predictions about eventual market acceptance can be made.

The most resource-intensive method of testing markets is called ‘final trials’. These are divided into two: simulated test market and full test market (which is often called ‘trial sell’ in B2B context). Simulated test markets are relatively inexpensive methods of statistically predicting the success of a product. However, these only apply to inexpensive consumer goods, and therefore do not concern B2B SaaS. The heaviest test is full test market or trial sales, which are similar to full launch concerning price and sales. The difference to full launch is that the scope can be limited to a certain area. (Cooper 2011, p. 481–483). It is also an option to release the product to the market normally, and gather information from this even though the PMF might have not been reached yet (Gupta et al. 2020).

These methods of course require some early customers and an early product. This is why both earlyvangelists and MVP are important: they are interacting with each other to produce information. Earlier it was noted, that enterprise software usually requires configuration and integration to existing systems. This is a challenge to testing, as it requires more effort and cannot necessarily be done quickly.

A way to potentially combat this is to use so-called 'Wizard of Oz' testing (Ries 2011, p. 106). In this, a human imitates the planned functionality of the software, that has not been developed yet. This can also be used in an iterative manner, to test different options without the need to develop each of those. (Dow et al. 2005) In other words, this allows testing functionalities that do not exist, at least with actions a human can imitate. This could be done also to avoid some integration: there does not necessarily have to be an interface between systems if a human can manually move data between systems. At a larger scale, this sort of manual labor would not be feasible or profitable, but it can be used for testing (Ries 2011, p. 106).

Another way of testing products, that do not yet exist, is smoke testing. This is presenting customers with product concept ideas similar to marketing material. The idea is to only test interest in the product. (Ries 2011, p. 95, 118; Eisenmann et al. 2013) This of course does not produce information about the upcoming product, but it can gauge the market potential if the product does what it is supposed to: therefore it can measure the market side of PMF and whether the idea resonates with it. It might even be possible to charge the customer for a smoke test, by collecting payments in advance (Eisenmann et al. 2013). However, getting some sort of MVP in front of potential customer should ideally be prioritized (Cooper 2011, p. 464–465). Furthermore, smoke testing systems that require integration can likely be challenging or at least require customer-specific tests.

As has now been discussed, interaction with customers in different forms is the main method of producing information about PMF. This is supported by research in co-production. Bogers & Horst (2014) investigated collaborative prototyping in a physical product setting, especially in regards to the user interface. While the context was different than in this thesis, they found that active user engagement leads to a better understanding of user needs. Due to differences in context, their exact findings might not be appropriate here, but the general idea of customer collaboration producing valuable insight likely holds true. Similarly, Chen et al. (2011) find that engaging in co-production leads to higher innovativeness, and Coviello & Joseph (2012) promotes customer collaboration especially as a source of needs, critique, feedback, and promotion.

2.3.3 Methods of Assessing Product-Market Fit

Thus far we have outlined methods of producing information about a new product via different tests, pilots, and trials. However, simply performing these tells a company nothing. One still needs to gain further understanding from the test users. Maurya (2012, p. 71–72) recommends using interviews to learn and gain qualitative data. He continues that surveys should only be used after this to validate qualitative findings, as they are unable to provide meaningful background information. This approach of testing the product is presented in figure 6.

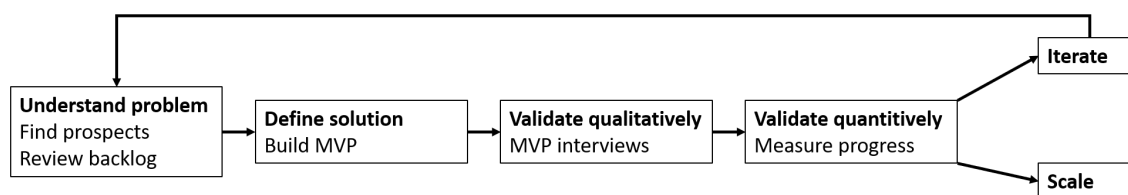


Figure 6. Systematic testing of product plan (adapted from Maurya 2012, p. 152–154, 165)

There are also other methods of gaining data from the different tests. When testing the different iterations of MVP, information about the software usage can be collected via log data. Also, customers should be able to provide direct feedback. (Leppänen & Hokkanen 2015)

Dennehy et al. (2019) and Blank & Dorf (2020, ch. 7) both approach interviews with a set of questions addressing different aspects of PMF. These aspects relate to the elements found earlier to make up PMF. Dennehy et al. (2019) focus on evaluating MVPs and split the questions into three groups or ‘lenses’, the first of which is directed towards customers, while others are more for the company to ponder. These are displayed in table 3. Notably, not each question necessarily needs to get a positive answer, but a balance between different lenses should be achieved. It should also be noted that the questions concern different stages of MVPs: some concern experiences with past trials, while others focus on future development. (Dennehy et al. 2019) This highlights the recursive nature of MVP.

Similarly, Blank & Dorf (2020, ch. 7) present three main questions, each with multiple sub-questions. These are presented in table 4. These questions are aimed to be analyzed inside the company, based on customer feedback and interviews. Notably, one should focus on whether there is true enthusiasm towards the product, not just lukewarm responses. (Blank & Dorf 2020, ch. 7) It is possible that the customers might in some cases give positive answers out of friendliness. Furthermore, the company itself might overestimate success chances, and customer positivity, and seek confirmation to existing possibly false assumptions. These biases can be mitigated, but the analysis needs to be critical. (York & Danes 2014)

The questions can also be condensed into a single one developed by Sean Ellis to measure PMF. This is ‘How would you feel if you could no longer use the product?’. A high share of ‘very disappointed’ responses (above 40 %) should indicate high PMF. (e.g. Cooper & Vlaskovits 2010, p. 37; Maurya 2012, p. 156–157) This is sometimes referred to as ‘The Sean Ellis test’ (Maurya 2012, p. 156).

Earlier in subsection 2.2.1 it was noted that Ries (2011) links PMF to so-called engines of growth. More specifically, each engine has a quantifiable metric to measure business success in regards to that particular engine. For sticky engine, this is the rate of com-

Table 3. Questions to evaluate minimum viable products with (adapted from Dennehy et al. 2019)

Desirability lens	What is the participant's first impression of the MVP? What does the participant most and least like about the MVP? What are the perceived strengths and weaknesses of the MVP? What benefits would the MVP provide to the participant? What participant's pain point or desire does the MVP address? How does the MVP compare to alternative options? What level of proficiency is required to use the MVP? Would the MVP fit in with the life of the participant? Are there any obvious impediments to using the MVP? Would the participant be willing to pay for the MVP?
Feasibility lens	Are we better placed than others to succeed with the MVP? What would be involved in building the MVP? What would be involved in entering the market? What would be involved in scaling market share? Can we protect the intellectual property in the MVP? Do we have the required technical and market capabilities? Do we have the required team to succeed? Do we have the required partnerships to succeed? Do we have sufficient team engagement? Do we have sufficient leadership commitment?
Viability lens	Does the MVP align with the organization's vision, values, and goals? Is there a viable business model for the MVP? Is there sufficient revenue potential to justify the MVP? Who will be willing to pay for the MVP and at what price point? Is the market for the MVP flat, declining, or growing? Is there an adequate return on the investment? How long before we break even with the MVP? Can market share be grown and protected? Is there a threat of new entrants and substitutes? Who are the competitors and how powerful are they? Is there sufficient finance available to succeed?

pounding, which is user growth rate minus churn rate. For viral engine, this is the viral coefficient, which is the average number of referrals per existing user. Finally, for paid engine proportion of revenue, calculated as the relative difference between CAC and CLTV. (Ries 2011, p. 209–218; Maurya 2012, p. 160). An alternative way of approaching CAC, would be to estimate, how long it takes for the customer value to cover that. One SaaS company in a study by Tyrväinen & Selin (2011) estimated that an optimal payback time would be 6–12 months.

Focusing on the company's own engine of growth, the company can estimate its PMF. An overview of engines and their related metrics is shown in table 5. In the table, reference values for 'good' metric values are presented. However the absolute values are not the

Table 4. Questions to evaluate product-market fit with (adapted from Blank & Dorf 2020, ch. 7)

<p>Are you attacking a serious problem or filling a compelling need?</p>	<p>Did your customers have friends or colleagues with similar problems or needs, and did they think the problem was important enough to discuss it with, or refer it to, their friends or coworkers?</p> <p>Were many of the customers you met attempting home-grown or workaround solutions to the problem your product will solve?</p> <p>Did most customers rate the problem or need's severity at 8, 9, or 10 on a scale of 10?</p> <p>Did most customers rate the pain caused by the problem at or near 5 on a scale of 5?</p> <p>Was there a dramatic difference in customer workflows after buying the product?</p> <p>Did customers say they would pay for that difference?</p> <p>Were customers palpably excited?</p>
<p>Does your product solve the problem or fill the need for your customers?</p>	<p>Did the minimum viable product generate significant buy or engage enthusiasm?</p> <p>Was the product exciting enough to stimulate significant customer referrals? Did those referred customers buy or engage at an encouraging rate?</p> <p>Did the long-term product vision generate highly positive customer feedback?</p> <p>Is the latest product-features-and-benefits hypothesis still appropriate and profitable?</p> <p>Did the long-term product-delivery schedule generate purchase enthusiasm?</p>
<p>Are there enough customers to deliver a sizable business opportunity?</p>	<p>Have you validated the total available market and serviceable available market for your market?</p> <p>Is the market size as you expected, and is it verified by customer feedback and industry data?</p> <p>Is the market growing significantly, with strong growth prospects?</p> <p>Do customer conversations verify that they'll buy repeatedly and refer others to do the same?</p> <p>Did any unexpected competitive threats emerge?</p>

only thing that matters, but considering the improvement of the metric made in each iteration of MVP is also important to demonstrate progress towards PMF (Ries 2011, p. 112–120).

Measuring the churn rate as a method of assessing PMF has also been proposed by Adams (2019). However, he notes that measuring actual lost customers might not always be viable, especially in B2B business where longer contracts might be involved. This might be a problem especially in the early stage of new products, where there might be just a few early customer companies: just one company ceasing business would represent a very large loss in customer base. Even in a more mature B2B context customer

Table 5. Engines of growth and their related growth metrics (adapted from Ries 2011, p. 209–218; Maurya 2012, p. 160)

Engine	Metric	Reference metric value
Sticky	Rate of compounding	User growth > churn rate
Viral	Viral coefficient	A user refers at least 1 other user on average
Paid	Proportion of revenue	CLTV > 3 * CAC

losses can be critical, as average customer value can be high (Tamaddoni Jahromi et al. 2014).

However, one can define churn rate also as customers who fail to remain engaged, although they might not necessarily be lost yet (Ries 2011, p. 210). This sort of customer engagement can be measured in many ways, such as daily/monthly active users, activity time, the number of used features, and the number of sessions (Adams 2019). Customer activity and changes in monetary customer value can be used to predict actual losses in customers (Tamaddoni Jahromi et al. 2014).

Gupta et al. (2020) argue that PMF is achieved when enough sales are reported or the sales start to grow. The exact definition of ‘enough’ remains unclear here, but it can be assumed that in B2B market the number could be even rather low. This metric is of course only usable after unrestricted product launch. However, interest can be gauged by letting customers contact the vendor about the product on a website for example (Blank & Dorf 2020, ch. 4). On the other hand, Adams (2019) argues specifically against using sales as a PMF metric, since initial sales and increase in customers might not reflect customer retention and business sustainability. Instead, he recommends utilizing cohort analysis by months to see how customers retain using the product. This might however be difficult in a contractual B2B setting, where customers might be bound to a product for a certain time.

According to Maurya (2012, p. 155), Andy Rachleff was the initial presenter of the term PMF. In an interview (Maples Jr. 2019), Rachleff listed four heuristics for determining PMF: two for consumer market and two for B2B market. These were:

- Consumer market
 1. word of mouth
 2. net promoter score
- B2B market
 1. sales yield on the sales learning curve
 2. proof of concept trial outcome

In this study, we are mainly interested in the B2B tools. The sales learning curve is a concept defined by Leslie & Holloway (2006). It is an idea that just as with manufacturing new products, sales also experience an S-shaped curve in efficiency. The sales learning curve is shown in figure 7. Sales yield in the graph means average revenue per sales representative (Leslie & Holloway 2006). Rachleff (in Maples Jr. 2019) argues that when the total sales yield divided by the total cost of the sales team exceeds 1, PMF is achieved. This is similar to the idea of measuring paid engine of growth as described by Ries (2011) and shown in table 5. Leslie & Holloway (2006) define this point as ‘break-even point’, where revenue provided by sales representatives exceeds their fully-loaded costs. This essentially means that CLTV exceeds CAC.

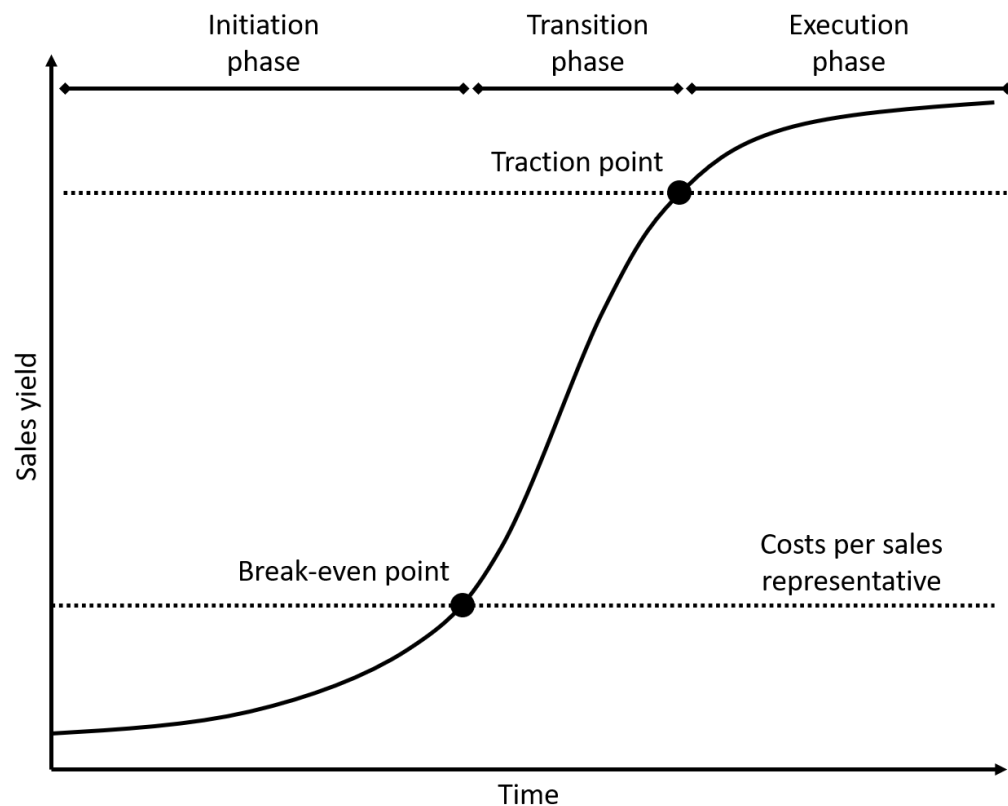


Figure 7. The sales learning curve (adapted from Leslie & Holloway 2006)

The other heuristic for B2B market mentioned by Rachleff (in Maples Jr. 2019) is proof of concept trial outcomes. These trials seem very similar to extended user trials by Cooper (2011, p. 478–479), which were described earlier. Rachleff (in Maples Jr. 2019) describes this as allowing the customer to use the product for a limited time, for example, a month. After this, if there is PMF, the customer should be very hesitant to stop the trial.

One potential way to tie PMF validation efforts together is presented by Blank (2020, ch. 3), who presents a quick, albeit simplified and perhaps even a bit humoristic, test for determining PMF. Based on information from the market, the three most important potential customer problems should be put on a list. Similarly, a list of the three main

features of the product should be made. In order for there to be PMF, the lists matching should be evident.

After the validation efforts confirm some level of PMF, the product will likely continue to grow within the early adopter market. However, moving to a mainstream market will still require work. (Ries 2011, p. 222) This is because according to Geoffrey Moore (as cited in Blank 2020, ch. 6), sales in the mainstream market will require different strategies than among the early adopters. This is called 'crossing the chasm' by Moore. Still, the product will also require further and constant development, as the customer needs and the environment evolve (Gupta et al. 2020). Therefore, PMF can likely also be lost if development becomes stagnant, and the market and customer needs evolve. Further specifics of mainstream commercialization are outside of the scope of this thesis. However, it should be noted that careful groundwork in finding PMF will help in finding success within a larger customer base (Blank 2020, ch. 6).

2.4 Reflection of Literature and Synthesis

We have now discussed PMF and enterprise software, their connection, and other related concepts. In this section, we provide discuss the themes raised in the literature and provide a condensed summary of the most relevant findings from the literature. Additionally, we provide a preliminary construction, as per the constructive research approach described in chapter 3.

Firstly, it is clear that while the concept of PMF is rather simple, it has large implications for the success of a new product. Similarly, while its essence can be said in a sentence or two, it is a wide concept spanning from ideation to development and further continuous improvement. These considerations make it much more comprehensive a subject than initially might seem.

As a result, it has connections to many different research fields and concepts. These connections or their relevance has not been investigated in a structured manner, even though the interest in lean startup methodology and PMF as a concept has been on the rise. Especially connections to other managerial frameworks and empirical evidence of the effectiveness of lean startup methodology is lacking. (Ghezzi 2019)

This resulted in two prominent characteristics for the literature review. Firstly, multiple different subjects were touched from business models (specifically SaaS) and startups to NPD and customer collaboration. This was a deliberate choice because it was not clear which considerations are the most central to the subject. Developing such clarity was also not the objective of this study and no clear conceptual connections were developed, although some related considerations are discussed. In any case, the literature review

was rather wide-ranging. It must also be said, that this made creating a cohesive review challenging.

Secondly, due to the lack of empirical descriptions of the issue at hand, the literature review also remains at a rather conceptual and descriptive level. While this is not a problem per se, it resulted in the discussion not being very elaborate in details. As discussed above and in the previous sections, this is actually rather characteristic to the researched phenomena.

Still, some considerations could be highlighted. The most apparent considerations in producing information about PMF are customer collaboration and experimentation. It seems that all sources on the subject either explicitly address these, or even take them for granted without further discussion. Indeed, some sources are quite vague about how this collaboration should be done in practice and what actions produce the most relevant information, even though they specifically and very heavily stress the importance of such collaboration. Some examples of sources that highlight customer collaboration are Cooper & Vlaskovits (2010), Ries (2011), Maurya (2012) and Eisenmann et al. (2013).

The methods found for producing and evaluating PMF information are collected to table 6. These were addressed in more detail in section 2.3. The table also includes methods explicitly stated to only apply to consumer products, despite the context of this thesis. This is because while they might not be applicable 'as is', there could be further development to these to create similar metrics that would be relevant in an enterprise setting too.

It should be noted, that to the author's knowledge, there is no published research dedicated to exploring PMF measurement or validation methods. The sources on the subject mostly focus on only a few methods, without much consideration for different approaches. This is reflected also in table 6, as most evaluation methods only have one or two mentions in selected sources. The exception to this is 'customer collaboration', which is highlighted in almost all of the selected sources. However, this term alone itself is rather vague and can mean lots of different things, and it does not provide much information alone. Here it is still used to highlight the importance and prevalence of customer collaboration in regards to PMF.

In fact, most sources seem to address PMF as important but the process leading up to it remains at an abstract level. An exaggerated and simplified process for the sake of argumentation is: cooperate with customers, receive feedback, adjust accordingly, and repeat until success emerges. This is undoubtedly sound advice, but also rather self-evident. If this would be the only procedure for reaching PMF, it would seem rather straightforward. Yet, it does not seem to be. The practical uncertainties relating to how experimentation should be done and how this can be incorporated to making the product better has been also raised by others (e.g. Frederiksen & Brem 2017; Ghezzi 2019; Hampel et al. 2020).

Table 6. Methods of producing and evaluating product-market fit information

	Cooper & Vlaskovits 2010	Cooper 2011	Ries 2011	Maurya 2012	Bosch et al. 2013	Adams 2019	Dennehy et al. 2019	Maples Jr. 2019	Blank & Dorf 2020	Gupta et al. 2020	Total
Customer collaboration	X	X	X	X	X		X	X	X	X	9
Simulated test market		X ¹									1
User trials		X					X	X	X		5
Churn rate (engagement)			X ²			X					2
Engine of growth metrics			X	X							2
Evaluating list of questions							X		X		2
Net promoter score								X ¹			1
Recurring new customers					X						1
Sales amount										X	1
Sales yield (CLTV and CAC)			X ²		X			X			3
Sean Ellis test	X			X	X						3
Word of mouth								X ¹			1

¹Applies for consumer products only ²Applies only in some specific situations

Especially Hampel et al. (2020) raise many practical questions about experimentation, where the information is lacking. These include prioritization of tests, result interpretation, and responsibility distribution. The lean startup methodology by Ries (2011) suggests interpreting testing through verifiable and actionable metrics, but this still is a rather abstract approach. He (p. 143–144) proposes that it must be extremely clear what affects these metrics to make informed decisions based on them. It could however be argued, that in reality there are no such clear metrics without any disruptions, highlighting the practical issues. Further supporting this, Frederiksen & Brem (2017) point out that while the lean startup methodology has its merits, it does remain at a rather philosophical level without much practical implementation instructions.

Another point that can be made about PMF validation, is that few sources seem to address the market viability side. It should be noted, that this was not the main focus in this study, so it did receive less research attention. Still, its absence is apparent. This study focused on *validation* during development. The fact that there is little discussion about the market at this development and validation stage, could to point that the market analysis should have been made earlier. The market is therefore assumed to be viable at this stage

and hence it receives less attention. It does not however make market consideration redundant: it is simply a precursor for customer need validation.

Based on the literature and subsequent considerations, an initial and preliminary framework for validating PMF was constructed. This is presented in figure 8. This framework condenses the information from the literature into a simple and approachable format.

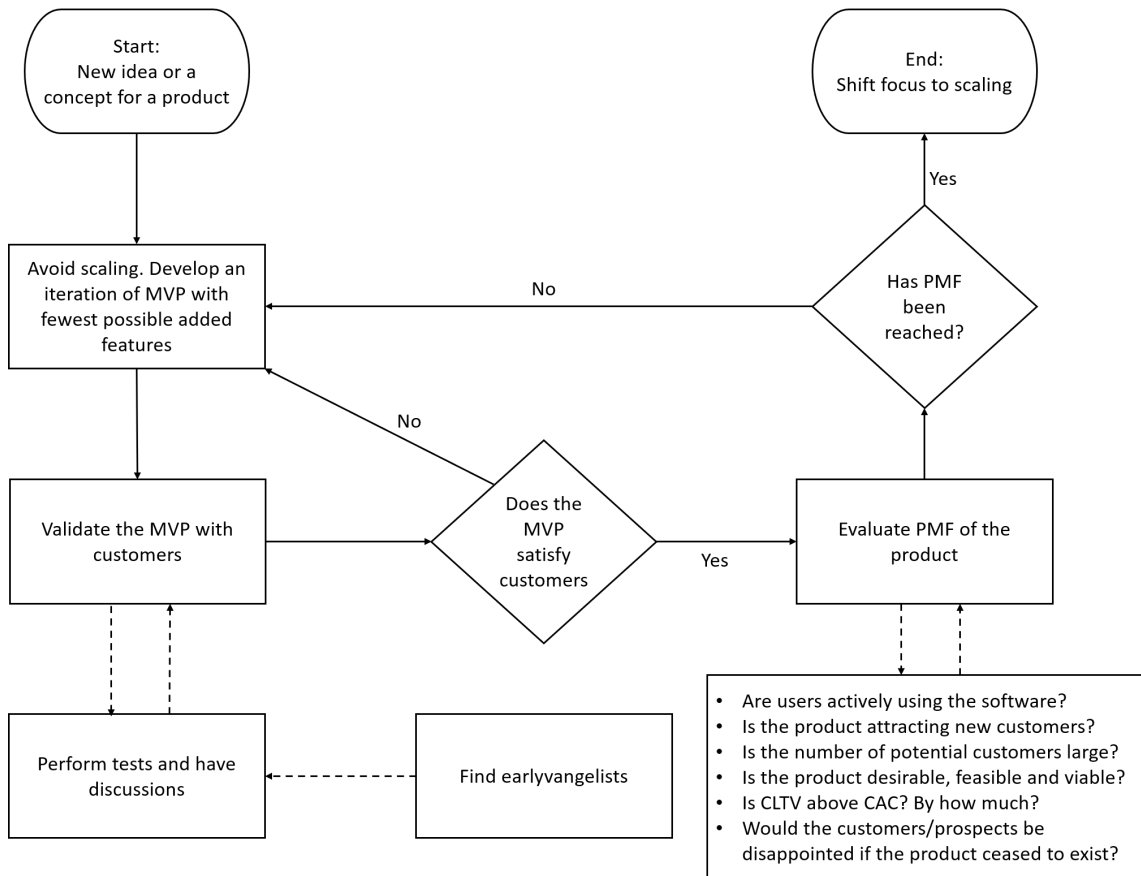


Figure 8. Preliminary approach to validating product-market fit based on literature

Perhaps the most apparent shortcoming of this initial framework, is that while it displays the concept and relevance of PMF, it actually provides rather little instruction about how the PMF validation is done and what exactly shows that PMF has been reached. This is however appropriate because as has now been discussed, such considerations are unclear in current literature. The framework is aimed to be a reflection of literature, so this characteristic is to be expected.

Therefore, it acts as a basis for developing related knowledge further in the empirical part of the thesis. The final framework aims to further elaborate on the shortcomings of the current one and provide new insight. It is presented later based on empirical findings in chapter 5.4.

3. RESEARCH METHODOLOGY AND DATA

3.1 Research Design

In this thesis, the concern is improving understanding of PMF and explaining related validation can be done. A regulation perspective is a suitable approach for such a study (Saunders et al. 2019, p. 139). Additionally, the goal is to solve a real-life problem. Additionally, the study can be also seen as exploratory, as it seeks knowledge about what sort of practices are currently in place and how the concept of PMF manifests in reality (Saunders et al. 2019, p. 186–187).

These aspects make constructive research a natural choice for the research strategy. This is a normative research strategy formulated at the beginning of the 1990s, that highlights problem-solving by constructing models through combining existing knowledge and innovation (Kasanen et al. 1993; Lukka 1999, p. 142). The very core of this strategy is to solve real-world problems in cooperation with an organization (Lukka 1999, p. 141).

From a categorization and semantic point of view, it should be noted that sources addressing constructive research approach do not explicitly class it as a ‘research strategy’. Generally speaking, the terminology surrounding research methodology is often used confusingly and in conflicting ways (Grix 2002). In this thesis terminology from Saunders et al. (2019) is used, and the term ‘constructive research’ is used. Saunders et al. (2019) do not address constructive research, but other sources (e.g. Kasanen et al. 1993) compare it to methodologies classed as research strategies by Saunders et al. Therefore, ‘constructive research’ is seen as a research strategy.

The process in constructive research is intuitive but in practice also requires scientific rigor to create and assess practically functioning results. This is also what separates constructive research from scientific problem solving and consulting: scientific methods are used to make the results applicable in other similar situations. (Kasanen et al. 1993)

Constructive research also has similarities with many other field research types, which usually fall under the action-oriented approach (Kasanen et al. 1993; Lukka 1999). Constructive research is differentiated from these by aiming to create managerial constructions that are theoretically valid, examining the general applicability of the construct, and by having a higher state of intervention with the target organization (Kasanen et al. 1993; Olkkonen 1994, p. 77–79; Lukka 1999, p. 141–145). The elements of constructive research and their linkages to this research are illustrated in figure 9.

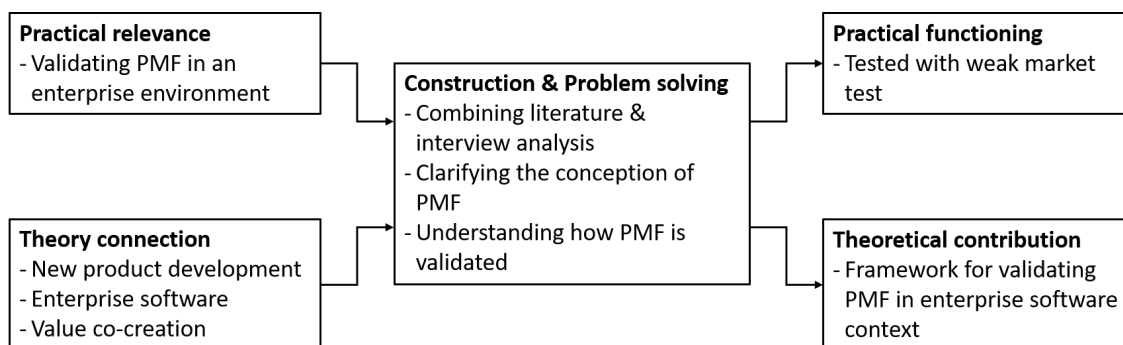


Figure 9. Elements of constructive research and linkages to the study (adapted from Kasanen et al. 1993)

The problem addressed in the thesis is rather clearly defined but does not suggest any particular research philosophy. Additionally, the aim is to provide solutions to contribute to future actions. In these cases, pragmatic research philosophy is often a good choice, that allows combining multiple types of knowledge (Saunders et al. 2019, p. 151). Furthermore, Lukka (1999, p. 141) states that the constructive research leans heavily on pragmatism. Pragmatic research philosophy is therefore adopted in this thesis.

At the same time, it is recognized that there is subjectivity in the methods used and in the results as well. In qualitative research, meaning is derived from words and images (Saunders et al. 2019, p. 179–180), and there is room for interpretation. Interpretations made from interviews and construction validation are therefore subjective to an extent. As a result, there is a distinct element from interpretivistic philosophy present. This is often suitable for business studies, which are complex and unique in context (Saunders et al. 2019, p. 149). In table 7 adopted methodical approaches are presented following the elements of the ‘research onion’ by Saunders et al. (2019).

This thesis follows the research process introduced by Kasanen et al. (1993) and further elaborated by Lukka (2003) and Oyegoke (2011). The steps and the related actions in context of this thesis are listed below.

1. Find a practically relevant problem that has a research potential

The problem for this thesis has been already presented and its relevance is justified in chapter 1. Also, in chapter 2 it was found that the field has existing related literature, but no clear answers to the problem at hand. This sort of problem that is experienced beforehand, is practically relevant, and has lacking analysis in literature is a typical and good topic for constructive research (Lukka 2003; Oyegoke 2011). Therefore, the problem has research potential.

Table 7. *Adopted methodological approaches*

	Approach	Presence in the study
Philosophy	Pragmatic	Elements from different research philosophies are combined to solve a problem. The subjectivity of qualitative data is recognized in an interpretivistic manner.
Theory development	Abductive	Results are derived from interviews deductively. However, literature review affects the interview guides and initial construction, adding an inductive element.
Strategy	Constructive research	The study is aimed to solve a problem from the target company. Both existing literature and empirical data are used to develop a functional solution.
Methods	Qualitative	The empirical data is interview recordings and transcriptions. This data is analyzed by utilizing thematic analysis.
Time horizon	Cross-sectional	The problem is studied in a specific and relatively short time frame. Effects of changes and developments in practices are not observed, but construction is validated with a weak market test.

2. Obtain a general, comprehensive understanding of the topic

Understanding the subject is quite naturally a key part of the research. In this thesis, an understanding of the context of the problem has been obtained over a longer period of employment. The problem itself has been discussed in a number of meetings outside the actual interviews.

Further understanding of the problem was gained through internal interviews. This helps especially with getting practical knowledge of the problem, which is highlighted by Lukka (2003). Furthermore, a literature review was conducted to gain an understanding of prior theory, which gives useful insight into existing approaches to the issue (Oyegoke 2011).

3. Innovate a solution, which also has potential for theoretical contribution

This phase is naturally critical for the success of the project, although even practical failures might provide academically interesting knowledge (Lukka 2003). In this thesis, the innovation was based on the gathered literature and interviews. The process was aimed to be iterative and the results were changing and formulated over time. This meant that no strict theoretical justifications or guidelines were followed during the innovation phase, which is appropriate in constructive research (Kasanen et al. 1993; Lukka 2003).

The literature review was conducted by searching relevant literature via academic search platforms. Academic peer-reviewed material was used as much as possible. However, as has been noted, the topic is partially rather lacking in academic research and still emerg-

ing. Therefore, some other sources were also used. For example, some books central to the topic were used as a reference, especially in regards to conceptual discussion.

The internal interviews were used to gain understanding about the current state of affairs in the target company, while also gaining ideas for improvement. After this, external interviews were conducted to gain an understanding of how PMF validation is done elsewhere. Data collection is described in more detail in section 3.2. The goal is to synthesize literature and contextual information into a solution (Oyegoke 2011).

4. Implement the solution and demonstrate that it works

Ideally, the created construction would be integrated into the target organization and its functionality tested in practice to prove it works (Kasanen et al. 1993; Lukka 2003). In this thesis, full implementation and validation cannot be done due to time constraints and chosen time horizon. It is in fact typical, that true practical testing of solutions is not feasible (Oyegoke 2011).

Instead, a ‘weak market test’ was conducted and the solution’s theoretical validity is examined. These are ways to demonstrate the feasibility of the solution without full implementation. ‘Weak market test’ was conducted via two discussion sessions with product leads and is described more in subsection 3.2.2. This answers the question of the weak market test: “Has any manager responsible for the financial results of his or her business unit been willing to apply the construction in question in his or her actual decision making?” (Kasanen et al. 1993, p. 253). Furthermore, the new solution’s compatibility with existing theories is examined in theoretical validation, which provides grounding in existing established theories (Oyegoke 2011).

5. Examine the scope of applicability of the solution

6. Identify theoretical contribution

These two phases call the researcher to ponder and examine the solution and its limitations. The idea is to recognize the circumstances of the study and suggests applicability in other situations. (Lukka 2003) In this thesis the scientific limitations and contributions are discussed in chapter 6. Additionally, the solution is reflected on and its compatibility with existing literature is discussed in chapter 5.

To further elaborate on the phases of this research, these are listed below. In reality, it was found out that the process is not linear and the phases partly overlap each other, as the results are formulated heuristically. This is likely normal, as the order of the phases may vary (Kasanen et al. 1993). To illustrate this, the actions taken in the thesis process and their relation to the constructive research process are also shown in figure 10.

1. Background knowledge

Knowledge has been gathered from the organization over a longer period of time

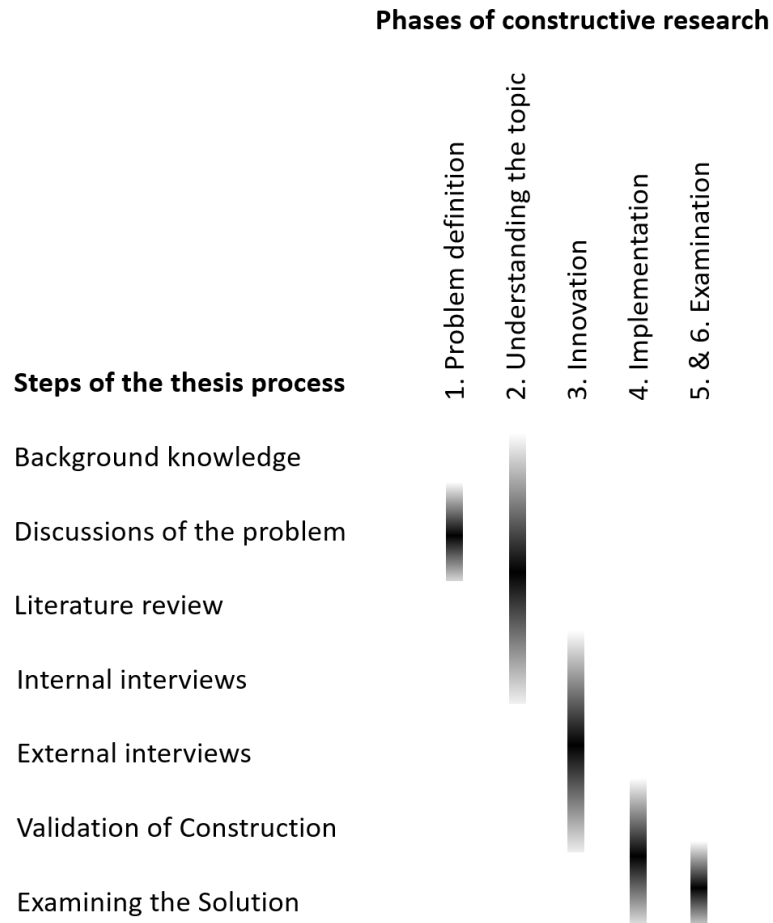


Figure 10. *The thesis process and relation to constructive research process*

by being employed there. Arguably this is not an actual research phase. However, this is relevant information when discussing the context of the real-life problem at hand.

2. Discussions of the problem

The problem which required solving was discussed with people in the target company. This both provided the problem that requires solving and further understanding about the topic.

3. Literature review

Existing relevant literature was researched and an understanding was formulated about the current answers literature provides for the problem. This aided with understanding the topic. It also enables formulating a preliminary framework that is used in the first workshop.

4. Internal and external interviews

Interviews were held for both internal and external professionals about how similar problems are and could be handled in their organizations. This was used as a tool for innovating the solution.

5. Internal discussion sessions

Two sessions were held with product leads in the target organization. In the first one, the aim was to get feedback on the developed solution, while also getting additional ideas without making any radical changes. In the latter one, the solution's viability is demonstrated with 'weak market test' (Kasanen et al. 1993).

6. Examining the solution

This remains at a theoretical level, where the solution is discussed critically in chapters 5 and 6.

3.2 Data Collection

3.2.1 Internal and External Interviews

The empirical portion of this thesis was conducted with interviews. These were divided into two groups that are referred to as 'internal' and 'external'. In internal interviews, the interviewee was from within the target company. In external interviews, the interviewees were from outside the target company. In both interview types, the interviewees had knowledge related to the subject from their own professional backgrounds.

All of the interviews were conducted remotely via Microsoft Teams. The interviews were conducted in a semi-structured fashion. The interviews had a predetermined set of themes and questions, which were used as a starting point. However, these were very flexible: questions and themes were allowed to be added and omitted. This rather free flow of the interview was based on responses and expertise areas of each individual being interviewed. This meant that the main focuses of the interviews were somewhat differing, but all offered insight into the research questions. This is typical and even advisable in an interpretivist research philosophy and in an exploratory research (Saunders et al. 2019, p. 187, 438), which were recognized as having roles in the thesis.

The internal interviews were conducted in April of 2021, before the external ones. The contacted interviewees were selected by asking for recommendations from within the target company for people who might have relevant knowledge. Internal interviews are presented in table 8. The interview guide in internal interviews is shown in appendix B. The questions focused on getting an understanding of the current practices and problems related to validating PMF, as well as ideas about how it could be done better.

The external interviews were conducted after internal ones in April and May of 2021 during a period of about three weeks. The interview requests were sent to potential participants based on recommendations that people in the target company provided. The characteristics that were looked for were a relevant industry field and knowledge about the study subject. External interviews are presented in table 9. The interview guide in external

Table 8. *Internal interviews*

Reference	Position in company	Length
I1	Executive	0:47
I2	Executive	1:10
I3	Executive	1:03
I4	Chief specialist	1:02

interviews is shown in appendix **C**. The questions are very similar to the ones used in internal interviews, but the interview guide was slightly developed based on findings and experiences from the internal ones. Furthermore, more attention was also given to the characteristics of the interviewee's business field.

Table 9. *External interviews*

Reference	Industry	Role	Length
E1	Software, digital transactions	Product lead	1:12
E2	Consultancy, startup operations	Consultant	1:30
E3	Software, retail solutions	Business unit lead	1:10
E4	Consultancy, startup operations	Consultant	1:22
E5	Software, industrial solutions	Executive, product management	1:16
E6	Software, financial administration	Executive, product management	1:04
E7	Software, financial administration	Executive, customer collaboration	0:52

The interviews were recorded and later transcribed, as recommended by Saunders et al. (2019, p. 644–645). The type of transcription used was 'intelligent verbatim', meaning that filler words, repetitions, and comments not relevant to the thesis subject were left out or summarized. Furthermore, the level of detail in the transcriptions depended on the context: more critical parts for analysis were transcribed at least close to verbatim, whereas things like background information were more summarized.

Analyzing qualitative data can be challenging because the data is diverse, somewhat interpretive, and rich. The interviews were analyzed in a fashion similar to thematic analysis, where qualitative data is codified and underlying themes are searched. (Saunders et al. 2019, p. 636–641, 651–660) The transcriptions were coded based on addressed top-

ics by utilizing a computer-aided qualitative data analysis software system. Additionally, self-memos were utilized to keep track of important themes.

With these tools, similar themes from the interviews were explored. The high-level themes included considerations and experiences related to PMF, characteristics of enterprise software and SaaS in relation to PMF, customer collaboration tools and methods, and indicators or metrics related to PMF. In total, the transcriptions consisted of around 100 pages of text. In the analysis, around 60 different codes were used, that were associated with over 300 quotations.

Findings from the interviews are discussed in chapter 4. Some quotations are raised from the interviews. These act as concrete examples or realizations of the discussed themes. They are also used in a conversational manner, where interesting or unique viewpoints are shown. Some quotations are translated to English by the author.

Also, chapter 4 contains some highlighted 'findings' of the aspects that were found during the interviews. The reasoning and argumentation for these are made in the body text and supported also by quotations. These are distinct pieces of information suggested by the interview material, that still include uncertainty and limitations, as discussed in section 6.2.

To protect the anonymity of interviewees and the organizations they represented, the exact sources of individual quotations are not disclosed. For the same reason no identifiable information about the interviewees is given and some redactions in quotations about details are made, concerning for example company names, products, and business areas. The interviewees were informed of this principle at the beginning of the interviews to promote a confident, trustworthy, and non-biased atmosphere (Saunders et al. 2019, p. 456).

3.2.2 Validation of Construction

The new construction was validated with a weak market test described by Kasanen et al. (1993). The aim of this was to validate whether company managers with financial responsibility would be willing to apply the construction and recommendations from the study in their own decision-making.

The construction in this case is a framework for producing information related to PMF and validating it. Although some aspects of the framework are rather concrete actions and methods, its results are likely rather abstract: a better understanding of PMF. Therefore, it can be difficult to approximate any financial results it might have, which even the weak market test implies. In this case, the validation focused on whether the constructions have elements suitable for practical use and whether it is believed that the findings are applicable to real-life decision-making.

Validation was done in two stages. First was a discussion with five product leads in the target company in late June 2021. In this, the preliminary findings and frame of the new construction were presented, and feedback and comments were collected. The comments were positive and the participants seemed interested in the findings. This indicated that the findings were both relevant and seemingly acceptable. Some interesting new considerations were also raised, which caused some new reflections in the next two chapters.

After the first validation session, the results were developed further and finalized. The second presentation was held in mid-August for two product leads in the target organization, who had been involved with the research the most. The goal of this was to go through the findings and to gain final validation for the framework. The feedback gained in the second session was also positive and reinforcement for the findings was gotten. The findings were said to include both relatable and thought-provoking points. Furthermore, implementing the findings in existing processes was contemplated, indicating interest in using them in practice at least in some form. In fact, the target company had already started taking some actions that were in line with future recommendations. Although these actions might not have been directly connected to this thesis, they can be seen as some validation for the findings.

After the second session, only minor changes were made, and the findings were effectively presented in their final form. The weak market test indicates whether a manager that is financially responsible is willing to apply the findings in practice (Kasanen et al. 1993). As the findings were seen to be relatable, the feedback regarding them was positive, and their use in practice was already discussed, the constructions presented in this study can be seen to pass the weak market test.

4. RESULTS

4.1 Product-Market Fit in Practice

4.1.1 Considerations in Enterprise Software, Established Companies, and Software-as-a-Service

All interviewees were asked whether they are familiar with the term ‘product-market fit’ and what it means to them. The conceptions of this were rather similar between the interviews, although some different approaches were also noted. All interviewees had at least a rudimentary understanding of it containing the match between a product and a problem. This aspect was the main focus of the interviews as well.

While all of the interviewees recognized the concept of PMF, very few had a defined process of recognizing, measuring, or validating this. Still, many seemed to have a general understanding of how good a PMF of a product might be. This was in many cases based on more experience-based assumptions and feelings from working with the product and first customers than any actual data. This sort of knowledge was found to be somewhat valuable, but it is intrinsically tacit knowledge, that is difficult to formalize or process in a pre-defined way.

This sort of informal and experience-based validation was seen to work especially in the initial phases of companies with a small organization, where very few people are working on product management. There the information about customer needs can be turned into a product vision by the same person, or at least within a small group. However, as the organization grows, the handling of such data was seen to become more difficult, as the information concerns more and more people. As a result, many recognized the difficulty of measuring how well customer needs are met before scaling the product.

“When we started we had hundreds of conversations with prospective customers. [...] Likely that [information] can be coded somehow, but it becomes very difficult in a larger solution. In the past, it was easier when just one or two people had the discussions. They developed insight about the issue through these.”
–Interviewee

Finding 1. In general, the interviewees had an understanding of what PMF is. However, the ways of understanding a product’s PMF were largely non-structured and produce interpretive and tacit knowledge.

The market viability aspect of PMF received less attention and this aspect was highlighted only by a few interviewees. This finding can likely at least partially be explained by the nature of the companies the interviewees represented. The interviewees were mainly from established companies with at least some products already generally available. This likely means that the market evaluation phase has already been passed and the market is provably viable. It should also be noted that the interview guide also focused significantly less on market viability.

Although all companies also had newer NPD projects, they mostly leaned on their existing market experience. Therefore, market viability consideration likely is not as necessary. Also, in established companies, it seems likely that market assessments are done by different people than product development and management. This finding is also supported by that those who raised market viability into the discussion without prompting, were working more closely on completely new products in more uncertain markets.

Finding 2. Market viability assessment in PMF receives less attention in established companies. Potentially the need for this is also diminished.

There were also some more unique considerations about what PMF is and what affects it. In some interviews, the presentation and sales of the product were highlighted. This brings forth the communication aspect with the customers: recognizing the need and positioning the product based on that.

“The way I see product-market fit, it is not just a product or a technical manifestation, but more about how it is presented and positioned.”

–Interviewee

A note made in a few interviews about customer needs is that while the customers in enterprise software are other companies or organizations, they are of course made up of people with different viewpoints, interests, and needs. This means that ‘customer needs’ is a concept that covers multiple different viewpoints of the same product.

“[Discussions] depend on whether there are end-users, who are interested in details, or executive-level people, who are interested in business outcomes and insights from other customers.”

–Interviewee

Therefore, the term ‘customer needs’ can be misleading, as these are not straightforward listings, but the requirements within the companies vary. The study did not provide any conclusive evidence about whose needs exactly should be the main focus. However, in many interviews, the importance of a solid idea, that solves real business needs, was highlighted. At the same time, actual functionality could be rather lackluster especially in the beginning stages of a product. Therefore, the needs of decision-makers might outweigh those of users, at least in the early phase. The needs of decision-makers of course are on a higher level and disconnected from technical details.

A related aspect in enterprise software is that the decision-makers rarely use the application themselves. Therefore, they might not fully understand what are the operational realities of using the software. Consequently, there can be acceptance with the decision-makers even if the product is not yet functional in actual use. This highlights the need for operational testing of the product.

One interviewee also stressed that the discussions are had with *people*, not companies. What they meant was that within the same customer company, there can be people with very good vision, while others are very set in current ways of acting. Therefore, each separate interaction with individuals should be seen as a feedback loop, not just the wider collaboration with the whole company.

“We might actually notice that the way workers conduct their work is entirely different than the customer’s decision-maker has believed. [...] Then we are in trouble: both us and the customer have done so much work to deliver a product with a perfect match, only to find out that it is an absolute washout in operational use.”

–Interviewee

Finding 3. The needs regarding enterprise software vary within customer organizations. Understanding and acknowledging different user groups and differences between people helps in gaining a comprehensive understanding of PMF.

One aspect that concerns only somewhat established companies is providing the customers with a set of products that together fill many different needs, usually within the same area. For example, the target company produces software for retail processes, including material flow and planogram planning. These solve different needs but benefit the same type of customers. Additionally, interviewees noted that the different types of software can support each other. Continuing with the same example, information about forecasted demand and batch sizes can help in determining suitable shelf space for a retail product.

These sorts of considerations mean that a product is not necessarily just a stand-alone solution that provides some value for the customer, but a part of a wider solution offering. This also has an impact on PMF of an enterprise software application, as the value that an application provides can partially be understood in a wider context of the whole offered portfolio.

“I would say that the customer also makes the decision based on the other products that we have. [...] It’s not the product-market fit of the one siloed product, but more of a product-market fit of the entire suite of products.”

–Interviewee

“Recently we have started to understand that customers buy our system because of [strong solution area], and the viewpoint of [another solution area] must also come through that.”
–Interviewee

This consideration of course only concerns companies with multiple products, and therefore is not a factor as such in relatively new companies developing their first product. However, some still noted that the products do not function in a vacuum and their tasks can be interconnected with other systems. Even in these cases, if the customers desire a more complete solution, that can be done via partnerships with other software companies with solutions in adjacent solution areas. Although this is not quite the same as having the whole solution in the company’s portfolio, it shows that PMF can depend on the wider solution offered.

“We have much more focus [than before] in our core competence area and utilize the whole ecosystem and partners more. If a customer wants to digitize their whole process, we can get some partners involved.”
–Interviewee

“Yes, there are very essential linkages between all of them [products].”
–Interviewee

This means that in some cases, it is relevant to consider not only the fit of the new product but also how well that product fits to be a part of the portfolio. Furthermore, the ability to solve a wider need with the whole portfolio can be considered. From this perspective, such a consideration could be called ‘portfolio-market fit’. It did not become apparent how the PMF of a single product can be distinguished from the fit of the wider portfolio.

Finding 4. In established companies with existing products, the ability to solve customer needs can be considered in a wider context of the whole portfolio of products. The synergy between products affects the value of individual products in an enterprise software setting. This more extensive view can be called ‘portfolio-market fit’.

The element of SaaS in enterprise software was recognized to have two characterized impacts on considering PMF. Firstly, deploying the solution was found to be easier than in traditional software delivery. This also means, that switching software provider is easier, as the switching costs are lower. However, these are still relative terms. Implementation of enterprise software even with the SaaS model was still seen to be a rather cumbersome task. Nonetheless, more rapid feedback cycles might be possible in SaaS according to the interviews. The role of PMF might also be more important, as customers might be able to change to a better solution if their needs are not satisfied at a satisfactory level.

“In SaaS business, it is much easier to experiment, in comparison to if we were doing physical products.”
–Interviewee

“The culmination of SaaS has made the market much easier to displace each other. We’ve become much more of a commodity. The easier you are to implement, the easier you are to walk away from.” –Interviewee

The second finding regarding SaaS is a bit similar but relates to the testing methods. These can be used in producing PMF information. In many SaaS applications it is rather straightforward to conduct simple tests, such as A/B tests and free trials. The business model might in fact be based around providing a free test while selling premium features in a pricing strategy known as ‘freemium’. (Maurya 2012, p. 180–186) However, based on the interviews, these characteristics do not apply to enterprise software due to complexity, integration barriers, and configurability. Therefore, these typical SaaS characteristics seem to not apply in enterprise products that extensively.

“I think this [research topic] is relevant in SaaS as well, but if it’s some light solution, there are other tools, such as freemium products, which don’t really fit in our area. We have very much interest in utilizing those too but haven’t had a suitable target for that yet.” –Interviewee

Finding 5. Even in enterprise software, SaaS model does make implementations and switching between less cumbersome in comparison to traditional software delivery. Still, many characteristics typically attributed to SaaS in regard to tests and business models do not apply in enterprise software.

4.1.2 Information Needs

As has been stated earlier, the essence of PMF is how well a product solves customer needs in a significant market. In the interviews, it became apparent, that in understanding PMF, a company should focus on the ‘need’, not the ‘product’. Therefore, the main question should not be ‘how well does this product function?’, but ‘what is the need and how could a product solve it?’. Through understanding the needs and problems extremely well, a product can be directed in the correct direction.

Multiple interviewees noted that NPD projects can easily become too feature-oriented: a company can gain feature or product ideas from various sources without a clear basis in customer need. The products from such ideation likely still answer some customer needs. However, many interviewees noted that they might not be the most pressing or important to the customer, or applicable in the market in general. Instead, the focus should be on the problem that a product solves.

This means that most productive discussions do not revolve around features that are being planned or developed, but around understanding the customer’s needs. In fact, multiple interviewees noted that they knowingly try to avoid giving any information to collaborators about the developed product in the early stages. This was done to avoid

affecting the customer opinions in any way and to get an understanding of the current state of the art in a pure form.

“We listened to the customer very closely. We were very cautious about feeding them any of our own ideas.”
–Interviewee

“I discussed [with a customer] for almost two hours about [a customer need] without me once commenting whether we had any solutions for that.”

–Interviewee

Through these discussions, the company can gain a throughout understanding of where the addressed market is software-wise, what are the issues with current solutions, and what the customers need from enterprise software to support their operations. This in turn can be seen as a good basis for product development.

Finding 6. Through understanding the needs of the market and the current state of the art very clearly a new product can be designed to answer the needs in a convincing manner.

At the same time, it was noted that not all needs are equal. The most important ones are the fundamental sets of problems the customer faces in their operations. These are rather equivalent to the concept of ‘jobs to be done’ by Christensen et al. (2016): the underlying goals the customer is trying to achieve. The need communicated by the customer can be some subordinate need or consequence of the current way of operating, while the actual ‘job to be done’ is more fundamental.

Based on the interviews, the most important needs to understand are the fundamental ones. Solving one fundamental need can naturally be seen as more important than solving a smaller need that is caused by the current way of doing business. Furthermore, some noted that the current needs might be in fact be misleading: they can be based on non-optimal, outdated, and generally unfounded ways of operating. This is why it is important to understand different needs in a correct hierarchical view.

“You should understand that in the software business all feature requests are not based on truly optimal ways to carry out the jobs to be done. They can rather be completely unnecessary clutter. Product management must shape what we believe in [...] so that it is optimal and separate from the current way of doing things.”
–Interviewee

As information about different needs becomes vaster, many interviewees note that this will result in the need to prioritize addressing different issues. The mentioned factors to take into account when prioritizing were the synergy between fulfilling the need and the vendor’s strategy, customer satisfaction, and potential monetary earnings resulting from fulfilling the need. Also, some interviewees noted that importance of understanding the

role or origin of the need, which can be used in determining how much value solving the issue could result in.

“We pay attention to a few things: where has the need originated from, what is the scale of it, and what is the impact of it.” –Interviewee

“[We try to validate] what things are important to our customers. Typically we select a few themes that we discuss. We won’t go into features or technicalities, but discuss themes on a higher level. Our goal is to shape the direction that our product roadmap should go towards.” –Interviewee

“You really try to keep it away from the software and more towards ‘this is where my business needs to be’.” –Interviewee

Finding 7. Customer needs vary in a spectrum between more fundamental and more complementary needs. PMF is affected by how fundamental and impactful the solved need is.

4.2 Methods of Producing Information

4.2.1 Customer Collaboration

Working with customers and prospects was heavily underlined by interviewees. This was perceived to be such a foundational aspect, that many other findings are actually just elaborations about how this should be done and what is important in these activities. It does seem that the current understanding is that the knowledge about PMF resides with prospects and customers, and in the interaction with them. Therefore, customer collaboration is not so much a method, but an underlying ideology.

“I don’t really see any other way [than customer collaboration] to validate in an early phase whether we are better or worse, and relevant or not.” –Interviewee

“At [company] the true success story of market viability and solid products is in the way our customers react and we partner with them.” –Interviewee

This finding was expected based on the literature. As was highlighted before in the literature review in section 2.3, the facts about customer needs and the product’s ability to solve them exist with the customers.

Finding 8. Collaboration with customers and prospects is a foundational aspect of validating PMF

In subsection 2.3.2 it was found that the first customers in collaboration should be so-called ‘earlyvangelists’ (Blank 2020, ch. 4). This also received support in interviews,

but in established companies, many other factors also seem to contribute to selecting participants. This is because the companies already have an established customer base, which can be at least partially also the target for the new product. In these cases, the companies seemed to use the existing customers in collaboration regarding the newer products. This is of course natural, but can also have some drawbacks.

In some cases, there was also some additional bureaucracy in selecting collaborators. Many interviewees recognized customer size as being a factor in selecting collaborators. However, there seemed to be some conflict with this. Others preferred to work with more agile smaller companies. On the other hand, many recognized that larger customers have better resources to utilize in collaboration. Some also noted that large companies might have more leverage and gain a position of greater importance, meaning that their opinions might matter more in development.

“When selecting customers [to collaborate with], their size matters. I don’t know if this is correct or not, but most vendors would likely react this way.”

–Interviewee

Some argued that the size of the customer should not matter, only their ability to provide excellent feedback. This is what is highlighted in the literature. In fact, some interviewees noted that whether the collaborator is even an actual customer should not possibly matter, but also other prospects working in the field should be recognized. Therefore, even in an established company, when seeking collaborators, it does not always seem beneficial to be obsessed only with the existing customers. Working with them was seen to be easier due to existing relationships, and there might be good candidates within the customer base, but this customer status was not seen as, *ipso facto*, a redeeming quality.

“It would be great if you could create an environment rallied around your software to get that prospect who doesn’t necessarily have to own the software. You’re just looking for thought leadership across the board. [...] Not everyone is going to own [our] software, but we still would love to get their insight about what their thoughts are in the industry and where they want to go.”

–Interviewee

“When seeking explosive growth, you don’t necessarily want to build that on top of existing customers. They have been segmented and positioned based on entirely wrong criteria. If the new product is positioned based on existing customers, that might direct the product in a completely wrong direction.”

–Interviewee

“Additionally, [one should consider] representability: how well does the customer represent an industry or some geographical area. Does the customer represent something else than just themselves?”

–Interviewee

These considerations indicate that even in established companies emphasis should be given to recognizing lead users either from the existing customer base or from outside of it. However, the realities of doing business and easier communication with existing contacts were found to have an effect on this. Therefore, there likely is a balance to be achieved with comfortable collaboration with existing contacts and more cumbersome collaboration with thought leaders.

One such reality is the difficulty to provide incentives for the collaborators and compelling reasons for them to participate in such activities. With existing customers, this was not perceived to be very easy, but at least somewhat doable. In these cases, the customers were seen to receive enough value through being able to affect development and learning new best practices to justify collaboration. With other prospects, the value is vaguer and the interviewees also noted that they have struggled to provide such incentive. Based on some remarks, the value in these cases can be based on believing in the vision of the product and seeing potential benefits from it in the long run. However, for this to work, the prospect truly needs to be an earlyvangelist in the sense that they already have the problem and they seek ways to remedy the situation.

Another recognized difficulty that multiple interviewees noted with customer collaboration is that customers tend to have a limited ability to envision new innovative products. Instead, they try to improve existing offerings with small incremental improvements. While these have their place and they can provide the customer additional value, it is very difficult to surpass incumbent products with only small improvements.

“We need to predict the future so that the customer might not yet know of the need but we need to have the solution when the need arises. [...] These are the sort of things that do not really originate from the customer base, but from our own ideation.”
–Interviewee

“The customers do not envision something that is completely new. [...] They want to improve everything a little bit. We need to do everything a bit better, but also be a bit different and transformational if we want to succeed with launching a product.”
–Interviewee

“If we ask a large group of customers about what they want, it’s likely going to be something that is already in the market, but just not well enough. [...] In my opinion, that won’t give us anything excellent, although it can provide some feedback.”
–Interviewee

This further underlines the importance of collaboration with lead users. According to von Hippel (1986) their very core characteristic is that they can produce ideas ahead of other market players. Therefore, they are also likely to promote innovative products that other collaborators might not envision.

Finding 9. Even established companies can gain insight from collaboration with lead users, even when they are outside of the current customer base.

Finding 10. Although the products are based on customer needs, successful solutions are based on deductions inside the company about the best way to satisfy that need. Customers are an inevitable source of information about needs and practical problems, but not necessarily a great source for ideas to satisfy them.

As was discussed in subsection **2.3.2**, actually finding these lead users or earlyvangelists has sometimes proven to be challenging (Ghezzi 2019). While this topic was not the main focus of the interviews, it was addressed in a few ones.

One interviewee hypothesized that while earlyvangelists can be difficult to find initially, they are more likely to seek knowledge actively, meaning that they might be more visible in professional meet-ups, organizations, forums, and social media networks. They continued that such people can be recognized by explaining the company's view of the needs, problems with current solutions, and the new solution vision to different people. Earlyvangelists should be visibly interested in having a discussion and hearing more.

A few different interviewees noted that finding the first earlyvangelist(s) is the most difficult. In those first discussions, one can ask for recommendations about who else to contact with questions such as 'who else could be related to this?' and 'who do you discuss these issues with?'. According to one interviewee, earlyvangelists should by nature be open to sharing their contacts. Another interviewee also noted that in smaller geographical areas and in enterprise software products, there might just be a few earlyvangelists in the whole market area, which could make finding them more difficult.

Of course, there are different methods for collaborating with customers and earlyvangelists, and many considerations in doing so. These are highlighted in the next subsections.

4.2.2 Discussions and Advisory Boards

The most usual forms of customer collaboration appeared to be different sorts of discussions with customers, both formal and informal. As discussed above, these aim to reveal the current needs and problems the customers are having. However, they can also be used for understanding possible future needs and validating software development direction.

The method of having discussions with customers seemed to vary. With some, these were very informal and occasional phone conversations called by product owners. It seems that these fit situations where the relationship with the customer is rather close. In larger established companies, the customers usually had some dedicated service team, which

is somewhat expected in enterprise SaaS. The service team is the main point of contact between the customer and the software provider, with whom they can have discussions about their needs and development wishes.

This represented one problem that was discussed with multiple interviewees in more established companies. As the customer discussions are had with multiple, even dozens, of different service teams, the information about customer needs gets fragmented and siloed. This makes it difficult to get a comprehensive picture of the whole situation. Especially the valuable information from lead users can get lost in the continuous stream of information from multiple different teams. Furthermore, the information is difficult to make explicit, meaning that sharing it is cumbersome.

This also makes customer communication a challenge, as there are multiple objectives with being in touch with them. Firstly, as they are using the software their core processes, they have questions and different support requests, that are communicated with the provider. Secondly, as discussed in subsection **2.1.1**, enterprise software is usually modular, which often means the software provider regularly tries to upsell their existing product. They can also try to cross-sell other related products to the same customer. Thirdly, as discussed in subsection **2.1.2**, enterprise SaaS is usually highly configurable, meaning that discussions about different business logic implementations can be often ongoing. On top of this, engaging in fruitful discussions about PMF can be exhausting for the customer. Of course, different people within the customer organization are likely to be responsible for these different aspects, but organizing these different channels can be a challenge.

“Of course, we can’t just let anyone in our company contact any customer, because that makes it too fragmented from the customer perspective.”

–Interviewee

One company approached this issue by having a dedicated person responsible for customer collaboration. They organized different forums, which are discussed more below, and were responsible for organizing gathering insight from customers. This sort of role might be beneficial in other larger companies as well.

One formal method of customer discussion is different forms of advisory boards. These were present in many of the companies the interviewees represented. They were named a bit differently depending on the context, with names including ‘customer advisory boards’, ‘interest groups’, and ‘user councils’, but their goals were rather similar. These are sets of people from different companies who discuss a selected topic together, sometimes regularly. The subjects could vary based on the participants: in some boards, the participants were software end-users, while in others they are C-level executives. There-

fore, the needs and interests of the participants can be different, which is also reflected in the different names the groups can be given.

Finding 11. Companies engage in regular discussions with their customers to understand their business better and to produce information about possible development needs. The discussions can take multiple different forms. In established companies, efficient usage of customer insight can get more difficult due to siloed tacit information and communication challenges.

What unifies the different boards, councils, and other related discussions, is the objective to understand the industry that the software addresses better. This manifests in roughly two different forms. The first is validating the current software and its ability to answer their needs. This is henceforth referred to as ‘retroactive validation’, where the testable features already exist on some level, at least as an idea.

“We have selected customers who participate in these to discuss our strategy to get some sort of validation about whether we address their needs or not.”

–Interviewee

“This is where the retailers, that all used [our] software, for example, got together and talk about how to best use the software.”

–Interviewee

The other form is visionary thinking and understanding future direction and what is needed to serve the market better. This is henceforth referred to as ‘proactive understanding’. This also seems to have different time frames from features that can be developed within months to wider strategic initiatives that can take up to ten years.

“We also allow them to bring us suggestions and feedback: ‘these are the pain points we see and this is something we would like [company] to develop’.”

–Interviewee

“Those customer advisory boards were very strategic in nature. Looking at executives within a company and then looking forward 3–7 years and saying ‘where do you really want to be from strategy, software and solution standpoint’.”

–Interviewee

In fact, this sort of categorization can be done for all information gathering efforts related to PMF. Some actions produce expertise to formulate informed hypotheses. Other actions then validate these hypotheses. Some actions might produce both types of knowledge.

Finding 12. The objectives of discussions with customers can roughly be divided into two in regards to PMF. The first objective is to gain validation for the plans the company has developed. The second objective is to gain an understanding of the business to allow developing those plans in the first place. The types of information are shown in table 10

Table 10. *Found types of product-market information from discussions*

Type	Information	Actions
Proactive	Understanding the current issues and needs of the customer or prospect. Developing expertise on the subject.	Ideating solutions to solve a fundamental enough need.
Retroactive	Validating the theorized issue and the solution for it. Making sure the solution creates value for the customer.	Gaining validation and steering development forward.

Using an online customer community as a tool for gaining customer insight was also discussed with a few interviewees. None of the companies had yet implemented such an environment, but there were plans about doing so. This seems to be a tool that is typical to SaaS, probably because the customer environments are similar enough that different customers can discuss the solution with each other.

The potential benefits of customer communities were seen as enabling customers to discuss their needs, use cases, and product development between each other and with the vendor. This could have many advantages. This allows the customers to network, have a transparent communication channel, and understand the development efforts better. For the vendor, the community ‘outsources’ part of organizing the conversations to the customers. Also, by allowing the customers to vote on proposed functionalities, the vendor can get a better idea about what is generalizable. However, this sort of forum would likely focus on rather incremental improvements, meaning that it would likely be more useful with more mature solutions.

Lastly, it can be noted that customer surveys were discussed only very little. One interviewee noted that they can be used in studying TAM. In regards to customer needs, the same interviewee noted that utilizing surveys is very difficult because they lose all the small nuances.

4.2.3 Tests and Prototypes

As was discussed in subsection 2.3.2, different sort of tests with iterations of MVPs are seen to be important in achieving PMF. This subject was also discussed with the interviewees. The practical details of such experimentation were not the main focus, but the surrounding principles and objectives.

Firstly, it seems clear that both enterprise software and SaaS have their own implications for performing these tests. In general, interviewees felt that SaaS can have a positive impact on the ability to experiment. In the consumer context, companies can try different

approaches and customer responses quickly. Tools such as free trials and A/B testing on websites were mentioned in the interviews.

However as has been highlighted many times, enterprise software is complex, cumbersome to implement, and crucial to the operations of the customers. This means that experimentation is difficult, which was noted in many interviews. Even if the customer would get the product for free, implementing it requires resources from them.

“Of course, in enterprise business, the first piece is rather large and it is not possible to provide free trials. That is not possible, because the implementation is so cumbersome.”
–Interviewee

As was discussed above, these sorts of tests are usual in SaaS in general but not in enterprise software. While tests like free trials might actually be possible in theory also in enterprise software, none of the interviewed companies had these in use. Some did mention that something like this has been thought of, but it would require an environment that is not very data-intensive, which can be difficult to find in enterprise software. Therefore, at least extensive trials seem unlikely also in the future.

Finding 13. Rapid experimentation with different iterations of the product is difficult in enterprise software.

However, another form of trials did emerge specifically in regards to enterprise software. For the lack of a better term, this could be called ‘business case trial’. This is a type of offline trial, where the prospect delivers the data in some format to the vendor, who can demonstrate the results with that particular set of data. These sorts of trials were noted in a few of the companies. In this regard the interviewees underlined making testing as easy as possible: sending data in any format and the vendor would take care of the rest. Alternatively, some noted that an interim integration based on emails, spreadsheets, or manual entry of data can be built.

These are very work-intensive but possible in an enterprise software setting, where the value of a prospect turning into a customer is high enough. These also would not work in the long run but are viable for a relatively short time to demonstrate the system.

“[We say to the prospect] ‘give us some pile of data and we will process it and show what it would look like [in our system].’”
–Interviewee

This sort of test can be especially effective in regards to systems that do forecasts or predictions and recommend actions based on them. In these cases, the customer can send data from history and that can be used to show the effectiveness: the customer can see how the predictions are becoming reality. Alternatively, the customer can send enough data from some time period $N - 2$ and consecutive time period $N - 1$. This way the data from $N - 2$ can be used as a training dataset and the recommendations for

$N - 1$ can be observed. Then the consecutive data can be used as a validation dataset and compared against the recommendations. This way the efficiency and value of the software can be demonstrated quickly.

“We can basically say ‘send us data for the past year in a one-off load’. We can run it through our algorithms and [...] they can check it against [what actually happened].”
–Interviewee

Other interviewees noted some other ways to make the testing a bit easier for the customer. These mainly revolved around limiting the scope based on geography or business areas. However, these tests were mainly for user acceptance testing purposes after the sale had already been agreed upon.

Finding 14. To compensate for difficulty with normal MVP testing, enterprise software companies can provide different offline trials. This is resource-intensive for the vendor, but allows proving value to the customer and gaining validation for the product.

Of course, this is not necessarily a tool for primarily evaluating PMF, but also providing a compelling enough case to gain a customer. However, many interviewees noted that the sales department is a central collaboration partner to get an understanding of PMF. This seems to be the case especially with retroactive validation, as shown in table 10. This is because, naturally, a salesperson is trying to display and gain interest in a product, even if it’s just a prototype.

In this case, the sales attempts are a combination of customer discussions and prototype testing. Based on a few interviews, selling is much clearer when there is some MVP that can be displayed. In this case, the MVP does not even have to be functional, it just needs to demonstrate the hypotheses about the solvable needs and the solution it offers. Offering this prototype to prospects and gauging their interest can be a powerful tool of understanding whether the product is relevant, even if the company is not actually really yet ready to sell and deliver the product.

“It is difficult to sell an idea, it needs to have a UI [user interface] or something to make the customers believe that we almost have a product even if we don’t. We tell them that this is just a prototype, but when they see it they almost believe that ‘they pretty much have something there’.”
–Interviewee

“Even if it’s seemingly sales, it’s actually about product-market fit.”

–Interviewee

This means that the value of the initial sales is not necessarily in the revenue they provide but in the information gained from these sales cases. Indeed, many interviewees noted that the initial sales can be at a lower price than what the normal price would be, or

even free. These considerations very much resemble the ‘initiation phase’ in sales, as described by Leslie & Holloway (2006).

“We also give systems to the customer for free. We say ‘this costs you nothing. Use it and give us feedback.’ Through that, we polish our applicability to that particular industry.”
–Interviewee

“Money is always an important aspect, but when you think about referenceability and the ability to have other customers talk to your partners, I find that extremely valuable, especially if you’re trying to build market credibility.”
–Interviewee

Also, in this stage, the sales learning curve has an effect. As was discussed in subsection 2.3.3, this is the idea that salespeople become more efficient at selling the product as time progresses (Leslie & Holloway 2006). This was discussed in some more detail with one interviewee. According to them, in the beginning, salespeople also need to develop an understanding of the product, its capabilities, and the customer needs. Through this, they can gain an understanding of what the customer response to the proposed solution is.

Based on the interviews, the salespeople also will likely gain some suggestions along the way. Evaluating these also requires understanding the needs of prospects in general. As the product is still evolving, the company is constantly looking for both proactive ideas and retroactive validation.

“It is a challenge, that your basic salesperson can drive sales negotiations through, but here you need much more product knowledge. There is no clear answer to whether we can do something because [...] we can if there’s enough demand.”
–Interviewee

Finding 15. Sales can be used for testing prototypes and gaining new information even at an early stage of product development. Furthermore, the role and objectives of sales in an early stage can differ from the usual conception: the goal isn’t necessarily to sell products, but also to gain information. This also means that the role of the salesperson is less about traditional selling and more about a consultative understanding of the situation.

4.2.4 Competitor Intelligence and Analyst Cooperation

The themes discussed with the interviewees included using information about and collaborating with third parties to gain knowledge about PMF. These third parties mainly included competitors and analyst companies. While the nature of information gained from these two is certainly different, both types were seen representing information about the market.

In competitor intelligence, there were a few different aspects raised by interviewees. Firstly, multiple interviewees mentioned benchmarking the functionality of competing products. However, this did not mean copying all functionality from competitors but reflecting these to the competencies of the company itself. Sometimes it was seen to make sense to replicate similar functionality, but this was not seen to have intrinsic value. Instead, the knowledge about competing competencies could be seen as representing the market situation and direction. This could be used to understand what the customer needs are and how they could develop in the future, which is relevant knowledge in understanding PMF.

“Even if some of our competitors have better competence than us in some areas, it does not mean we should invest in that.” –Interviewee

“The prevailing idea is that we are not utilizing a copycat strategy. [...] We must understand what they do and through that we can understand where the market is going. However, it does not make sense to copy the strategy of someone else, if our strengths are different.” –Interviewee

A few different interviewees specifically mentioned using Requests for Proposal (RFPs) in gaining information about the market. In enterprise software, these contain long lists of functional and non-functional requirements that the customer has for a product they are looking to procure. Through those, a gap analysis can be performed to see how a product fares against the requirements most customers have. However, it is typical that no product fulfills all listed needs perfectly. Therefore, understanding how impactful those gaps are in relation to the areas that a product performs well becomes a challenge.

“We know what the market asks for. Saying the gaps is easy. What is difficult to say, out of all the functionality we have, what proportion would those seven gaps stand for in relation to everything we already have that the customer also needs.” –Interviewee

“It is truly about trying to separate your market fit. What is really the minimum viable product, versus something that is nice to have?” –Interviewee

One interviewee noted that one consideration is also the technological sophistication of the targeted market. This can come into play when a solution is designed that solves customer needs, but customers are not able to take advantage of it because of some technological limitations. Limitations can exist for example in system interfaces, data sources, and even employee skills.

“The customers were not as mature as we thought. That doesn’t mean we have failed, but we have overestimated the readiness to use a product like this. [...] It’s easy to get intrigued about the possibility to do something cool and technical. [...] They need to be mature enough for the value proposition.

That is a difficult balance if you want to be thought-leading. You need to balance it with the likelihood to take something to the market when the market is ready for it.”
–Interviewee

Another approach to this technological sophistication was discussed with another interviewee. They noted that sometimes people are not willing to stop carrying out processes in the current way, even if new solutions through technological advancement could handle them better. He gave an example from an industrial setting, where process parameter optimization was still done by hand by employees, although an automated system was better at doing such activity. This could mean technological sophistication means not only the *ability* to use high-technology products but also the *willingness* to do so and the trust in these.

Finding 16. Intelligence regarding the market and competitors can be used in evaluating PMF. This information is not best used directly in guiding features, but in understanding the market and its direction. This can be used to answer the recognized market needs with a solution that utilizes the company’s own strengths.

Very few specific methods of analyzing the market in practice were discussed in interviews, as these were not a focus of this research. However, many interviewees brought up cooperation with analyst companies in understanding the market. These are companies that analyze products that act in a similar field and provide reports based on those analyzes. Another similar group is the solution integrators, who implement solutions from many different vendors.

“Another way, which is an obvious one, we have people at Gartner and the likes. They make assessments on product-market fit based on the whole software domain. You can look at the Gartner magic quadrant. That is an assessment of the different vendors’ product-market fit to some extent.”

–Interviewee

Cooperation with these companies was also recognized to be usable in estimating the size of different markets. One interviewee demonstrated this by showing approximations of TAM in a certain business field broken down to different geographical areas and categories within that market. These considerations are likely important in designing a product that answers to the needs of a previously unserved market for the company when assessing market viability.

However, reports by analysts were also not seen as a perfect tool for evaluating PMF. As enterprise software products are very complex, analysts might not be able to grasp the details between products. Consequently, they were found to have possibly a relatively narrow conception of the different products and the analyses might be affected by how

much cooperation is done with them. Therefore, there are other factors affecting the evaluations than the product itself.

Interviews also noted, that the analysts might not be able to discern between the strengths of different products, and evaluating complex products directly against each other can be so multi-dimensional, that such comparison might not be entirely representative of the situation. Lastly, they can possibly give the impression that features should be copied from competitors, which might not always be feasible, as discussed above.

“The problem with analyst cooperation is that it very easily distorts the picture of the market. In our past, it lead to us copying competitors too much. They compare the solutions against each other and they can say that ‘this solution does that’.”
–Interviewee

Finding 17. Collaboration with analyst companies can produce useful knowledge about PMF and the competence of a product against competitors. However, this includes potential distortions and biases and cannot be fully depended on. Analyst companies can also help in evaluating the market size of new products.

4.3 Interpreting Information and Signs of Product-Market Fit

4.3.1 Interpreting Collaboration

As was discussed in the previous sections, there are different ways of understanding PMF of a product. What can be said to unite these, is the fact that they revolve around collaboration with customers or another outside entity. This still leaves open the question about how this collaboration should be interpreted and how the collected information can be used to produce understanding.

With product tests, some potential quantitative metrics were mentioned, that could provide insight into PMF of a product. However, the information received via discussions and advisory boards is inherently qualitative and tacit without further analysis. This seemed to be a hurdle to many interviewees.

The interviewees were asked, how they analyzed this sort of discussion. None had a very structured approach to this, although some tools were utilized. Some mentioned tools were recording the discussions, taking notes, writing summaries, and sharing all of these with involved people. These can then be addressed further in internal meetings.

One interviewee noted that the issue with summaries is that they, by very definition, lose some information and nuance. Therefore, biases and expectations about the outcome can cause some important information to be lost. They suggested that all interactions

could in fact be transcribed. This could allow some analysis tools to be used. They also believed that when people would read those transcripts, they could formulate informed conceptions of what they believe the product should focus on.

“When you convert some information into trackable data, you are actually taking a snapshot of the situation, and the richness of the information suffers. It is dangerous before you know the actual situation through hundreds of cases. You might lose something essential.”
–Interviewee

Ultimately based on the interviews, the analysis of the different produced information comes down to human interpretation. People involved strive to formulate their perception of customer needs, proposed solutions, and ultimately the PMF of a product. The tools for this are somewhat lacking or at least unstructured. This also means that the conception of PMF is interpretative to an extent since different people can have different approaches to the same situation.

“People have different opinions about whether we have reached it [PMF] and what increases it and what decreases it. Additionally, it is a dynamic issue, as the market keeps changing.”
–Interviewee

Finding 18. There are some rather basic tools for producing knowledge about PMF from different collaborative actions. However, no clear structured approach for this was found.

4.3.2 Leading Indicators in Early Stages

In the early stages of a product’s life cycle, the product has not been sold yet or it only has a few customers. In this setting, the methods to produce information are more limited. Also, there were very lacking indicators documented in literature about early-stage PMF.

In this study, one objective was to find such leading indicators for PMF, to determine whether a product is ready for scaling. However, it became evident that based on these interviewees, no clear quantitative indicators exist. Instead, a company can gain validation for the hypotheses about customer needs and proposed solutions, as described in previous sections.

“These are lagging indicators, and we would require some leading indicators.”
–Interviewee

“It’s based on engaging in co-creation and asking them [prospects] what is their assessment of the business and its impact. We’ve also tested how much we get similar opinions from others from all around the world so that it’s not just the one.”
–Interviewee

One interviewee even questioned the whole concept of measuring PMF. They argued that measurement is difficult, and instead, a company should focus on getting an understanding of the customer needs and the best possible practices to solve those. Through this expertise about how things should be done, individuals in the company can get an idea of the level of PMF a product has.

“We are talking about a concept that is difficult to measure. In fact, I don’t think there is any need to.”
–Interviewee

It is likely possible to not consciously measure PMF and still have a successful product. In fact, most interviewees did not recognize that they did any knowing PMF validation activities, but they have had successful product launches, as was already described in finding 1.

In regards to more quantitative indicators, one interviewee did mention the ‘Sean Ellis test’, which was addressed in subsection 2.3.3 as a tempting indicator that can be used even in an early stage, as it does not require a sellable product. However, they were very quick to critique it, as they had never seen it being used with any success, and getting a representative sample for the questionnaire in difficult, especially in B2B setting.

Finding 19. Leading indicators for PMF are qualitative and based on expertise in the targeted business and understanding the customer needs extremely well.

‘Observing’ customer reactions to proposed solutions was discussed in multiple interviews, and also has been mentioned in earlier sections. One interviewee offered a little more concrete elaboration to what in customer reactions should exactly be observed. They argued that the way in which information is gotten is relevant, not necessarily the content of the information. By that, they meant that if the customer is evidently interested, proactive, and reachable, it likely means the product is relevant and possibly indicates PMF.

“They [customers or prospects] will answer emails and things will progress quickly. Issues won’t be stuck in a state of limbo, where the salesperson has to hunt down the customer. [...] Everyone is very busy. If the buyer is truly interested, it’s a strong indicator that we’re doing something that is genuinely important.”
–Interviewee

They specifically mentioned using ‘customer verifiers’ by Adamson et al. (2015, p. 246–250) to gauge customer engagement. These are actions by the customer that

1. require active participation
2. communicate a willingness to change; and
3. are binary and tangible.

Some examples of such actions are acknowledging that the current *status quo* is not sufficient, being able to communicate the value a new solution provides, requesting details about different specifications, and finally committing implementation resources (Adamson et al. 2015, p. 246–250). Basically, these are signs that signal that the prospect really is interested. Consequently, if there are many interested prospects, at least the idea for the solution resonates with the market, even if the actual product is not quite there yet. This can be seen as a precursor for PMF.

Finding 20. It is possible to estimate PMF through the manner in which prospects engage in communication with the company, not just the content of the communication.

4.3.3 Lagging Indicators in Later Stages

While the interviews did not reveal that many leading indicators to PMF, there were many different lagging indicators addressed. These are indicators that can be used as indicators of PMF when some sales and traction has already been gotten. While these can be useful in for example allocating sales resources, their problem is that they rely on past data (sales experiences, revenue, etc.). Therefore, the information they give is always somewhat outdated or based on earlier actions, hence the word ‘lagging’.

Many mentioned evaluating PMF based on some monetary metrics. As enterprise software is designed to support core operations, a good enterprise software system should also have positive monetary impacts. In this view, the software would be profitable to the customer to reach PMF.

“The end result is surely some sort of ROI [return on investment] calculation.”
–Interviewee

However, there are some limitations to this noted by the interviewees. First of all, as enterprise systems are very complex, it might be rather difficult to estimate their impact, even after implementation. Secondly, some systems do not have a direct effect impact on profits, even though they contribute to those indirectly.

One interviewee mentioned a system that provided more direct visibility into a certain part of customer’s operations. While this made it easier for customers to grasp that activity and develop related processes making it more efficient, the monetary value of such visibility is not apparent. Due to these considerations, providing a compelling case for monetary benefits can be difficult and such results are somewhat open for interpretation.

Therefore, purely financial metrics might not be viable. It is possible to use more defined operational sets of Key Performance Indicators (KPIs) in measurement as well, which were discussed in many interviews. However, these are naturally much more situation-

dependent. They reflect improvement in some processes that the system attempts to improve, and they can be agreed upon with the customer. For example, in SCM context some mentioned basic KPIs were inventory value and availability.

“We need to agree with the customer what problems they want us to solve [...] and what kind of metrics do we need to prove that the pilot was a success.”

–Interviewee

“Regardless of what software you’re implementing, you need to align on those KPIs and effectively measure those in order to make sure we provide that tangible value.”

–Interviewee

“We can agree that [...] the success criteria would be basically 2 percentage point improvement [in a KPI]. We try to do something that really addresses the value the product is expected to bring to those customers but also something that we can actually measure and is not subject to a lot of other factors that provide a lot of noise.”

–Interviewee

KPIs should, by very nature, reflect the goals and therefore the needs of the customers. Therefore, improving them also answers customer’s needs at least to some extent. What makes these indicators lagging, is that in order to calculate different impacts on KPIs, actual implementations or at least sales demos with real data are needed to see the results.

Furthermore, even though the effects on KPIs are good, other customers or prospects might not perceive the value in the same way, as noted by some interviewees. This can be due to a number of reasons, for example using a different set of KPIs or acting in a different market. It can always be argued that the KPI demonstrations do not apply to some new customers due to some differentiating factors. In fact, one interviewee noted that the ability to transform to different use cases is one way to provide value, although it is difficult to measure. It also provides the ability to serve a large market, as the exact customer needs can differ. Additionally, there are also qualitative needs the customers have, that cannot necessarily be measured.

“There are two different things in regards to this: are the measurable results good and does the customer think that this software is good?”

–Interviewee

“What’s also related to product fitting the market, is that even though the functionalities are similar [to another product], a product might not be as appealing as other products. Usability: is it as easy to use? Appearance? Can you use it with more devices and so on? Here we start to drift towards non-science. The measurement is not as much an engineering science, but it’s more on the side of emotion.”

–Interviewee

Finding 21. Being able to demonstrate the value provided by the solution can be used as an indicator of PMF. The manifestation of this can differ based on the circumstances. Notably, while the underlying value for the customer is monetary, the value perceived by the customer is affected by other factors as well.

One interviewee suggested looking at the number of salespeople who are competent at selling the product to estimate its PMF. The context of this suggestion was an established company, that already had lots of salespeople selling older established products. Therefore, the suggestion was that when knowledge required to sell the product reached larger numbers of existing salespeople in the company, it would indicate PMF.

A few different interviews mentioned net promoter scores and customer satisfaction in general as a potential PMF indicator. However, so many things can affect these, that using them to indicate PMF can be misleading. One interviewee noted that while not all customers will be happy all the time, the most important thing is that the customers are willing to discuss with the vendor and act as references. This could indicate that they believe in the product and the solution it provides, even when they are not fully happy. This in turn could indicate PMF.

One interviewee also brought up being contacted by quality prospects when PMF is reached, even without any significant marketing. The product likely answers to some real need, if the potential customers are actively seeking more information about it and there appears to be demand even without very active efforts to sell it. Of course, this does not necessarily mean the product would suit the prospects, but at least the communicated idea resonates with them.

Finding 22. The manner and atmosphere in which interaction with customers is done can signal PMF.

Other rather simple metrics that were suggested were market share or position, revenue (for the software vendor itself), and quantity and price of sales. These are realizations of gaining market success, which can be seen as a result of PMF. As a result, these likely indicate PMF in a valid manner.

However, it could be argued that they are extremely lagging. One interviewee described these as a “scoreboard”, meaning that they display results rather than affect the process in which those results are gotten. So while these are likely valid and somewhat precise indicators, their lack of timeliness makes their usefulness questionable. The found lagging indicators are listed in table 11.

Table 11. Found lagging indicators for product-market fit

Name	Description
Proven implementation profitability	Being able to demonstrate and prove the monetary value of procuring and implementing the product.
Proven functional improvement	Being able to demonstrate improvements in selected operational KPIs after implementing the product.
Competence of salespeople	Being able to show that sales yield has increased to a satisfactory level.
Customer openness	Customers being open to communication, even when not fully happy, and willing to act as references.
Prospect creation direction	Some prospects approaching the vendor, and not always the other way around.
CLTV and CAC	Being able to show that the CLTV exceeds CAC significantly. Alternatively being able to show that CAC payback time is at a satisfactory level.
Scoreboard metrics	Showing increased and satisfactory market share, revenue, sales quantity, and average sales value. Arguably extremely lagging, possibly to the point of non-relevance in regards to PMF.

5. DISCUSSION

5.1 Essence of Product-Market Fit

The definition of PMF was rather clear based on literature, although some differences did emerge. The concept was also rather familiar to the interviewees and the connection between customer needs and the product's proposed solution was recognized to be the main factor in reaching PMF. Although there were also some less common considerations presented, the most prevalent considerations were rather unified.

However, what became apparent is that different people have different approaches to the concept, although the main principles were common. Some interviewees emphasized sales and communication, while others focused on product management and development. To a degree, these are interconnected, but the different considerations make the concept rather wide. A similar finding was made in regards to literature, where the concept of PMF could be approached from multiple different angles. In the interviews, the focus was especially on the customer need aspect of PMF.

One important finding from the interviewees was that 'customer needs' are actually needs from the people inside customer companies, and they, therefore, differ even inside them. This seems rather obvious but the implications of this to PMF are rather notable and have, to the author's knowledge, not been addressed in the literature. Firstly, it can be hypothesized that the different needs fall in a hierarchy with some needs being more fundamental and critical than others. The fundamental needs cause more defined needs in lower levels of the hierarchy. This can be seen as a 'need tree' to demonstrate this idea.

In reality, however, such clear hierarchy and levels likely do not exist, but the needs exist in a spectrum. It could be argued that for any company the most fundamental need is to create revenue with minimal costs, and the other needs are elaborations caused by the operational environment, strategy, and business model. Of course, no enterprise software can fulfill the need of 'making money' fully, but more concrete approach methods are needed. Therefore, there are likely different levels of needs on a wider spectrum between very fundamental and very granular needs, where different needs have cause-and-effect relationships with each other. A successful new product needs to solve a need fundamental enough to create sufficient new value, but concrete enough to guide development in an efficient manner. The needs fluctuate in relation to each other and

their importance is likely interpretive, but the tree as shown in figure 11 can be seen as an illustration of the situation.

Also, the needs of different personnel were found to differ. Especially in the beginning, answering to needs of decision-makers was found to be potentially the most important. However, the end-user needs likely cannot be completely overlooked, because, at the end of the day, they are the ones utilizing the software. If the software does not perform the tasks they need, it does not function in practice and the business benefits cannot materialize. Therefore, while solving a problem to produce business benefits is the whole selling point of enterprise software, lower-level needs are also a consideration. This could mean that in order to achieve PMF, the needs of all stakeholders must be met at least on a reasonable level, but the priority initially should be in the higher needs.

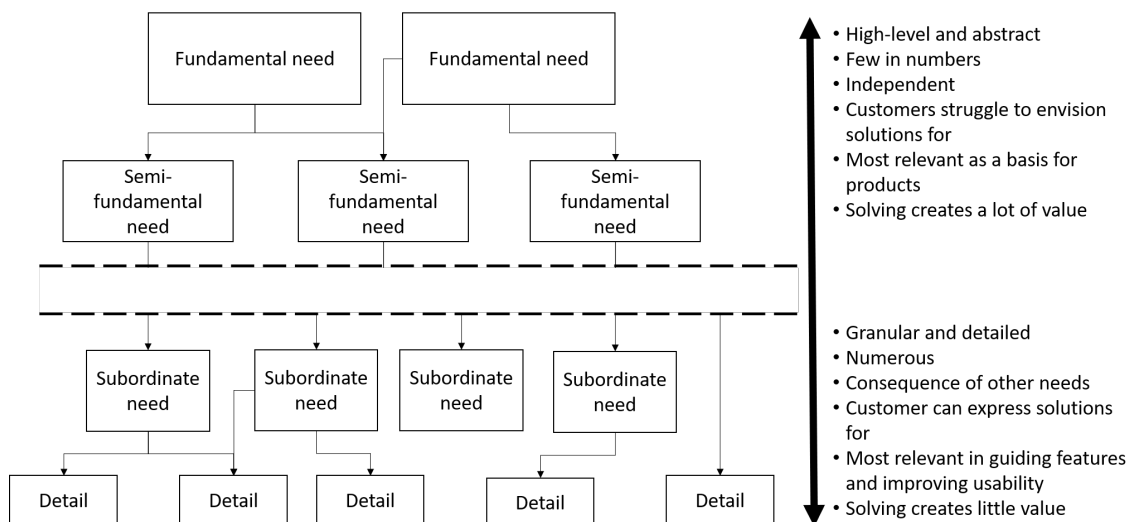


Figure 11. Hypothesized hierarchy of business needs

For example, a retailer might think that they need more workforce effectiveness in shelving products. They might ask for software to guide shelving efforts in a more efficient manner. However, the actual problem might be with the shelving being concentrated on certain days or times. Therefore, a potential higher-level solution would be to increase coordination of deliveries to spread them out evenly and consequently balance shelving work more evenly.

It seems likely that not all needs are needed to be fulfilled to reach PMF. As was shown in the results, some interviewees did say that recognizing the gaps in the software was easy but assessing the impact of those gaps was not. Therefore, it is possible that recognizing where the recognized need lies in the need spectrum is both important but also a challenge. This relates to the concept of 'job to be done', where one must understand the underlying goal, for which a product is purchased (Christensen et al. 2016). Also, as was discussed in the previous chapter, some lower-level needs can be non-optimal. In these cases, it might not make sense to solve that need, but instead solve a need at a

higher level in a manner that eliminates the lower-level need, which therefore becomes redundant.

These considerations, therefore, mean that just understanding 'customer needs' might not be enough, but also understanding their impact, importance, relation, and origin of those needs. Indeed, this sort of information can help in understanding and exploring the problem domain (Gupta et al. 2020). Through this, the software vendor can understand what exactly are the needs that should be targeted with the solution. Likely those needs are fundamental enough to allow solving them to produce significant value but still tangible enough to guide development. This is the proactive information that was discussed in the previous chapter.

This solution must then be tested to see whether the customers agree that it solves a need or a group of needs. As was discussed in the literature review, this can be done with an MVP, which can take multiple different forms. This is the smallest possible set of features that can be used to test the hypotheses (Eisenmann et al. 2013) and it can even be just a presentation showing the solution. So even though it was noted both in the literature review (Ghezzi 2019) and in the interviews that the first *functional* MVP in enterprise software is already a rather complex one, the more rudimentary forms of MVPs can be used earlier. As one interviewee noted, just having a user interface already signals that there is something in the works, although the actual product does not exist yet.

In this sense, the term minimum viable product is misleading. It implies that it is a product that does the least possible to be a viable option for customers, but as has been discussed, this is not always the case. Firstly, it might not be a product at all: it does not necessarily yet produce any value for the customer, as Ries (2011, p. 28) broadly defines a product. Instead, it is a vehicle to develop the method of producing value. Secondly, even if an MVP technically would be a product, it might not yet be a viable option for the customer. Instead, it is a viable method of testing the hypothesis in the least effort possible. These considerations mean that a more descriptive term would be 'minimum testable embodiment (of a solution)', but of course this term does not have the same appeal to it.

Market viability was also found to affect PMF, although the focus of the interviews was not in this aspect. However, it does seem clear that a market needs to be sizable enough to actually support a product. What was highlighted in the interviews in relation to markets, was recognizing the commonalities within the target market: solving a problem that many potential customers have. This is a consideration when doing customer collaboration, as the vendor must recognize which needs are common. This can be done at least by engaging in communication with multiple customers. Another consideration that was mentioned was the market technological sophistication, where the vendor must make sure customers are able to use the solution from a technology standpoint: the required data exists, integrations can be built and the customer is willing to move to a new solution.

If a product has too high technological demands for a market, that might not be a viable solution for customers even if it otherwise would solve the needs very well.

Based on these considerations, the elements of needed knowledge related to PMF can be split into two main aspects and further into four branches. These are displayed in table 12. These aspects are partially inspired and backed by the arena attractiveness characteristics Cooper (1983; 1987), which were addressed in subsection 2.2.2.

Table 12. *Types of product-market fit knowledge*

Market viability		Product compatibility	
Market size:	Technological sophistication:	Proactive understanding:	Retrospective validation:
Can the product solve the needs of a significant number of customers?	Are the customers able and willing to take advantage of the product?	What are the customer needs and their interconnected relations and impacts?	Have the needs been understood correctly and does the product solve them?

5.2 Ways of Validating Product-Market Fit

In the previous section, the two different sides of PMF were discussed. As has been explained, the focus was not on the market side, so there were not so many recognized methods recognized for approaching this aspect. However, it could be argued that the concepts of TAM, SAM and SOM are already rather well known, which can be verified with a simple Google search. What some interviewees pointed out, that there are analyst companies whose services specifically include estimating market size.

In regards to market technological sophistication, no specific tools for approaching this were discussed in detail. However, it is likely that understanding the customer processes and the software tools they utilize at the moment could contribute to understanding what sort of data is available and on the other hand, how much technological advancement they would be willing to accept. In an enterprise software context, technological sophistication is therefore a combination of the ability to provide data and use the resulting information from the system, and the willingness and readiness to believe that the information is useful, valuable, and better than human-produced alternatives. Analyzing the adopter classes of the market and different customers might also reveal useful information (Rogers 1983, p. 241–252).

What this study focused most on was the ability of the product to solve the needs of the market. Two aspects were recognized to this: proactive understanding and retrospective validation. The first produces understanding and hypotheses, and the latter validates

those hypotheses. There usually is some product development in between these phases, that allows the validation to happen. This sort of development that is driven by developing hypotheses and validating those is actually the very backbone of the lean startup methodology (Ries 2011, p. 55–57). This is also an iterative process: while validation for solutions is gained, likely new hypotheses and refinement to existing ones also come up. Therefore, these two types of information can be intertwined. This sort of iterative development is also well-founded in literature (e.g. Dow et al. 2005; Coviello & Joseph 2012; Ghezzi 2019; Blank 2020; Huikkola & Kohtamäki 2020).

The starting point of this thesis was to find ways to validate PMF to evaluate whether it is ready to be scaled. That is, the objective was to do this for a somewhat ready product. However, as the research progressed, the underlying assumption for this was found to be flawed. A major part of PMF validation is that a better understanding is gained throughout the whole process of gathering more knowledge of the market and designing products that solve the recognized needs. It is therefore difficult to evaluate PMF at a single point in time if there is no deep understanding of customer needs built during the development. Therefore, although the actual ‘validation’ happens through retrospective validation, the proactive understanding built over time is an intrinsic part of this process.

Customer collaboration was found to be a central part of the whole process of understanding PMF, as was expected based on literature. Notably in this context, ‘customers’ can also be seen to include prospects (Millier 1999, as cited in Coviello & Joseph 2012), as both actual customers and potential customers hold knowledge about current practices, improvement areas, and problems.

As was discussed in the previous chapter, customers are not necessarily great at envisioning major innovation. This is also supported by literature (Mahr et al. 2014; Trott 2017, p. 562–563) but customers can still support in making that innovation happen (Coviello & Joseph 2012). Indeed, seems that the value from customer collaboration is in providing the background knowledge required for supporting innovation, understanding the problems, and innovating better methods of working. Therefore, both the collaboration and internal capabilities to produce a solution are important aspects. The customers can also validate the hypotheses and conclusions that are made based on the gathered knowledge. This is the other form of valuable information customers can help to produce.

There were a few different forms of customer collaboration that were raised. Perhaps the most common and also potentially simplest form was different sorts of discussions with customers. The exact form of these can differ from sales meetings to informal phone calls, likely depending on the relationship between the vendor and customer. The idea of combining sales and understanding PMF is rather similar to test sells described by Cooper (2011, p. 483), which was discussed in subsection 2.3.2.

A more structured approach was different sorts of advisory boards. These can have different compositions. Only actual customers were involved in some cases, but also involving other forward-thinking prospects was seen as desirable, although motivating them was found challenging. This combination of actual customers and potential forward-thinking customers is also supported by Coviello & Joseph (2012) and Mahr et al. (2014), who both have similar suggestions.

Conducting different tests was also discussed with the interviewees and there were some considerations regarding this raised in the last chapter. However, it seemed that many interviewees did not have a clear idea of tests in regards to PMF. Many thought of these in a technical sense and from a user acceptance testing perspective. Therefore, the role of testing might be different than what was initially thought. They might not be as central in understanding PMF, but instead can be used to validate the understanding and prove its existence. In other words, the role of tests is emphasized in retrospective validation. This does also make sense, as testing requires already some somewhat functional product, which should have been built based on an earlier understanding of the situation. Maurya (2012, p. 153–154) describes a similar process, where ‘rollouts’ are done based on needs that are recognized earlier.

It should be noted that in a wider sense, tests can also be seen to include different sorts of MVP validation efforts. Therefore, even presenting an idea and tentative solution could be seen as a test.

Notably, customer surveys were brought up very little. Furthermore, when they were, their usefulness in recognizing customer needs was questioned. This could mean they are not a good tool in this aspect, although they could be used in gauging market size. This is in line with Maurya (2012, p. 71–72), who suggested only using surveys in validating findings. This could mean that these could be used in producing retrospective validation.

Another aspect that was discussed in the results, was competitor and other market intelligence. However, the valuable information from these also seems rather similar to customer collaboration. Simply copying what competitors are doing was not seen to always be sensible. Instead, this intelligence should also be understood in the context of the vendor’s own strengths. Therefore, it also contributes to the backdrop where the innovation happens but does not give any ready-made solutions. In fact, in the study by Cooper & de Brentani (1991) synergy between the product and the company was the only factor that was slightly more significant in predicting success than PMF. Therefore, the product that is developed must utilize the vendor’s strengths, even if some support for innovation is gained from the market.

The recognized methods of producing knowledge of PMF are shown in table 13. Also, the types of knowledge, as shown in table 12, they are seen to produce are presented.

Table 13. *Recognized methods of producing product-market fit knowledge*

Method	Description	Produced knowledge
Discussions	Many types of formal and informal discussions directly with individual customers. They can take different forms, such as sales, product co-creation, or feedback requests.	Very flexible method that can produce both proactive understanding and retrospective validation or even both, depending on the context. However, it seems to be especially important in the first stages of building proactive understanding.
Advisory boards	Formal groups of customers and prospects that can discuss topics related to the product and its field. Attendees can also vary from end-users to decision-makers. Usually focus is not on current product functionality but on desired development direction.	A rather flexible method. Usually focus is on proactive understanding, but especially in boards that are focused more on end-users, also retrospective validation is possible.
Surveys	Questionnaires via different mediums consisting of predefined questions. Can be focused on customer needs or on market size	Might be useful in retrospective validation but not in proactive understanding. Can be used to map market size and viability.
Tests	Efforts to receive feedback on iterations of MVPs and test them in practice. Tests can vary from implementing software to presenting the solutions.	As tests are made based on existing MVPs, the information is purely retrospective validation.
Competitor intelligence	Being aware of and understanding the product features and development directions of different competitors.	Potential to understand the state and direction of the market, and future needs. Information is both about technological sophistication and proactive understanding. The information should be interpreted in the context of the vendor's own competencies.
Analyst co-operation	Communicating with analyst companies, participating in their market studies, buying their market intelligence services, and examining the resulting reports.	The type of such collaboration can differ and so can the gained information. In early phases, this can help with gauging market size. The studies could help in understanding market needs and future direction, producing proactive understanding. Lastly, studies of existing solutions could provide some retrospective validation.

Some have argued that recognizing when PMF is achieved is rather self-evident and a company will know when a product has a good enough PMF through the product gaining larger traction (e.g. Andreessen 2007; Ries 2011, p. 220). However, it can be argued that such traction can only be gained after the product has already existed for some time and started to aim towards scaling. This is despite the fact that scaling should not be attempted before reaching PMF, as discussed in subsection 2.2.1. This causes a sort of *catch-22* situation, where recognizing PMF is both the trigger for and a result of scaling. Therefore, ideally, some sort of leading indicators should exist that provide a clearer picture of PMF before focusing on sales.

The interviews revealed that there are no known leading indicators that would be very tangible, at least in the companies that the interviewees represented. Instead, the leading indicators are based on the expertise within the vendor's organization. They must be able to interpret the situation: the impact of the problems customers have and the effect the solution could have. Some input can also be gained from *how* the customers interact with the vendor.

However, this leaves the challenges of obscurity and tacit information. Especially in a larger company, the qualitative information can easily get scattered and no one might have a clear idea of the situation. This sort of *laissez-faire* approach without much systematic structure might work in some cases but is inherently difficult to generalize in a comprehensive manner. Yet, it does seem to be the prevalent method of understanding PMF. This approach also makes it challenging to formulate, when exactly a product is ready for scaling, as the situation is open to interpretation. Therefore, there might not be a clear solution for this problematique. However, the factors contributing to this leading understanding have been outlined.

There were more structured and tangible lagging indicators recognized. The indicators were rather varied, extending for example from profitability for the customer to having developed a competent sales force. These were gathered in table 11.

What made the comment about a competent sales force interesting, was that it resembled the sales learning curve (Leslie & Holloway 2006). However, a foreseen challenge with this is that the knowledge and ability to sell the product likely does not spread spontaneously. Instead, the company needs to direct the salespeople towards learning about the new product. Consequently, this brings forth the timing of such a shift towards the new product. Scaling in this manner should be only done when PMF is reached. The number of capable salespeople cannot be both indicator of PMF (i.e. a trigger for scaling) and a result of reaching PMF (i.e. consequence of scaling). Still, some kind of measurement of competence of salespeople could be seen as an indicator of PMF, which is backed by the concept of the sales learning curve. However, this study revealed no details about how such evaluation could be done.

Interpreting the reliability of these lagging indicators in general based on this study alone is rather challenging. This is because each individual indicators was only mentioned at a few interviews at maximum. Therefore, the indicators are based on consideration from rather few individuals. A similar notion was also made in regards to literature in section 2.4. Further evaluative research would be needed to see how the recognized indicators function in practice.

In practice, it seems likely that both types of indicators could be used at the same time. The more qualitative leading indicators can and likely should continue to be used even if more lagging data becomes available. This can provide a more comprehensive overview. On the other hand, as PMF for even an established product can change due to market changes, the concept is somewhat shifting. Consequently, the information should likely be collected and reflected with indicators in a recurring fashion. Selected indicators both from literature and this research are shown in table 14. The references to literature are made earlier in table 6. The theorized applicability of indicators both as leading and lagging is also shown.

Table 14. *Product-market fit indicators in literature and in this research*

Name	Present in		Applicable as	
	Literature	This research	Leading	Lagging
Hypotheses based in understanding	X	X	X	
Proven implementation profitability		X		X
Proven functional improvement		X		X
Sales yield	X	X		X
CLTV and CAC	X	X		X
Customer eagerness & openness		X	X	X
Prospect creation direction		X		X
Scoreboard metrics		X		Doubtful
Churn rate & engagement	X			X
Evaluating list of questions	X		X	X
Sean Ellis test	X	Objected	X	X

Andreessen (2007) describes PMF as market success starting to and demand drastically increasing, which shifts the focus of the company from development to being able to provide the product. From this perspective, many simple very lagging indicators were found based on things like revenue, sales, and market position. However, as was also raised by some interviewees, these are more like 'scoreboards', as they are very lagging. Therefore, they are likely a longer-term result of PMF, meaning that their usefulness in recognizing the point of reaching it is questionable. However, supposedly they could be used in some retrospective analyses.

5.3 Considerations from the Contexts of the Study

Three main contexts are recognized in this study, which are enterprise software, SaaS and established companies. This study also sought to establish what sort of considerations these have in regards to PMF.

Firstly, established companies can be seen as ones that have existed for some longer period of time and already have some ready products on the market. It is also rather natural that in this context the companies are larger than in a situation where the companies are developing their first products. This was seen to affect how PMF knowledge was gathered. When the organization is small, the same person or at maximum a few people are able to have an overview of the product and customer collaboration. This is because they are involved in many processes and information sharing within a small intimate team is likely more transparent than in a large company. Consequently, the small team is able to develop the vision based on this information, which is referred to as proactive understanding.

In larger established companies this consideration gets more challenging in many regards. Based on the literature, these can include restricting bureaucracy, and lack of freedom, incentive, and resources (Kirsner 2016; Edison et al. 2018). Especially gaining better information from customers can be seen as a benefit in startups, that can be difficult to achieve in larger companies (Kirsner 2016).

Indeed, the interviewees noted that as the number of people and customers involved increases, the proactive understanding becomes more spread out. Developing a comprehensive understanding is more difficult and communicating with customers is more challenging, as existing communication channels spanning across different teams and customer success managers exist. Therefore, there are more barriers to having a clear conception of what the solvable comprehensive problematique is and what are the relations between different aspects within that.

There were no very clear solutions presented for solving this problem, which actually is to be expected since information management in large organizations and knowledge management, in general, are comprehensive research areas. One company had appointed a person responsible for customer collaboration, which could be a sensible practice since they could have a clear idea about how and when collaboration is done. Additionally, new products that are being developed would likely benefit from a clear product lead, who would have much freedom to operate and develop the product as they see fit, much like an independent startup but still with the resources of the parent company in the background.

In established companies, customer collaboration was found to also be affected by additional factors related to the existing customer base, such as customer size. Based on the interviews and also findings by Mahr et al. (2014) and Coviello & Joseph (2012) (see

subsection 2.3.2), only working with customers because they are existing ones is not the best course of action. Instead, the best outcomes likely result from collaboration with a mix of existing customers and outside lead-users.

The product should be developed based on this proactive understanding. There could be more available resources for the actual development in established companies, although this was not discussed in the interviews. After this, the developed MVP should be used to validate to made hypotheses and solutions. In general, reluctance to display lacking and 'half-baked' ideas to customers is a problem (Cooper 2011, p. 474; Dennehy et al. 2019), especially in established companies (Kirsner 2016), where there are likely some interpreted expectations for products. The semi-independent product team described above could help with this too.

One additional interesting finding from the interviews was the 'portfolio-market fit', which was coined as a term to describe how well a portfolio of products can satisfy the larger set of needs of a customer. This likely mostly concerns established companies, who actually have a portfolio, that is a collection, of products. However, some similar considerations could also be made with smaller companies through partner collaboration, where the set of solutions provided by multiple companies form the portfolio from the customer's point of view.

Although product portfolios and their management is nothing new (Cooper & Edgett 1999, p. 179–220; Trott 2017, p. 455–456), to the author's knowledge their role in regard to solving large sets of problems in a manner such as PMF has not been discussed. Would it be possible that a product's PMF could be affected by the portfolio it is part of? It could be argued that this is likely and some interviews pointed in this direction. Consequently, is it possible that a product can be interpreted as having independent PMF, whereas, in reality, its fit is actually portfolio-market fit? In other words, the success or sales of a product might not directly correlate with its PMF, if that success is mainly due to being bundled with other products. This study did not reveal many details about these aspects, but these could be interesting considerations in the future.

This study was originally directed to focus more on SaaS than what eventually transpired. However, what was noted early in the interviews was that SaaS in the context of enterprise software is rather different from what is usually seen of characteristics of the SaaS model. This seems to be a result of how central an enterprise software system is to a client and on the other hand, the fact that the system is a generic solution applicable for a variety of customers. These are inherent characteristics of an enterprise software system (Davenport 1998). These result in the need to support different sorts of processes in the software.

Many SaaS characteristics seem to be built around the fact that all customers receive the same product and access the same software instances via multi-tenancy (Mäkilä et al.

2010; Tyrväinen & Selin 2011). This is true usually in enterprise software too, but even though the customers use the same product without much customization, the different customer processes cause the configurations to be rather different between customers. This ‘configurable limit’ is usually high in enterprise software (Sun et al. 2008), which means that although the product is the same, it manifests in different forms. Additionally, the data and modules can differ between customers (Davenport 1998; Sun et al. 2007; Tsai & Sun 2013).

These things mean that the agility of SaaS is somewhat limited in the enterprise software context, at least in the companies that participated in this study. This can be seen for example in the inability to provide some testing tools, like free trials, A/B tests, and freemium business model. While there was interest in utilizing these in the companies, no viable options for this had presented themselves at least this far.

These considerations eventually meant that the study might have more in common with enterprise software in general than what is usually characterized as SaaS. These two have interesting contrast. SaaS can be seen as easy to test and quick to implement. Enterprise software on the other hand requires data integration and implementation projects, causing slowness in the process. Also, the CLTV in enterprise software is likely rather large, in comparison to most SaaS applications. This has implications on how much effort can go into testing the product with a single customer.

It was also seen as rather cumbersome to develop an enterprise software system, as it takes a lot of time. This could be seen as making MVP testing difficult. However, it could be argued that this consideration actually makes it even more important. As was noted earlier in subsection 5.1, an MVP is not actually necessarily a product, but some sort of manifestation of a solution. As building the actual product is difficult, validation can be sought through testing presentations, visual mockups, and smaller parts of the whole solution. When testing an actual product, that can be made easier for the customer via limiting the scope of the test. Also, offline trials dubbed as ‘business case trials’ can be used, which resemble ‘Wizard of Oz’ testing (Dow et al. 2005), that was introduced in subsection 2.3.2.

5.4 Validation Framework and Future Recommendations

The goal of constructive research is to provide a construction based on both literature and new research to solve a problem (Kasanen et al. 1993). In this study, the considerations made in chapters 2, 4 and 5 are condensed into illustrative framework. This framework focuses on understanding and validating PMF (i.e. research question 2). Discussion into all research questions is provided in the previous subsections.

The framework, in this case, is split into two. Firstly, the types of PMF knowledge and the methods of producing these are displayed in figure 12. This framework displays the recognized PMF knowledge types, their relationship with each other, and methods of producing said types of knowledge. Additionally, the iterative nature of MVP testing is shown as a loop in the process.

Notably, the figure does not include an end. Instead, producing PMF knowledge can continue indefinitely even after scaling, although at some point the product's life cycle does likely reach an end, at which point PMF knowledge regarding it is no longer needed.

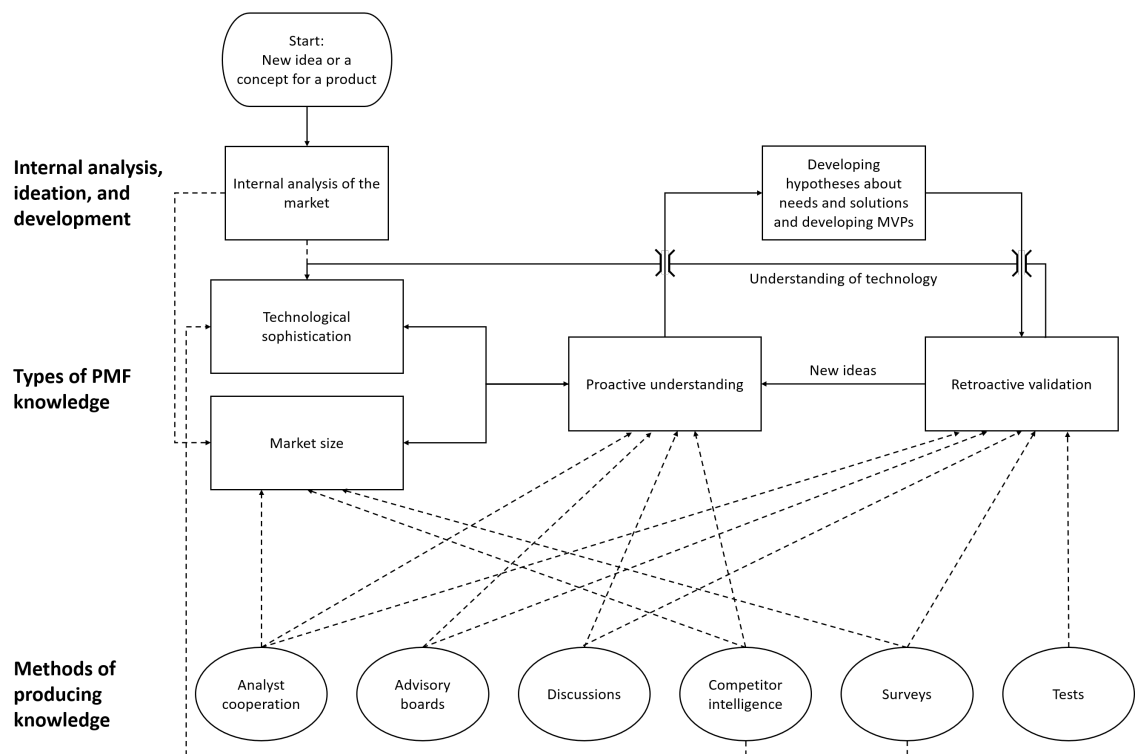


Figure 12. Product-market fit knowledge framework

This first framework of PMF knowledge creation is incorporated as part of the second framework. In this second framework, the process of understanding and validating PMF is shown. These two sides that are mainly conceptualized based on the empirical study have been highlighted with dashed rectangles. As can be seen, the development of PMF knowledge, which was elaborated in the first framework figure, is a central part of the second framework. However, the second framework shows the whole process of also using the knowledge in decision-making. In addition to PMF knowledge, this framework incorporates the usage of PMF indicators to assist in scaling decisions. Possible indicators were shown in table 14.

A preliminary framework based on literature was presented at the end of the literature review in figure 8. The new framework specifically addresses the shortcomings of this by

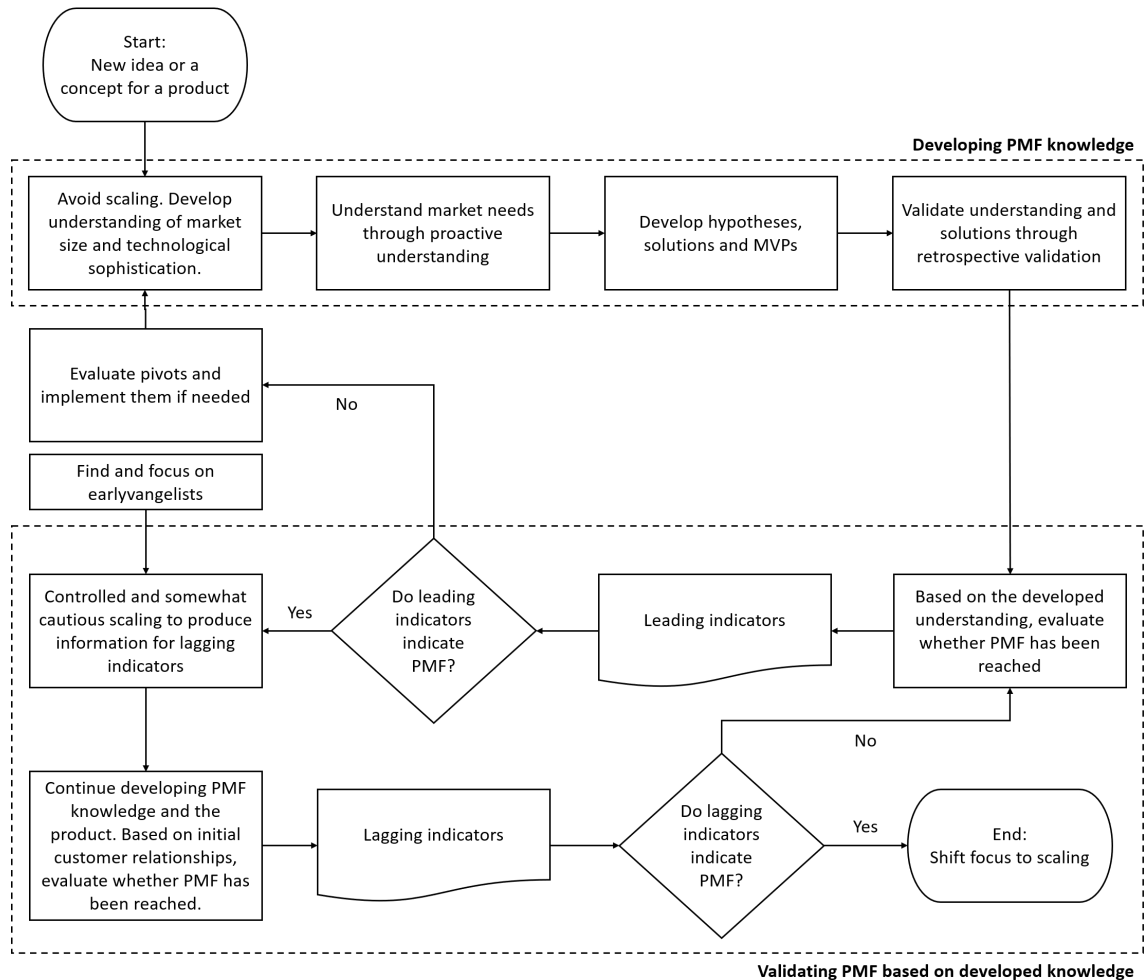


Figure 13. Product-market fit validation framework

providing a clearer approach to PMF validation by elaborating knowledge types and by providing a more understandable approach to PMF indicators.

Notably, the second framework mentions the concept of ‘pivoting’. There are many types of pivots, but these can include a shift in the market or product (Ries 2011, p. 172–178). Therefore, during the development, it is possible that the market size or required technological sophistication changes during the process. Even customer needs might change if targeted customers change. As a result, it should be noted that pivots could cause some points of discontinuity in these frameworks by changing the operational environment during the development. Similarly, it might be possible that a product has PMF in some market areas or geographical areas, but not in others. Therefore, parts of the process might have to be repeated in different areas.

Based on the results and discussion, some concrete recommendations for future actions for the target company are presented. More general and abstract management recommendations are discussed in section 6.1. The more practical recommendations are shown in table 15. The presented time horizons for different actions are illustrative

and can differ in practice based on a variety of factors, such as existing processes and data.

Table 15. *Future recommendations for the target company*

Time horizon	Action	Description
Weeks	Examine the subject	Getting familiar with this study and its results and conclusions. Reflecting its potential implications on existing processes. Also, examining new processes where the frameworks could act as a basis.
Months	Spread knowledge of PMF	Within the target company and relevant teams, aim to share the view of PMF and its impacts on the business.
Months/year	Recognize the role of PMF in scaling decisions	Start implementing methods of understanding and validating PMF in product development work. This study presents frameworks for this.
Months/year	Clarify customer collaboration efforts	Dedicate a person responsible for the efforts of coordinating customer collaboration and producing related knowledge. Also, include the principle of MVP testing into the process, where testing can be done with even rather simple forms of the idea.
Months/years	Combine data from other sources	Include data from competitor analysis and analyst cooperation into PMF analysis process.
Months/years	Formalize the role of customer collaboration	Aim to develop forums where PMF knowledge can be developed in collaboration with customers, such as customer advisory boards and beta programs.
Years	Develop an online customer community	Develop and launch an online forum, where customers and the company can share ideas and needs. Enable customers to interact with each other to gain an understanding of common needs.

These recommendations are based on the findings and discussion presented earlier. Firstly, the considerations presented in this study should be examined and related ideas spread to people who could benefit from the information in their work. This allows the readers to also draw their own conclusions and practical ideas to support future actions. Next, the resulting conclusions can be implemented into existing processes of product development. In practice, this could mean focusing on gaining PMF knowledge in a more aware fashion by implementing the presented methods of producing knowledge. In scal-

ing decisions, the indicators presented in the study could act as one guiding data point, although this study is not enough to clarify which indicators would be the best.

As was the case in one company that was interviewed, a dedicated person could be appointed to manage customer collaboration and PMF knowledge in general. This would centralize the information gathering effort and clarify the picture of the situation with new products. The aim of this is to make sure that the insights from customers would be gathered and used effectively in product development without getting lost in the midst of a large amount of information.

On a somewhat related note, the utilization of more basic MVPs could be investigated, as even a very basic form of an idea can help in producing knowledge without the need to use resources in extensive development. Furthermore, information can also be gained from competitors and analysts, and the data from these sources can be included in gaining a more complete understanding of the situation, where applicable. The types of knowledge different actions produce were presented in figure **12**.

As part of the process, the company can also strive to formalize customer collaboration. This means making information gathering efforts more established via advisory boards and different programs, where discussions about customer needs, issues, and future development can be had. Ideally, these would be implemented as soon as possible, but the exact time horizon depends on practical considerations, such as existing customer communication channels. The customer collaboration responsible, which was discussed above, could have a significant role in designing, executing, and overseeing the programs. Also in SaaS context, online customer communities could be looked into. Although none of the companies had a functional online community, these were considered in multiple ones. This could help in producing and prioritizing information and also in making it explicit.

6. CONCLUSIONS

6.1 Scientific and Managerial Contributions

There are two high-level potential contributions a constructive research study can have: the new novel construct itself, and the application and combination of existing knowledge (Lukka 2003). This is also argued for by Keating (1995), who divides case studies into three classes: theory discovery, refinement, and refutation.

In constructive research, theory refinement is often the goal (Lukka 2003). Theory refinement produces re-specifications, evidence, and operational definitions related to existing theory. In contrast, theory discovery can provide emergent constructs and hypothesized relationships. (Keating 1995) Lukka (1999, p. 133) elaborates this by noting that in field research contribution to *ex-ante* theory must be achieved, reported, and discussed and the results must be linked to previous knowledge or lack thereof. Therefore, the *post-ante* theory must be a combination of previous literature and empirical findings.

It can be argued, that in this research the contributions are both in the new construction, summarized in section 5.4, and in the wider discussion regarding PMF, where both existing literature and new findings are presented primarily in chapter 5 as a whole. In general, this study proposes a clearer structure to understanding and validating PMF to support scaling decisions through clarifying PMF knowledge types and related knowledge-producing actions. Consequently, it offers tools for more efficient expansion to new product areas in established companies, especially in the field of enterprise software.

Furthermore, the contributions are partially theory refinement and partially theory discovery. In regards to refinement, some operational definitions and considerations regarding PMF, customer needs, customer collaboration methods, and enterprise software context were raised. In regards to theory discovery, types of PMF knowledge are proposed and their connection to methods of producing said knowledge.

There have been some frameworks focusing on building new products with customers with focus also on PMF (e.g. Ries 2011; Blank 2020). However, this thesis is, to the author's knowledge, the first attempt to conceptualize practical methods of understanding PMF of a product. As a result, four types of PMF knowledge are found. While these were not necessarily extremely surprising or radically new ideas, they are conceptualized elements of understanding PMF, which has so far been lacking in research.

Related to these elements of PMF knowledge, six different methods of producing these were recognized. Also, their role in producing different sorts of knowledge is discussed. Literature was found to highlight the role of customer collaboration in understanding PMF (e.g. Cooper & Vlaskovits 2010; Ries 2011; Maurya 2012; Eisenmann et al. 2013; Blank 2020). The found methods offer a more concrete and clear view into the practicalities of producing PMF knowledge. Additionally, methods relating to competitors and analysts are found, which were not considered in literature in PMF context.

The indicators of PMF were not a focal point of any research known to the author. As a result, there was not a very clear overview of possible usable indicators. Instead, these were rather scattered, as shown earlier in table 6. This study sought additional indicators and reinforcement for existing ones. While the found indicators were still rather scattered and interviewee-dependent, some considerations were found regarding both indicators already found in literature and new ones. Additionally, a division into leading and lagging PMF indicators is proposed.

These three aspects can be seen as the primary contribution of this study. They shed light on what knowledge is relevant in understanding PMF of a product, how that knowledge can be produced, and finally what indicates the existence of PMF. These provide a comprehensive view into understanding and validating PMF, which has previously been lacking in the literature.

In addition to these primary considerations, there are some additional more minor contributions. The definition and impact of PMF was seen rather unanimously in literature, although different authors highlighted some different aspects (Cooper & de Brentani 1991; Andreessen 2007; Fitzpatrick 2010; Dennehy et al. 2019; Blank & Dorf 2020). This study added to this by elaborating 'customer needs', their relationship with each other, and with the concept of PMF. While finding guidance on producing a product that has PMF was not an objective of this research, some discussion is provided about what sort of needs should perhaps be the focus in development activities.

Lastly, in regard to scientific contributions, the study raises some considerations regarding enterprise software, operating with a SaaS model, and being an established company. The considerations describe how these contexts affect validating PMF. These contexts form a rather specific business area, but the findings are still interesting and can potentially have implications in other areas as well. Especially the area of enterprise software was found to affect some areas of PMF validation due to its complexity, which can be important information for companies in this business. The role of MVPs is also discussed in this context.

In practice, the considerations raised in this study can be useful to enterprise software vendors, and possibly also companies acting in other business areas. The frameworks presented in section 5.4 describe a process helpful in understanding PMF. This could be

used to help with company expansion. Notably, they should suppress premature scaling, which can cause wasting resources and making the development more difficult.

Perhaps more importantly than utilizing the frameworks, companies should recognize the role of PMF and knowingly pay more attention to the progress of a new product in this regard. This thesis provides many aspects to this. Firstly, the role of customer collaboration should be recognized, even formally. This can mean utilizing advisory boards and making efforts to analyze the resulting information systematically. Also, discussions with customers should be also seen as a method of producing PMF information. Especially in established companies where this information can get scattered and lost, attention should be paid to getting an overview of the situation and coordinating customer collaboration. In addition to customer collaboration, the other recognized methods relating to analysts and competitors should be noted, keeping in mind the presented limitations.

Lastly, indicators of PMF could be used in guiding scaling. However, as their applicability in practice is still somewhat unclear, giving very specific recommendations about these is not possible. They could possibly be used as a tool for 'gatekeeping' when scaling should be attempted. In NPD context and in the stage-gate model, the role of 'gatekeepers' is to make go/kill decisions and allocate resources (Cooper & Edgett 1999, p. 123–124). In a similar fashion, these indicators could at least assist in making the decision to allocate resources to start scaling.

6.2 Limitations and Conflicts of Interest

The results in this thesis have been developed especially with enterprise software in mind. It is probable that the findings are applicable rather widely to different sorts of enterprise software applications, and possible even to other B2B software applications. On the other hand, while some of the findings might also relate to the consumer context, they might not be directly applicable in such an operational environment, as customer collaboration in those circumstances is very different. The applicability of the findings outside the software business is unclear, but it seems likely that similar elements regarding PMF would exist in other business areas as well.

The main source of uncertainty is the rather limited amount of interviews ($N = 11$) from under ten different companies. While this is a typical and perfectly acceptable number for a master's thesis, it provides potential limitations on the scope of applicability and generalizability. For example, some aspects were only discussed in one or two interviews, meaning that the information regarding them can be rather narrow.

Furthermore, the interviewees were contacted partially based on existing relationships that people in the target company had, which could cause potential biases. On the other

hand, the interviewees did represent rather different industries and roles, meaning that insight was gotten from a wide scope of different perspectives.

There are also limitations caused by using interviews as the method of collecting empirical data. This is inherently situation-dependent, at least partially open for interpretation, and causes challenges in regard to generalizability. Therefore, it is important that the reader understands the context, setting, and execution of the research, which are discussed in chapters 1 and 3. (Saunders et al. 2019, p. 449–451)

The developed construction was tested with only a weak market test, which means there is some, but still limited, evidence of the functionality of results in practice. Kasanen et al. (1993) note that even this is a relatively strict test, as no tentative result is likely to pass it. Additionally, the construction does not conflict with any known frameworks. On the contrary, the findings were rather well aligned with existing literature.

Gaining more compelling proof showing actual pragmatic applicability would require additional research. In fact, the findings can be seen as propositions for potential generalizations, but due to the limited scope of this research, their reliability remains to be verified. A metaphor in the spirit of the topic of the thesis is that the findings can be seen as a version of MVP, whose hypotheses are well-founded but still need reinforcement before scaling.

This thesis was done in cooperation and while being in an employment relationship with the target company.

6.3 Needs for Further Research

PMF relates to many vast fields of research: strategy, NPD, and innovation management to name a few. Exploring all these subjects and their linkages and effect to PMF in a comprehensive, yet cohesive, manner proved to be challenging. As the discussion around PMF grows more mature, there is a distinct need for clarifying and elaborating its relationship with other concepts and frameworks. This thesis already provides some basis for this, but a more focused approach to answering explicitly this issue is needed. How exactly is PMF related to different managerial concepts?

A few different interviewees mentioned that typically SaaS companies can utilize tools for gauging interest, such as free trials, freemium products, or even A/B testing on a website. However, this is limited to rather light and straightforward software, such as communications tools, and many types of productivity software. These differ from enterprise software in required implementation and scale of use. All of these interviewees mentioned a few things related to these tools in relation to enterprise software. Firstly, these are difficult to utilize due to the complexity, scale, and data intensity of the software. Secondly, they still have an interest in utilizing these but have either seen viable opportunities for this.

Thirdly, although it is likely challenging, there could be some ways to utilize such tools in enterprise settings as well, at least in areas that require less data integration. A potential investigation subject is how these tools could work in practice in enterprise software and what principles should guide the utilization. This sort of research could also rather likely contribute to methods of producing information about PMF.

One finding mostly related to established companies was the existence of portfolio-market fit. However, not many details of its nature or considerations related to it were raised. Potentially considering market fit in the wider context of the portfolio of products could reveal interesting distinctions between a product's own fit and fit of the solution group. Future research could attempt to discern between these two types of market fit. Additionally, considerations originating from portfolio-market fit in relation to scaling a product could be investigated.

Lastly, the findings presented in this study could be validated and supplemented. As the methods of producing PMF knowledge and the related indicators were rather heavily interviewee-dependent, it is likely that more of these could be found in further interviews from other companies. One specific research topic could be formalizing the methods of coding information from customer collaboration and making it explicit, which could help to produce knowledge of PMF especially in larger established companies. Additionally, to make the findings in this research more generalizable and functional, the applicability of the results in practice and their validity could be researched further.

REFERENCES

- Adams, D. (2019). *Deal With SaaS Churn Early to Ensure Product Market Fit Before Scaling*. Gartner.
- Adamson, B., Dixon, M., Spenner, P. & Toman, N. (2015). *The Challenger Customer: Selling to the Hidden Influencer Who Can Multiply Your Results*. 1st ed. London: Portfolio Penguin.
- Alam, I. & Perry, C. (2002). A customer-oriented new service development process. *Journal of Services Marketing*, Vol. 16(6), pp. 515–534.
- Andreessen, M. (2007). *The Pmarca Guide to Startups. Part 4: The only thing that matters*. Archived from original. URL: https://pmarchive.com/guide_to_startups_part4.html (Accessed: 2.3.2021).
- Berthelsen, E. & Brant, K. (2018). *Four Steps for Calculating Potential Market Share Size for a New Product or Service*. Gartner.
- Blank, S. (2020). *The Four Steps to the Epiphany: Successful Strategies for Products that Win*. 5th ed. Ebook, republication from 2013. Hoboken, New Jersey: Wiley.
- Blank, S. & Dorf, B. (2020). *The Startup Owner's Manual*. 1st ed. Ebook, republication from 2012. Hoboken, New Jersey: Wiley.
- Bogers, M. & Horst, W. (2014). Collaborative Prototyping: Cross-Fertilization of Knowledge in Prototype-Driven Problem Solving. *Journal of Product Innovation Management*, Vol. 31(4), pp. 744–764.
- Boillat, T. & Legner, C. (2013). From On-Premise Software to Cloud Services: The Impact of Cloud Computing on Enterprise Software Vendors' Business Models. *Journal of Theoretical and Applied Electronic Commerce Research*, Vol. 8(3), pp. 39–58.
- Bosch, J., Holmström Olsson, H., Björk, J. & Ljungblad, J. (2013). The Early Stage Software Startup Development Model: A Framework for Operationalizing Lean Principles in Software Startups. In: Fitzgerald, B., Conboy, K., Power, K., Valerdi, R., Morgan, L. & Stol, K.-J. (eds.), *Proceedings of Lean Enterprise Software and Systems (LESS)* (Galway, Ireland, Dec. 1–4, 2013), pp. 1–15. Lecture Notes in Business Information Processing, vol. 167.
- Ceccagnoli, M., Forman, C., Huang, P. & Wu, D. J. (2012). Cocreation of Value in a Platform Ecosystem: The Case of Enterprise Software. *MIS Quarterly*, Vol. 36(1), pp. 263–290.
- Chen, J.-S., Tsou, H.-T. & Ching, R. K. H. (2011). Co-production and its effects on service innovation. *Industrial Marketing Management*, Vol. 40, pp. 1331–1346.

- Choudhary, V. (2007). Comparison of Software Quality Under Perpetual Licensing and Software as a Service. *Journal of Management Information Systems*, Vol. 24(2), pp. 141–165.
- Christensen, C. M., Hall, T., Dillon, K. & Duncan, D. S. (2016). Know Your Customers' "Jobs to Be Done". *Harvard Business Review*, Vol. 94 (September), pp. 54–62.
- Coombs, R. & Miles, I. (2000). Innovation, Measurement and Services: The New Problematique. In: Metcalfe, J. S. & Miles, I. (eds.), *Innovation Systems in the Service Economy*, pp. 83–102. Dordrecht: Kluwer.
- Cooper, B. & Vlaskovits, P. (2010). The Entrepreneur's Guide to Customer Development: A Cheat Sheet to The Four Steps to the Epiphany. *Sine loco: Cooper-Vlaskovits*.
- Cooper, R. G. (1983). The Impact of New Product Strategies. *Industrial Marketing Management*, Vol. 12(4), pp. 243–256.
- Cooper, R. G. (1987). Defining the New Product Strategy. *IEEE Transactions on Engineering Management*, Vol. EM-34(3), pp. 184–193.
- Cooper, R. G. (1988). The New Product Process: A Decision Guide for Management. *Journal of Marketing Management*, Vol. 3(3), pp. 238–255.
- Cooper, R. G. (2011). *Winning at new products: Creating value through innovation*. 4th ed. New York: Basic Books.
- Cooper, R. G. & de Brentani, U. (1991). New Industrial Financial Services: What Distinguishes the Winners. *Journal of Product Innovation Management*, Vol. 8(2), pp. 75–90.
- Cooper, R. G. & Edgett, S. J. (1999). *Product Development For The Service Sector: Lessons From Market Leaders*. 1st ed. New York: Basic Books.
- Cooper, R. G. & Kleinschmidt, E. J. (1986). An Investigation into the New Product Process: Steps, Deficiencies, and Impact. *Journal of Product Innovation Management*, Vol. 3(2), pp. 71–85.
- Coviello, N. E. & Joseph, R. M. (2012). Creating Major Innovations with Customers: Insights from Small and Young Technology Firms. *Journal of Marketing*, Vol. 76 (November), pp. 87–104.
- Davenport, T. H. (1998). Putting the Enterprise into the Enterprise System. *Harvard Business Review*, Vol. 76 (July-August), pp. 121–131.
- Dennehy, D., Kasaraian, L., O'Raghallaigh, P., Conboy, K., Sammon, D. & Lynch, P. (2019). A Lean Start-up approach for developing minimum viable products in an established company. *Journal of Decision Systems*, Vol. 28(3), pp. 224–232.
- Dow, S., MacIntyre, B., Lee, J., Oezbek, C., Bolter, J. D. & Gandy, M. (2005). Wizard of Oz Support throughout an Iterative Design Process. *IEEE Pervasive Computing*, Vol. 4(4), pp. 18–26.
- Dubey, A. & Wagle, D. (2007). Delivering software as a service. *The McKinsey Quarterly*. Web exclusive, May 2007.

- Edison, H., Smørsgård, N. M., Wang, X. & Abrahamsson, P. (2018). Lean Internal Startups for Software Product Innovation in Large Companies: Enablers and Inhibitors. *Journal of Systems and Software*, Vol. 135, pp. 69–87.
- Eisenmann, T., Ries, E. & Dillard, S. (2013). *Hypothesis-Driven Entrepreneurship: The Lean Startup*. Harvard Business School Entrepreneurial Management Case No. 812-095. Harvard Business School.
- Fitzpatrick, C. (2010). Improving Product-Market Fit by Engaging an Open Source Community. *Technology Innovation Management Review*. URL: <https://timreview.ca/article/365> (Accessed: 8.3.2021).
- Foote, N. W., Galbraith, J., Hope, Q. & Miller, D. (2001). Making solutions the answer. *The McKinsey Quarterly*, Vol. 2001(3), pp. 84–93.
- Frederiksen, D. L. & Brem, A. (2017). How do entrepreneurs think they create value? A scientific reflection of Eric Ries' Lean Startup approach. *International Entrepreneurship and Management Journal*, Vol. 13, pp. 169–189.
- Ghezzi, A. (2019). Digital startups and the adoption and implementation of Lean Startup Approaches: Effectuation, Bricolage and Opportunity Creation in practice. *Technological Forecasting and Social Change*, Vol. 146, pp. 945–960.
- Grix, J. (2002). Introducing Students to the Generic Terminology of Social Research. *Politics*, Vol. 22(3), pp. 175–186.
- Gummesson, E. (1978). Toward a theory of professional service marketing. *Industrial Marketing Management*, Vol. 7(2), pp. 89–95.
- Gupta, V., Fernandez-Crehuet, J. M. & Hanne, T. (2020). Fostering Continuous Value Proposition Innovation through Freelancer Involvement in Software Startups: Insights from Multiple Case Studies. *Sustainability*, Vol. 12(21), 8922.
- Hampel, C., Perkmann, M. & Phillips, N. (2020). Beyond the lean start-up: experimentation in corporate entrepreneurship and innovation. *Innovation*, Vol. 22(1), pp. 1–11.
- Hine, C., Schneider, J.-G., Han, J. & Versteeg, S. (2009). Scalable Emulation of Enterprise Systems. In: *Proceedings of Australian Software Engineering Conference (ASWEC)* (Gold Coast, Australia, Apr. 14–17, 2009), pp. 142–151.
- von Hippel, E. (1986). Lead Users: A Source of Novel Product Concepts. *Management Science*, Vol. 32(7), pp. 791–805.
- Hogan, M., Liu, F., Sokol, A. & Tong, J. (2011). *NIST Cloud Computing Standards Roadmap*. Special Publication 500-291. National Institute of Standards and Technology.
- Huikkola, T. & Kohtamäki, M. (2020). Agile New Solution Development in Manufacturing Companies. *Technology Innovation Management Review*, Vol. 10(3), pp. 16–23.
- Jaakkola, E., Meiren, T., Witell, L., Edvardsson, B., Schäfer, A., Reynoso, J., Sebastiani, R. & Weitlaner, D. (2017). Does one size fit all? New service development across different types of services. *Journal of Service Management*, Vol. 28(2), pp. 329–347.

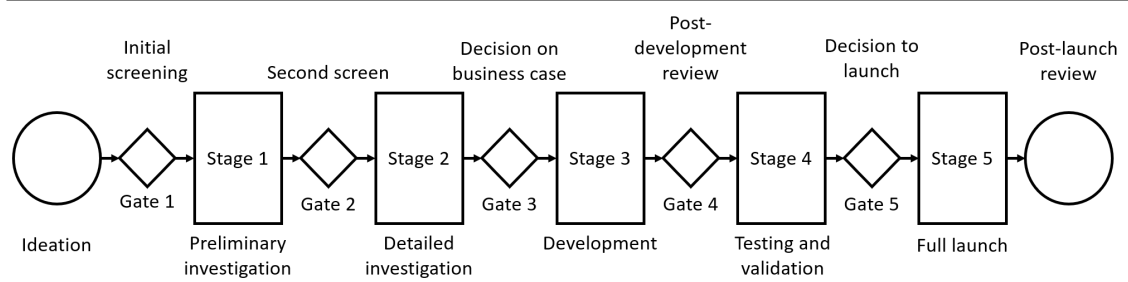
- Jacobs, F. R., Berry, W. L., Whybark, D. C. & Vollmann, T. E. (2018). *Manufacturing Planning and Control for Supply Chain Management: The CPIM Reference*. 2nd ed. New York: McGraw-Hill Education.
- Kasanen, E., Lukka, K. & Siitonen, A. (1993). The Constructive Approach in Management Accounting Research. *Journal of management accounting research*, Vol. 5, pp. 243–264.
- Keating, P. J. (1995). A framework for classifying and evaluating the theoretical contributions of case research in management accounting. *Journal of Management Accounting Research*, Vol. 7, pp. 66–86.
- Kirsner, S. (2016). The Barriers Big Companies Face When They Try to Act Like Lean Startups. *Harvard Business Review*. URL: <https://hbr.org/2016/08/the-barriers-big-companies-face-when-they-try-to-act-like-lean-startups> (Accessed: 12.3.2021).
- Krebs, R., Momm, C. & Kounev, S. (2012). Architectural Concerns in Multi-Tenant SaaS Applications. In: Leymann, F., Ivanon, I., Sinderen, M. van & Shan, T. (eds.), *Proceedings of International Conference on Cloud Computing and Services Science (CLOSER)* (Porto, Portugal, Apr. 18–21, 2012), pp. 426–431.
- Leppänen, M. & Hokkanen, L. (2015). Four patterns for internal startups. In: *Proceedings of European Conference on Pattern Languages of Programs (EuroPLoP)* (Irsee, Germany, July 8–12, 2015).
- Leslie, M. & Holloway, C. A. (2006). The Sales Learning Curve. *Harvard Business Review*, Vol. 84 (July-August), pp. 114–123.
- Lovelock, C. & Gummesson, E. (2004). Whither Services Marketing? In Search of a New Paradigm and Fresh Perspectives. *Journal of Service Research*, Vol. 7(1), pp. 20–41.
- Lukka, K. (1999). Case/field-tutkimuksen erilaiset lähestymistavat laskentatoimessa. In: Hookana-Turunen, H. (ed.), *Tutkija, opettaja, akateeminen vaikuttaja ja käytännön toimija: Professori Reino Majala 65 vuotta*, pp. 129–150. Turun kauppakorkeakoulun julkaisu, C-1:1999
- Lukka, K. (2003). The Constructive Research Approach. In: Ojala, L. & Hilmola, O.-P. (eds.), *Case Study Research in Logistics*, pp. 83–101. Publications of the Turku School of Economics and Business Administration, B 1:2003
- MA, D. (2007). The business model of "Software-as-a-Service". In: Zhang, L.-J., Watson, T. J., Aalts, W. van der & Hung, P. C. K. (eds.), *Proceedings of International Conference on Services Computing (SCC)* (Salt Lake City, USA, July 9–13, 2007).
- Mahr, D., Lievens, A. & Blazevic, V. (2014). The Value of Customer Cocreated Knowledge during the Innovation Process. *Journal of Product Innovation Management*, Vol. 31(3), pp. 599–615.
- Mäkilä, T., Järvi, A., Rönkkö, M. & Nissilä, J. (2010). How to Define Software-as-a-Service – An Empirical Study of Finnish SaaS Providers. In: Tyrväinen, P., Jansen, S. & Cusumano, M. A. (eds.), *Proceedings of International Conference on Software Busi-*

- ness (ICSOB) (Jyväskylä, Finland, June 21–23, 2010), pp. 115–124. Lecture Notes in Business Information Processing, vol. 51.
- Maples Jr., M. (2019). *Andy Rachleff on “How to Know If You’ve Got Product Market Fit”*. Transcribed interview. URL: <https://greatness.floodgate.com/episodes/andy-rachleff-on-how-to-know-if-youve-got-product-market-fit-XxGvX8DH/transcript> (Accessed: 17.3.2021).
- Maurya, A. (2012). *Running Lean: Iterate from Plan A to a Plan That Works*. 2nd ed. The Lean Series. Sebastopol, California: O’Reilly.
- Morrison, P. D., Roberts, J. H. & Midgley, D. F. (2004). The nature of lead users and measurement of leading edge status. *Research Policy*, Vol. 33(2), pp. 351–362.
- Nieuwenhuis, L. J. M., Ehrenhard, M. L. & Prause, L. (2018). The shift to Cloud Computing: The impact of disruptive technology on the enterprise software business ecosystem. *Technological Forecasting & Social Change*, Vol. 129, pp. 308–313.
- Nijssen, E. J., Hillebrand, B., Vermeulen, P. A. M. & Kemp, R. G. M. (2006). Exploring product and service innovation similarities and differences. *International Journal of Research in Marketing*, Vol. 23, pp. 241–251.
- Olkkonen, T. (1994). *Johdatus teollisuustalouden tutkimustyöhön*. 2nd ed. Espoo: Teknillinen korkeakoulu.
- Osterwalder, A. & Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Hoboken, New Jersey: Wiley.
- Oyegoke, A. (2011). The constructive research approach in project management research. *International Journal of Managing Projects in Business*, Vol. 4(4), pp. 573–595.
- Ranjan, K. R. & Read, S. (2016). Value co-creation: concept and measurement. *Journal of the Academy of Marketing Science*, Vol. 44(3), pp. 290–315.
- Rettig, C. (2007). The Trouble With Enterprise Software. *MIT Sloan Management Review*, Vol. 49(1), pp. 21–27.
- Ries, E. (2011). *The Lean Startup: How Today’s Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. 1st ed. New York: Random House.
- Rogers, E. M. (1983). *Diffusion of Innovations*. 3rd ed. New York: The Free Press.
- Rönkkö, M., Peltonen, J. & Pärnänen, D. (2011). *Software Industry Survey 2011*. Aalto University, School of Science.
- Rymer, J. R., Staten, J., Wang, C. & McKee, J. (2012). *Achieve Cloud Economics For Operations and Services*. Forrester.
- Saunders, M. N. K., Lewis, P. & Thornhill, A. (2019). *Research Methods for Business Students*. 8th ed. New York: Pearson.
- Sun, W., Zhang, K., Chen, S.-K., Zhang, X. & Liang, H. (2007). Software as a Service: An Integration Perspective. In: Krämer, B. J., Lin, K.-J. & Narasimhan, P. (eds.), *Proceedings of International Conference on Service Oriented Computing (ICSOC)* (Vienna,

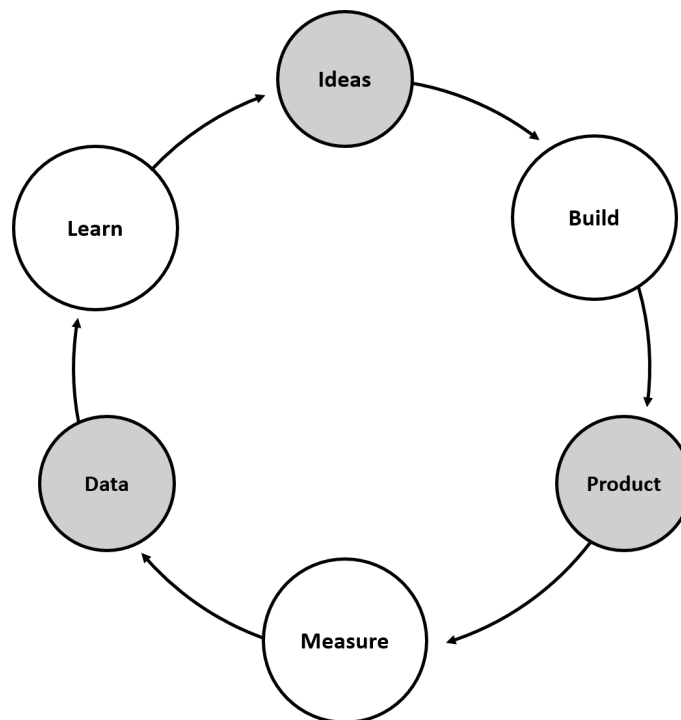
- Austria, Sept. 17–20, 2007), pp. 558–569. *Lecture Notes in Computer Science*, vol. 4749.
- Sun, W., Zhang, X., Guo, C. J., Sun, P. & Su, H. (2008). Software as a Service: Configuration and Customization Perspectives. In: *Proceedings of IEEE Congress on Services Part II* (Beijing, China, Sept. 23–26, 2008), pp. 18–24.
- Tamaddoni Jahromi, A., Stakhovych, S. & Ewing, M. (2014). Managing B2B customer churn, retention and profitability. *Industrial Marketing Management*, Vol. 43, pp. 1258–1268.
- Trott, P. (2017). *Innovation Management and New Product Development*. 6th ed. Harlow, United Kingdom: Pearson Education.
- Tsai, W.-T. & Sun, X. (2013). SaaS Multi-Tenant Application Customization. In: *Proceedings of International Symposium on Service-Oriented System Engineering (SOSE)* (San Francisco, USA, Mar. 25–28, 2013), pp. 1–12.
- Turner, M., Budgen, D. & Brereton, P. (2003). Turning Software into a Service. *Computer*, Vol. 36(10), pp. 38–44.
- Tyrväinen, P. & Selin, J. (2011). How to Sell SaaS: A Model for Main Factors of Marketing and Selling Software-as-a-Service. In: Regnell, B., Weerd, I. van de & De Troyer, O. (eds.), *Proceedings of International Conference on Software Business (ICSOB)* (Brussels, Belgium, June 8–10, 2011), pp. 2–16. *Lecture Notes in Business Information Processing*, vol. 80.
- Vargo, S. L. & Lusch, R. F. (2004a). Evolving to a New Dominant Logic for Marketing. *Journal of marketing*, Vol. 68(1), pp. 1–17.
- Vargo, S. L. & Lusch, R. F. (2004b). The Four Service Marketing Myths: Remnants of a Goods-Based, Manufacturing Mode. *Journal of Service Research*, Vol. 6(4), pp. 324–335.
- Waters, B. (2005). Software as a service: A look at the customer benefits. *Journal of Digital Asset Management*, Vol. 1, pp. 32–39.
- Yip, M.H., Phaal, R. & Probert, D.R. (2012). Value co-creation in early stage new product-service system development. In: Tossavainen, P.J., Harjula, M. & Holmlid, S. (eds.), *Proceedings of Service Design and Service Innovation Conference (ServDes)* (Helsinki, Finland, Feb. 8–10, 2012), pp. 287–298. *Linköping Electronic Conference Proceedings*.
- York, J.L. & Danes, J.E. (2014). Customer Development, Innovation, and Decision-Making Biases in the Lean Startup. *Journal of Small Business Strategy*, Vol. 24(2), pp. 21–40.
- Zeithaml, V.A., Parasuraman, A. & Berry, L.L. (1985). Problems and Strategies in Services Marketing. *Journal of Marketing*, Vol. 49 (Spring), pp. 33–46.

Appendices

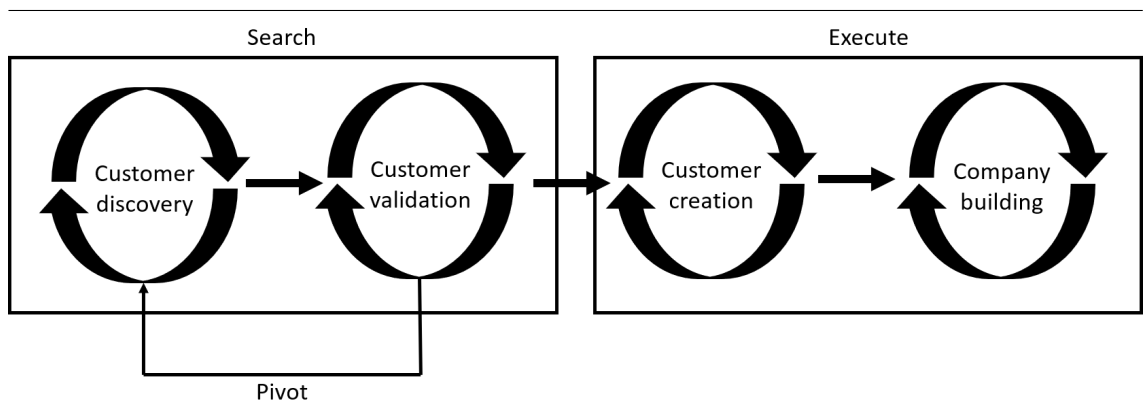
A Models for Developing New Products and Solutions



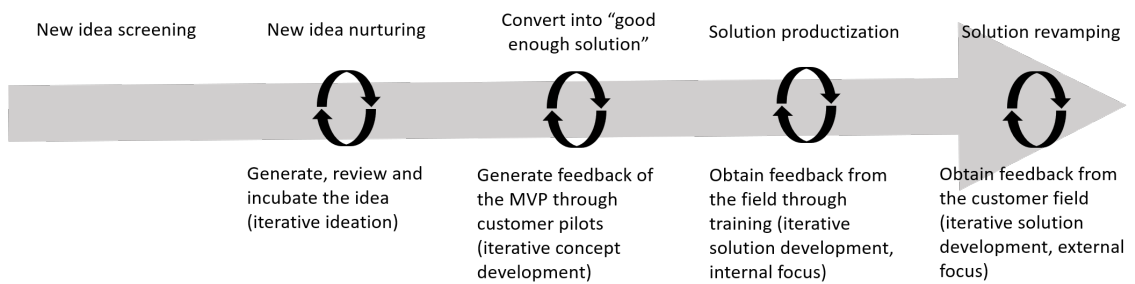
Stage-gate model (adapted from Cooper & Edgett 1999, p. 100)



Build-measure-learn feedback loop (adapted from Ries 2011, p. 75)



Customer development model (adapted from Blank 2020, ch. 2)



Agile new solution development model (adapted from Huikkola & Kohtamäki 2020)

B Interview Guide in Internal Interviews

Background and involvement in new product development

1. Please describe your professional background and current role.
2. How have you been involved with developing new products or conducting market research related to this?

Gathering market intelligence in new product development

3. How have customers been involved in developing new products?
4. How have the needs of customers been mapped as part of developing products?
5. What sort of pilots or tests have been used in determining how well a product fulfills customer needs?
 - (a) How was data collected from these?
 - (b) How was the data analyzed to produce knowledge about how well the product answers to the needs?
6. What kind of metrics or KPIs have been used to measure how well the product answers to the needs of customers?
7. Have the products been developed further based on customer feedback?
8. How does one know that a product fulfills customer needs well enough or vice versa?
 - (a) What criteria should be fulfilled to determine this point has been reached?
 - (b) Have these judgments turned out to be successful?

Product-market fit in new product development

9. How familiar are you with the term 'product-market fit'?
10. Retrospecting earlier questions, do you recognize whether product-market fit has been evaluated in new product development?
 - (a) Can you think of additional ways to measure this?
 - (b) How can a company know whether a product has this?
11. What sort of information do you consider important in evaluating product-market fit?
12. How does the enterprise software context affect testing and evaluating product-market fit?
 - (a) How can complex systems be tested with customers?

- (b) How can the risks and problems related to integration and implementation be mitigated?
- (c) How can one evaluate how well a product answers to customer needs in an enterprise setting?

13. What has been challenging in evaluating product-market fit?
14. What has gone well in evaluating product-market fit?

Closing

15. Do you have anything to add to any addressed themes or questions?
16. Do you have any feedback or questions regarding the interview or the thesis in general?

C Interview Guide in External Interviews

Background and involvement in new product development

1. Please describe your professional background and current role.
2. How would you describe the current products or services you and your company are working with?
3. What are the core products of your company?
4. How have you been involved with developing new products or researching the market for those?

Gathering market intelligence in new product development

5. How have customers been involved in developing new products?
6. How have the needs of customers been mapped as part of developing products?
7. What sort of pilots or tests have been used in determining how well a product fulfills customer needs?
 - (a) How was data collected from these?
 - (b) How was the data analyzed to produce knowledge about how well the product answers to the needs?
8. How can the product be tested in the real world as quickly as possible?
9. What kind of metrics or KPIs have been used to measure how well the product answers to the needs of customers?
10. How does one know that a product fulfills customer needs well enough or vice versa?
 - (a) What criteria should be fulfilled to determine this point has been reached?
 - (b) Have these judgments turned out to be successful?

Product-market fit in new product development

11. How familiar are you with the term 'product-market fit'?
12. Retrospecting earlier questions, do you recognize whether product-market fit has been evaluated in new product development?
 - (a) Can you think of additional ways to measure this?
 - (b) How can a company know whether a product has this?
13. How can competitor intelligence be used in measuring product-market fit?
 - (a) How can a company know that a product is better than competitors, especially before scaling the product.

14. What other sorts of information do you consider important in evaluating product-market fit?
15. How does the enterprise software context affect testing and evaluating product-market fit?
 - (a) How can complex systems be tested with customers?
 - (b) How can the barrier for testing be reduced?
 - (c) How can one evaluate how well a product answers to customer needs in an enterprise setting?
16. What has been challenging in evaluating product-market fit?
 - (a) Are there any examples where there has been premature scaling?
17. What has gone well in evaluating product-market fit?

Closing

18. Do you have anything to add to any addressed themes or questions, or would you like to underline something?
19. Do you have any feedback or questions regarding the interview or the thesis in general?