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Looking back on ERP implementations: A retrospective analysis of success criteria

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Looking back on ERP implementations: A retrospective analysis of success criteria

Terugkijken op ERP implementaties: een analyse van succes criteria achteraf

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Abstract

This study aims to provide an answer to the question of which criteria can determine the successfulness of ERP implementations afterward. Based on a literature review and performing a meta-plan workshop, a list of nine main criteria was composed which together determine this success. These criteria can be ordered into short-term success; project, medium-term success; user experience; usage; information; infrastructure; service; and system, and long-term success; internal business value; and external business value. All of these criteria were verified in an empirical study by performing interviews with experts that were involved in recent ERP implementations. All of the nine criteria were found relevant for determining the success of an ERP implementation in practice. These criteria should be measured after the implementation project is finished. These criteria could ultimately result in a model which can be used as a predecessor for a measurement or evaluation tool. Further research should focus on validating this model and add prioritization and statistic indicators (KPIs) to these criteria.

Key terms

ERP, ERP implementation, ERP success, information system success, project success, success criteria, success criterion

Summary

ERP implementations can be considered complex exertions. Because of the expensive nature of these projects, both from a cost- and time-investment perspective, business managers are highly interested in their success. A properly functioning ERP system can lead to a competitive advantage for organizations. Therefore, the measurement of the success of the implementation of these ERP systems can be considered an important research topic. Although the topic of success criteria is researched from a more generic point of view on information systems, it is not explicitly specified for ERP implementations. This study aims to provide an answer to the question of which criteria can determine the successfulness of ERP implementations afterward.

In the literature analysis, the questions *Which success criteria (for both project- and product, and short- and long-term success) for ERP implementations can be found in the existing literature?* and *At what moments is it useful to determine the successfulness of ERP implementations?* were answered. This led to the conclusion that multiple models could be applied to measure the success of an ERP implementation and that these models should be combined into a single model. Another conclusion was that the focus of measuring ERP success should be on the post-implementation phase because this is the moment when the expected benefits or the implementation start to become visible. Thereby, different dimensions should be taken into account which can be measured in the short-, medium-, and long term of the project.

Based on a literature review, a meta-plan workshop was performed to answer the question *Which criteria for success that were found in the literature are suitable for validating in practice?.* It turned out that the right abstraction level to determine success was on the level of success dimensions. This led to a list of nine main success criteria, which all include several sub-criteria. These criteria can be ordered into short-term success: project, medium-term success: user experience; usage; information; infrastructure; service; and system, and long-term success: internal business value; and external business value.

All of these criteria were verified in an empirical study by performing interviews with experts that were involved in recent ERP implementations. During these interviews, two questions needed to be answered: *Which criteria for success that were determined in RQ3 are identified as relevant in practice by field experts?* and *Are there any new criteria that derive from the empirical study that are not described in earlier studies?.* All of the nine main criteria were found relevant for determining the success of an ERP implementation in practice. This leads to the answer to the main research question that the successfulness of ERP implementations can be determined by evaluating nine success criteria. These criteria include sub-criteria that can or cannot, apply to a specific ERP implementation, based on the specific goals and circumstances of that implementation.

These criteria could ultimately result in a model which can be used as a predecessor for a measurement or evaluation tool for project/business managers or can be used at the intake/start of a project to determine aspects of the project that should be focused on. Further research should focus on validating this model and add prioritization and statistic indicators (KPIs) to these criteria. Next to further validation of the model, a few topics that came up during the empirical study could be further researched, namely the 'wow-factor' as an element of success, cross-platform support, and scalability.

Summary in Dutch

ERP implementaties worden gezien als complexe exercities. Doordat deze vaak duur zijn, zowel vanuit een kosten- als een tijdsinvestering-perspectief, zijn managers in sterke mate geïnteresseerd in het succes ervan. Een goed functionerend ERP kan leiden tot concurrentievoordeel voor bedrijven. Daarom kan het meten van het succes van een ERP implementatie als een belangrijk onderzoeksonderwerp beschouwd worden. Hoewel het onderwerp succes criteria al wel is onderzocht vanuit een meer generiek perspectief op informatie systemen, is het nooit expliciet gespecificeerd voor ERP implementaties. Deze studie heeft als doel om de vraag te beantwoorden welke criteria achteraf het succes bepalen van ERP implementaties.

In het literatuuronderzoek, zijn de vragen *Welke succes criteria (voor zowel project- als product-, en korte en lange termijn succes) voor ERP implementaties kunnen gevonden worden in de bestaande literatuur?* en *Op welke momenten is het zinvol om het succes van ERP implementaties te bepalen?* beantwoord. Dit leidde tot de conclusie dat verschillende modellen toepasbaar kunnen zijn om succes van ERP implementaties te meten en dat deze modellen gecombineerd dienen te worden in één model. Een andere conclusie was dat de focus van het meten van ERP succes zou moeten liggen op de fase ná de implementatie omdat vanaf dat moment de verwachte voordelen van de implementatie pas zichtbaar worden. Daarbij moet rekening gehouden met verschillende dimensies waarin succes gemeten kan worden op zowel de korte- midden lange- als lange termijn.

Gebaseerd op het literatuuronderzoek, heeft er een meta-plan workshop plaatsgevonden waarbij de vraag beantwoord werd *Welke criteria voor succes die gevonden zijn in de literatuur zijn geschikt om te valideren in de praktijk?*. Het bleek dat het juiste abstractieniveau om succes te bepalen ligt op het niveau van succes dimensies. Dit leidde tot een set van negen hoofd succes criteria. Die criteria kunnen worden geordend in korte termijn succes: project, midden lange termijn succes: gebruikerservaring; gebruik; informatie; infrastructuur; dienstverlening en systeem en lange termijn succes: interne toegevoegde waarde en externe toegevoegde waarde.

Al deze criteria konden geverifieerd worden in het empirisch onderzoek door interviews te houden met experts die recentelijk betrokken zijn geweest bij ERP implementaties. Tijdens deze interviews moesten er twee vragen beantwoord worden: *Welke criteria voor succes die werden vastgesteld in deelvraag 3 worden door experts gezien als relevant in de praktijk?* en *Zijn er nieuwe criteria die voortkomen uit het empirisch onderzoek die niet genoemd zijn in eerdere literatuur?.* Alle negen criteria bleken uiteindelijk relevant te zijn voor het bepalen van het succes van ERP implementaties in de praktijk. Hiermee kan de hoofdvraag beantwoord worden met dat het succes van ERP implementaties bepaald kan worden door negen succescriteria te evalueren. Deze criteria bevatten ook sub-criteria die al dan niet toegepast kunnen worden op specifieke ERP implementaties, afhankelijk van de specifieke doelen en omstandigheden van deze implementatie.

Uiteindelijk kunnen deze criteria een model vormen wat als voorloper gebruikt kan worden voor een meetinstrument of evaluatietool voor (project)managers of het kan gebruikt worden bij de start van een project om vast te stellen op welke aspecten er tijdens het project gefocust moet worden. Verder onderzoek zou zich moeten richten op het verder valideren van dit model en ook een prioritering en statistische indicatoren (KPIs) te formuleren voor deze criteria. Naast verdere validatie, zijn er ook nog een aantal onderwerpen die naar voren kwamen tijdens het empirische onderzoek die onderzocht zouden kunnen worden, namelijk de 'wow-factor' als een element van succes, ondersteuning om meerdere platformen en schaalbaarheid.

Contents

1. Introduction

1.1.   Background

In the current business landscape, we cannot imagine a large-scale organization without (a form of) an Enterprise Resource Planning (ERP) system. Unfortunately, these ERP systems and their implementation are often associated with failure and risks. Saade and Nijher (2016) stated that ERP implementations have been delivered late in most cases and 58% of the implementations have gone over budget. Famous examples from the past years of ERP implementations that went over budget are the implementation of *SAP* at the German supermarket giant Lidl or the consolidation of the British Vodafone's CRM onto a *Siebel* platform. Despite these high risks, ERP systems are one of the most important business information technologies. Ghosh and Skibniewski (2010) stated that these systems tend to transform the core business of the organization, which means that they involve multiple business units and actors in the organization. As pointed out by Marnewick and Labuschagne (2005), an ERP system involves more than just the software package. Other elements, like the customer's mindset, change management, the flow of the processes, and methodology, should also be taken into consideration when implementing a new ERP system. Therefore, ERP implementations can be considered complex exertions. Because of the expensive nature of these projects, both from a cost- and time-investment perspective, business managers are highly interested in their success. Also, organizations perceive ERP as a vital tool for organizational competition (Shaul & Tauber, 2013). A properly functioning ERP system can lead to a competitive advantage for organizations. Therefore, the measurement of the success of the implementation of these ERP systems can be considered an important research topic.

1.2.   Exploration of the topic

This research will be carried out within the field of ERP implementations. Over the last two decades, a considerable amount of research has been done on the topic of ERP and ERP implementations. Janssens (2017) summarized the main research topics of this field when researching the complexity of ERP implementations and came up with the following domains: ERP implementation phases, Critical Success Factors (CSFs) of ERP implementations, risks of ERP implementations, prediction methods for ERP implementations and business process redesign for ERP implementations. This suggests there is no specific research on the topic of determining the success of an ERP implementation afterward, although this can be placed in a more general way in one of the other topics. This is also underlined by Hasan et al. (2019). They determined the problem that most studies on ERP success tend to focus on the initial implementation and not on the post-implementation phase.

For this specific study, the following concepts require further specification: ERP, Project Success, and Success criteria.

ERP
The first and most important concept to define is *ERP* – Enterprise Resource Planning. For this research, a generic approach is required because success can be applied to many aspects of the ERP system. The following definition by Marnewick and Labuschagne (2005) is used for ERP: A packaged

business software system that lets an organization automate and integrate the majority of its business processes, share common data and practices across the enterprise and produce and access information in a real-time environment. The ultimate goal of an ERP system is that information must only be entered once.

Project success

One of the first attempts to define project success was Barnes' Iron Triangle, which was mainly focused on 'hard' success criteria. According to Albert et al. (2017) researchers are not in agreement on a definition of project success. These authors have reviewed the literature on the evaluation of project success, therefore, their findings are used in this study. Project success can be considered a multi-dimensional concept that can be viewed from different angles. These authors point out a few differentiations that must be made:

- Between success factors and success criteria: *Success factors* are mostly determined beforehand and contribute to successfully completing a project. *Success criteria* on the order hand, are used to assess the success of a project afterward.
- Between *project management* success and *product* success. Although the outcome of a project can be a success, the project can be managed poorly or vice versa.
- Between *short-term* success and *long-term* success. During the execution of the project, the results may be promising. However, this does not guarantee that the project will be a success in the end.

The most important differentiation for this study has to be made between the critical success factors and the success criteria. These two seem related at first hand. Westerveld (2003) linked these two concepts creating the Project Excellence model. This model is generic by nature and focuses on all kinds of projects, and not specifically on ERP implementations.

Success criteria

Criteria are the set of principles or standards by which judgment is made (Lim & Zain, 1999). Success criteria can be split up into hard criteria, which are objective and measurable, like time, cost, and performance, and soft criteria, which are subjective and harder to evaluate, like project-member of customer satisfaction (Albert et al., 2017). Some criteria that are derived from Project Excellence Model (Westerveld, 2003) are project results like time, costs and quality/scope, the appreciation from the client, project team, personnel, users, partners, and stakeholders.

1.3.   Problem statement

Because business managers are highly interested in the success of the ERP implementations, mainly because of the major strategic importance to the organization, and no decently scientifically covered measuring tool is available, it is important to find out which criteria determine this success. Although the topic of success criteria is researched from a more generic point of view on information systems, it is not explicitly specified for ERP implementations. To make more well-found statements about the success of these complex ERP implementations, a study that is specifically focused on ERP instead of information systems, in general, would be fitting. In addition, Hasan et al. (2019) pointed out that there is a gap in the literature about the post-implementation phase because most research tends to focus on the implementation itself. This suggests that more focus on this post-implementation phase would also give more insight into the success of ERP implementations. Finally, much research has been performed on critical success factors for ERP implementations, which are a condition for success, not an outcome. These studies tend to focus on theoretical frameworks that aim to provide a model that

can capture variations in ERP implementation (Saade & Nijher, 2016). According to these authors, no model defines success or failure, only a diverse set of loose measures adopted to assess the notion of success and failure. Although CSFs should be taken into account when looking at the whole of an ERP implementation, they are not viable for evaluating success.

1.4.   Research objective and questions

This leads to the following main research question that should be answered:

Which criteria can determine the successfulness of ERP implementations afterward?

To answer this research question, a literature analysis has to be performed in the first place. The following sub-questions have to be answered in this analysis:

- *RQ1: Which success criteria (for both project- and product, and short- and long-term success) for ERP implementations can be found in the existing literature?*

This research question will lead to a list of criteria that can be used to determine the success, by mapping and combining the results of different studies.

- *RQ2: At what moments is it useful to determine the successfulness of ERP implementations?*

This research question will focus on the timing of the evaluation of the ERP implementation, in this way a distinction can be made on when which specific criteria can be measured.

After this literature analysis, empirical research has to be carried out to find out whether these criteria can be found relevant in practice.

The main question for the empirical study is:

To what extent can the criteria that derive from the existing literature be found relevant in practice?

The sub-questions for the empirical study are:

- *RQ3: Which criteria for success that were found in the literature are suitable for validating in practice?*

To determine whether the criteria that were found in the literature can be used for the empirical study, these criteria need to be evaluated and structured by experts in the field. This can serve as a base for a questionnaire for RQ4 and RQ5.

- *RQ4: Which criteria for success that were determined in RQ3 are identified as relevant in practice by field experts?*

This research question will answer whether the criteria that were defined in the literature study and structured in RQ3 can be found in practice and played a role in the determination of the success of ERP implementations. It will validate the criteria that were found by empirical data.

- *RQ5: Are there any new criteria that derive from the empirical study that are not described in earlier studies?*

This research question will potentially expand the list of criteria that was determined in the previous research questions. In this way, criteria that were missed in the current literature can be included.

1.5.   Motivation/relevance

1.5.1. Scientific relevance

As pointed out by several authors, the focus on the post-implementations phase in the current body of research is scarce (Osnes et al., 2018). According to Gollner and Baumane-Vītoliņa (2016), there have been some case studies in the past few years, and many of the ERP success measurement approaches were not empirically validated. Existing empirical studies are mostly measuring the impact of various factors on the success of ERP implementation. But they do not examine a comprehensive model for ERP project success measurement itself. The goal of this study is to contribute to the area of post-implementation ERP success, by exposing more empirical data. Ultimately, these findings could be the source for building a measurement tool to evaluate ERP implementations. Having a proper measurement tool could lead to a better understanding of how and when to evaluate the success of ERP implementations, and which criteria are useful to look at when evaluating.

1.5.2. Practical relevance

As business managers have a high interest in the success of ERP implementations (Shaul & Tauber, 2013), a more clear list of criteria, specifically for implementing ERP systems and not projects in general, can give more insight into how to measure the success of these implementations. Organizations struggle to measure success in a scientifically substantiated way. According to Gollner and Baumane-Vītoliņa (2016), a few simple instruments exist for measuring ERP implementation success with ERP consulting companies. But these surveys are neither standardized nor confirmed with statistical methods and are usually kept as an internal secret. A clearer view of which criteria increase the success of ERP implementations could lead to gaining more business value from ERP implementations and avoiding pitfalls when implementing a new ERP system (Osnes et al., 2018). Software managers can also use the results to prioritize improvement opportunities in their organizations (Garousi et al., 2019).

1.6.   Main lines of approach

In this thesis, the goal is to find out which criteria we can define for the success of ERP implementations afterward. To achieve this goal, a literature analysis is carried out to find out what previous studies have yielded and which criteria are already defined for success. This will lead to a theoretical framework that will be described in the second chapter.

Based on this analysis, an empirical study has been set up. In this study, an analysis is performed on several finished ERP implementation projects, that were done with the Thinkwise low-code platform. For every project, key players in the implementation (project managers, champion users, developers/consultants, and product owners) were interviewed about the success of the project and what specific factors were, and were not, responsible for the success of the project. The research method for the empirical study will be described in the third chapter. This chapter will also cover the topics of validity, representativeness of the research, and some ethical aspects of the study. The result of this analysis is a list of criteria that can be used to determine the success of an ERP implementation after the project is finished. These results will be described in the fourth chapter. In the fifth chapter, a conclusion will be set forth and the most important discussion points and further recommendations will be described.

2. Theoretical framework

2.1. Research approach

To set up a theoretical framework for this study, two sub-research questions were defined in the first chapter. These will be the base for the theoretical framework research:

- *RQ1: Which success criteria (for both project- and product, and short- and long-term success) for ERP implementations can be found in the existing literature?*
- *RQ2: At what moments is it useful to determine the successfulness of ERP implementations?*

Review method

These two questions will be answered by performing a literature study. In this literature review, a deductive approach will be used to develop a theoretical framework that can be subsequently tested with data. The form of review that will be used is a theoretical review, which examines the body of theory that has accumulated regarding ERP implementation success. To determine the relevance of publications that are found, the first filter will be the title of the publication. It should include (a specific combination of) the search terms which are described in the paragraph below. After filtering on titles of publications, the abstract will be red to find out if the publication covers the topics that contribute to answering the research questions. After that, the summary, discussion, and conclusion will be red to confirm the relevance. Finally, the publications that were found relevant will be red in detail.

Search terms

For the first question, the following search terms can be defined: *Criteria, Variables, Enterprise, ERP or Enterprise Resource Planning, Project, Success.* These terms are relevant because they can be used to look for articles that are about the success of ERP implementations. Variables are used as a synonym for criteria, this can increase the result of relevant publications. Projects are added to cover articles that refer to projects instead of implementations. A combination of the terms criteria *and* success should at least be in the title of the article, this would lead to publications in which the focus is on success. ERP and Enterprise can be in the body of the article in this combination. Using ERP in the title would lead to a too wide scope because, in this study, we are only looking for success, not for information about ERP in general.

For the second question the following search terms can be added to the existing terms: *Reflecting, Evaluation, Timing, Phase.* These queries use the same two keywords in the title, project and success, and need to be combined with reflecting, timing and phase in the body. This combination of search terms is relevant because it leads to publications about the evaluation of ERP implementations in combination with a specific time aspect. These search terms are all defined based on literature that was found during the exploration of the topic which is presented in chapter 1 of this thesis.

Search methods

For both research questions, queries can be set up to search the library of the Open University for relevant articles. The type of literature that will be looked for are exclusively scientific publications, journal articles, and optionally theses, to ensure the research is founded on independent and objective knowledge. To prevent scope increase, the search will also be limited to the field of business (management) and computer science, or a combination of both. Therefore, multiple databases will be used, including Academic Search Elite, ACM Digital Library, AIS (Association for Information Systems),

Cambridge Journals, EBSCO, Emerald Insights, Google Scholar, and Oxford University Press. The specific queries that will be used can be found in appendix 1.

2.2. Research implementation

Using (combinations) of the search terms led to some results but these were not sufficient for answering the research questions. For the results, see appendix 2. Trying out different combinations of the same terms led to the same results or even less usable results. Both success criteria in the ERP/Enterprise did not give many useful hits. In combination with project, it gave a little more result but still not enough. After this, a new term is introduced, 'implementation'. This led to more results but a lot of articles turned out to focus on critical success factors. To prevent this, the term 'critical success factor' and CSF were excluded. This led to two new queries. After finding eight useful articles, a new search term came up to use: ' Information systems'. This term was used in combination with the existing search terms. The querying method led to 17 usable articles being initially used for this study. These articles were all red in detail. Based on the concepts described in these articles, the snowballing method was used to find more relevant articles that are related. This was especially helpful regarding the subject of the model of DeLone and McLean which will be described in the results in the next paragraph.

2.3. Results and conclusions

2.3.1. Which success criteria for ERP implementations can be found in the existing literature?

Information systems success – the DeLone and McLean (D&M) model

One of the most cited studies of the last decades about measuring information system success is the model of DeLone and McLean (the D&M model). According to Urbach and Müller (2011), the D&M model has not only received great appreciation in the information systems community but most of its propositions explaining the success of an IS are supported. Therefore, the D&M is a good starting point for building the theoretical framework for this study. DeLone and McLean defined six distinct dimensions of information systems success in their original model: *system quality*, *information quality*, *use*, *user satisfaction*, *individual impact,* and *organizational impact* (DeLone & McLean, 1992). They concluded, based on a classification of empirical studies, that all these studies fall into these six major interrelated and interdependent categories. Later, they updated their original model and added *service quality, and intention to use,* and they changed *individual* and *organizational impact* into *net benefits* (Delone & McLean, 2003). Pereira et al. (2021) also concluded in their study that the variables of the D&M model are still relevant. In their study of the D&M model, Urbach and Müller (2011) provide an exemplary selection of validated measures that can be reused for future applications of the model. They based these measures on the 2003 version of the D&M model and added the results of other applications in the field. These measures are outlined in appendix 3.

Applying the D&M model to ERP success

Gollner and Baumane-Vītoliņa (2016) have applied the extended D&M model which Van Der Westhuizen and Fitzgerald (2005) introduced as an extension to the widely accepted model of Delone and McLean (2003) specifically to ERP project success. They argue that project success can be measured using only five dimensions. An important addition to the original updated model was the

introduction of the dimension Project Management Success. Based on the idea of Baccarini (1999) about project success components, Van Der Westhuizen and Fitzgerald (2005) made a distinction between *project management success* and *project product success*. Project management success focuses on the project management process and in particular on the accomplishments of the project regarding costs, time, and quality. Project product success, on the other hand, focuses on the effects of the project's end product. The D&M model heavily focused on product success and therefore needed an addition. Lech (2013) argues in his study that project management criteria, solely, cannot be a determinant of success. This underlines the necessity of combining these two dimensions of success. Omari and Nia (2021) also underlined in their literature review on measurement models for information systems that a multi-dimensional approach is needed.

Westhuizen and Fitzgerald's model, consisting of eleven dimensions, was too complex according to Gollner and Baumane-Vītoliņa (2016) and would lead to an unmanageable measuring model. They reduced the number of dimensions to five, by rearranging and bundling them together. This led to the following dimensions: *Project Management* (consisting of: *within specifications, stakeholder satisfaction, quality of project management process, service quality,* and *use/intention to use*), *Time, and Budget* (consisting of: *within time, within budget, within specifications,* and *quality of project management process*), *ERP System Quality* (consisting of *system quality* and *information quality*), *User Satisfaction* (consisting of *use/Intention to use* and *user satisfaction*), and finally *Economic Value* (consisting of *project stakeholder satisfaction, system quality, information quality,* and *net benefits*). These dimensions are visually represented in Figure 1.
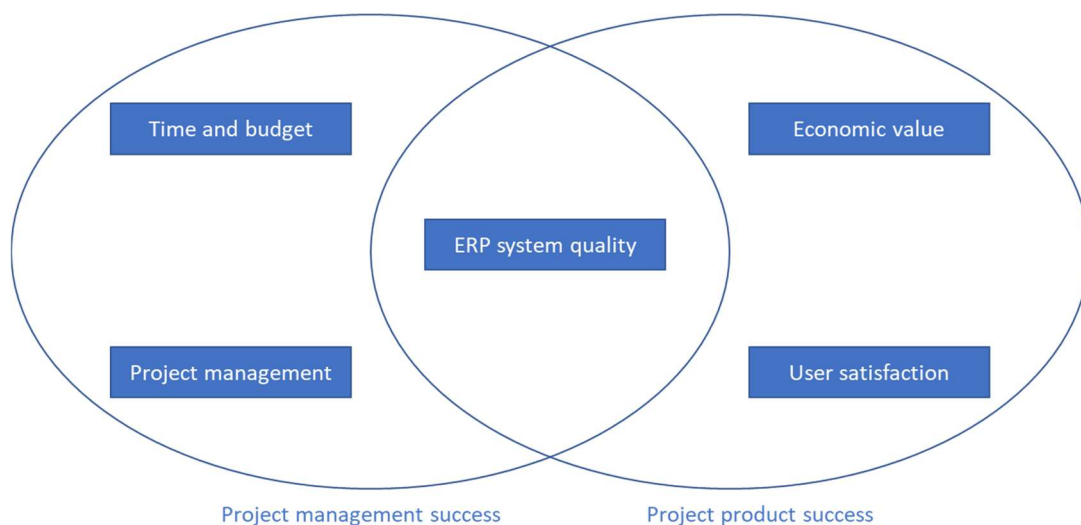
Figure 1. ERP Project success Measurement with five dimensions (Gollner & Baumane-Vītoliņa, 2016).

This leads to a new set of measures/criteria as outlined in appendix 4. In this table, the dimensions and measures of the D&M model are combined with the definitions of Van Der Westhuizen and Fitzgerald (2005) and Baccarini (1999). As Van Der Westhuizen and Fitzgerald (2005) are not very specific about stakeholder satisfaction, the findings of Castro et al. (2021) are also added to this table. Although Castro's research is more focused on project success in general and not specifically on ERP/information systems project success, these criteria make a useful addition to this list. Another perspective that is in line with the models deriving from the D&M model, is the relationship between user satisfaction and actual system benefits derived from the ERP system Cosmos Xulu and Suknunan

(2020). The authors suggest that ERP systems should be developed with the priority of conforming to the user jobs. This underlines the importance of this dimension.

Using the existing criteria to measure in practice

Even though there is a considerable amount of literature on the topic of project success, there is still a gap on how to measure this success. The suggested measures either have not been tested in reliable empirical research or have been tested in specific industries or sectors (Castro et al., 2019). These authors also point out that each research study measures project success differently. Therefore, these studies lead to different results and these results are incomparable. Castro et al. (2019) advocate the use of success criteria not as a measure of success or failure but as a set of dimensions that should be used to compare different projects. In a later publication, Castro et al. (2021) argue project success is a multidimensional construct and needs to be treated as such, therefore a more comprehensive assessment of project success is needed. Their advice is to combine specific and more general measurements. This limited theoretical attention is also underlined by Al-Okaily et al. (2021), and they opt for more empirical validation of this model in the ERP domain.

Conclusion

To the question, of which criteria can be found in the existing literature?, the main answer is that multiple models could be applied to measure the success of an ERP implementation. Therefore, we should look at these existing models and use a combination of these models to come to a list of criteria that can result in a multidisciplinary view on the success of the implementation. For the rest of this study, the extended version of the D&M model by Gollner and Baumane-Vītoliṇa (2016) will be used as a base, with additions from Van Der Westhuizen and Fitzgerald (2005), Baccarini (1999), Van Der Westhuizen and Fitzgerald (2005), and Castro et al. (2021). This list of criteria can be found in appendix 4.

2.3.2. At what moments is it useful to determine the successfulness of ERP implementations?

Focus on the post-implementation phase of projects

An ERP project life cycle consists of three phases, according to Hasan et al. (2019). The ERP adoption, the implementation, and the post-implementation stage. In the post-implementation stage, performance can be split up into two stages: intermediate benefit and overall benefit. Hasan et al. (2019) also pointed out that numerous organizations have been struggling with the issue of post-implementation and that there is an urgent call to understand the causes and effects of the success of the implementation. According to Guo (2019), a post-project evaluation can help organizations improve the chances of project success in the future.

The project success continuum

Joseph and Marnewick (2021) recognize a pattern in the assessment of project success across multiple dimensions, where the measurement is relying on immediate or short-term success. This is, however, an unjust way to determine the overall project's success. The outcomes in the short or medium-term can be one way, this does not always say something about the long-term success. The authors do, however, point out that although short-term project success does not directly impact long-term success, there is a clear correlation between medium- and long-term success. In this continuum, medium-term success functions as a bridge between short-term and long-term success. Furthermore, it is also dependent on the stakeholder viewpoint, where project managers will tend to focus on the

short- and maybe intermediate-term, business executives will have long-term interests for the organization as a whole. Therefore, project success should be viewed as a continuum that exists between these three time dimensions (Joseph & Marnewick, 2021), which are described below:

Short-term success

According to Joseph and Marnewick (2021), the term short-term success is analogous to project management success and project efficiency from a generalized view. The short time success applies to the final phase of the implementation/project and the immediate effects after the 'go-live' of the new system. The most common assessment of short-term success is the triple constraint. This is defined as a triangle of time, cost, and performance. Project managers focus on these three dimensions of success. The triple constraint is also referred to as the Iron Triangle (Rugenyi, 2015). Prostejovska and Tomankova (2017) also defined that the Iron Triangle alone is not sufficient to define project success and that other criteria should be taken into account.

Medium-term success

Baccarini (1999) defined the project goal, project purpose, and stakeholder satisfaction as the most important aspects of project success in the medium term. The medium-term success applies to the phase after the direct implementation until, roughly two years after the implementation, depending on the organization. Joseph and Marnewick (2021) argue that these success measures as predicted benefits of the project. They are not evident until the project is completed. This is also referred to as the "Fata Morgana" effect, success is an illusion that changes as you near it. This is especially relevant to the domain of information system success, because of the ambiguous nature of the success criteria. Joseph and Marnewick (2021) argue that medium-term success should co-exist with short-term success.

Long-term success

While measuring medium-term success, the focus is more on meeting and delivering on the client and user expectations, long-term success measurement should focus on strategic outcomes, such as exploiting new markets and achieving competitive advantage. This strategic effect can only be measured after a period of two to five years (Joseph & Marnewick, 2021).

Conclusion

The best timing to measure the success of an ERP implementation is in the post-implementation phase because this is the moment when the expected benefits or the implementation start to become visible. Thereby, different dimensions should be taken into account which can be measured in the short-, medium-, and long term of the project. This subdivision into short-, medium- and long-term success can be used as a structure for the success criteria but is not an aspect that should be explicitly validated because it does not interfere with the content of the set of criteria. These dimensions can be found in the description of the criteria in appendix 4, and for each phase of the post-implementation phase, different criteria can be measured. Short-term success will focus more on the 'classic' success criteria, deriving from the iron triangle, medium-term success will tend to focus more on stakeholder satisfaction, and long-term success will be more strategic in nature.

2.4.   The objective of the follow-up research

Although there have been some research and case studies were performed, more empirical data is needed to validate the success criteria that were found, as mentioned by Castro et al. (2021). The current empirical evidence is not based on a combination of the criteria from the different models, especially the combination of the (extended) D&M model and the project success continuum. Therefore, an empirical study will be performed to validate the success criteria (appendix 4) in ERP implementations. Based on the idea of the project success continuum of Joseph and Marnewick (2021), the focus will be multidimensional. A longitudinal study would make sense to evaluate both the short-, medium- and long-term success. Within the boundaries of this study, that would not be realistic. Therefore, this multidimensional aspect has to be taken into account when performing empirical research. In this empirical research, the following research question will be answered: *To what extent can the criteria that derive from the existing literature be found relevant in practice?*

3. Methodology

3.1.   Conceptual design

The main question that needs to be answered during the empirical study is:

To what extent can the criteria that derive from the existing literature be found relevant in practice?

The sub-questions for the empirical study are:

- *RQ3: Which criteria for success that were found in the literature are suitable for validating in practice?*
- *RQ4: Which criteria for success that were determined in RQ3 are identified as relevant in practice by field experts?*
- *RQ5: Are there any new criteria that derive from the empirical study that are not described in earlier studies?*

As pointed out in the previous chapter, based on the result of the literature analyses, the main objective of this study is to validate the criteria that are defined in appendix 4 and create a new model based on the previous ones. This means that the approach of this study is a combination of deduction and induction, which is also referred to as abduction. The study will be qualitative in nature because constructed meanings expressed about the phenomenon, in the case of this study ERP implementation success, are being studied. The type of information that is required will mostly be the opinions of subject matter experts and people that were involved in ERP implementations. Therefore, the research strategy for this study will be an interview-based survey. It will be specifically interview-based because this will allow gaining information from a wide range of respondents. With that argumentation, a questionnaire-based survey could also be used, but this would lead to data that is too superficial. In this way, it is a lot more difficult to go into detail about why a specific criterion is important to a respondent or find information that is not already thought of by the researcher beforehand. Although a longitudinal approach would lead to interesting results, especially because the phenomenon of ERP implementations occurs over a longer period, the time horizon of this study will be cross-sectional. This allows gaining data from different respondents within a relatively short period of research time.

As for other research strategies, a case study could also suffice but this would lead to a more narrow research population and would focus on only one specific case. The goal of this study is to learn about the relevance of ERP success criteria in general and not to validate how this applies to one specific situation. The grounded theory approach could also be used to develop new theories based on the information derived from the empirical study. However, the results of the literature study turned out that there is quite a large existing body of knowledge. Therefore, building new theories would not be a valid strategy. Furthermore, this approach would not fit into the time period of this study. Other strategies, like experiments, documentary research, ethnography, action research, and narrative inquiry, would not fit the purpose of this study.

3.2.   Technical design

Based on the three research questions, a multi-method approach needs to be applied. For RQ3, a focus group (meta-plan workshop) will be used and for RQ4 and RQ5, one-to-one interviews will be used. These methods will be described in further detail below.

RQ3: To answer this question, information is required from people which are subject matter experts on success criteria for ERP implementations. This information can be extracted using questioning and observation. Because the information that is required is highly about interpretation, an observation would not fit. Therefore, questioning will be used. By questioning individuals, using a one-to-one interview, information could be extracted. The goal is, however, to come to a definitive list of criteria, upon which all experts agree. Therefore, a many-to-many interview would be more sufficient. Because interaction is required between the respondents, a focus group would be most fitting. For this focus group, a meta-plan workshop technique will be used. In this way, a structured discussion can be held between the experts which leads to a common understanding and conclusion of the topic. During this meta-plan workshop, the different criteria that were found in the literature by all subject matter experts will be discussed. The goal is to come to a bundled list of criteria. In this way, the internal validity of the study is increased. The requirements for the participants are described in appendix 8.

During the meta-plan workshop, an independent moderator will be appointed to lead the discussion, in this way, the participants can focus on the in-depth discussion and won't be distracted by logistics during the sessions. The moderator should have experience in leading interactive sessions and has to be familiar with the concepts of ERP. The moderator should make sure that the agenda is followed and that the discussions will be efficient. Next to that, he should also make sure that everyone gets their say in the discussion and that the discussion leads to a final conclusion. For the execution of the meta-plan workshop, a tree-step approach will be used. These steps are described in more detail in appendix 10.

Figure 2. Meta-plan workshop approach

RQ4 and RQ5: For this part of the study, the focus is on the evaluation of ERP implementations. Therefore, observations would not suffice, as the activities that need to be observed already happened. Another option would be document analyses, this could lead to useful data to some extent, but this would also result in the interpretation of the researcher of the available project documents. Next to that, this would heavily focus on the more 'classic' success criteria, which are mostly applicable to short-term success. Speaking to people that were involved in the implementation would lead to much more detailed information, that also applies to the short- and medium-term success of the implementation. In contrast to RQ3, this part of the study is focused more on individual opinions than on coming to a common understanding and conclusion. This leads to the choice of performing one-to-one interviews as the main source of data collection for this part of the study. The interviews will be performed internet-mediated, using video conferencing software. This allows both face-to-face interactions, which add nuance to the conversation, and immediately records the interview. These interviews will be based on the new model derived from the meta-plan workshop (appendix 5). For every unique criterion, the respondent will determine whether it could indicate the success of the project he was involved in. During the interview, the model derived from the meta-plan workshop will

be used as a general structure to make sure all criteria are covered in the interview. This will be combined with more in-depth questions that come up during the passing of the interview to find more qualitative information, like arguments about why the criteria are relevant. In other words, semi-structured interviews will be performed.

The scope of the interview will include a period of two to ten years because, within this, both short-medium and long-term success can be evaluated. The focus will be on more recent implementations (less than ten years ago) to make sure that all required information is still available within the organizations and the implementations can be compared to each other. To make sure that different perspectives are covered, people with different roles in ERP implementations will be included in the study. To gain significant results, the intended amount of interviews will be two respondents per ERP implementation to incorporate both the perspective of the project team and the business. In total, six interviews will be held. The requirements for the respondents are described in appendix 8.

All respondents will receive an information letter (appendix 6) beforehand with a brief explanation of the content of the interview and a definition of the terminology ERP system, success criteria, and critical success factors. In this information letter, they will also agree with the terms of participating in this study. Before these interviews will be performed, a test interview will be held. This interview will be held with an ERP consultant/developer who represents the target respondents. This test interview will be used to verify if the structure of the interview is valid and will potentially bring up inconveniences in the model which should be taken into account during the definitive interviews. The definitive structure of the interview that will be used can be found in appendix 7.

3.3.   Data analysis

A qualitative analysis will be performed on the results of the meta-plan workshop and the interviews. For the meta-plan workshop, a twofold analysis is required. First, the abstraction level to validate the success criteria needs to be determined, this should derive from step 1 of the meta-plan workshop which is a predecessor for the second and third step. This abstraction level will be determined based on weighting all the arguments for the different options to question a large list of criteria. The second part of the analysis will be based on steps 2 and 3 of the meta-plan workshop. This will lead to a new structured list of criteria, on which a new model can be created.

The six interviews will be recorded and transcribed. By transcribing, the risk of loss of information is reduced and everything that is said during the interview can be incorporated into further analysis. This will also make this analysis more traceable for other researchers. To transcribe the interviews, first text-to-speech software will be used, the build-in function of Microsoft Word will be used, and the recordings will be saved on the local server of the researcher. After that, the transcript will be manually checked to clean the data. To analyze the transcripts, a coding method will be applied to link the information of the interviews to the model derived from the meta-plan workshop. This coding process will consist of the following steps. These steps are described in more detail in appendix 10.
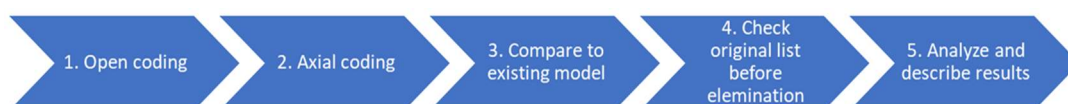
Figure 3. Interview analysis approach

3.4. Reflection: validity, reliability, and ethical aspects

Internal validity

To cover internal validity, a few steps will be taken during the empirical study. The main goal is to make sure that a causal relationship can be determined between the degree of applicability of the success criteria and the course of the ERP implementations. First, the same structure is used as the base for all interviews that will be performed. The people that will be interviewed are all people with similar roles in the implementation. Next to that, the implementations that will be studied all took place during roughly the same period. This reduces the amount of influence of external factors that could have changed the course of the ERP implementation.

External validity

The external validity of this study could be problematic because of the limited scope and time of the study. Therefore, it will be harder to generalize the results. This has to be taken into account when analyzing the results and drawing conclusions. However, this study aims to validate a predefined model in practice, therefore, it is possible to use the results of a more restricted population of respondents. Next to that, multiple projects for multiple companies in different business sectors will be analyzed, which leads to a more diverse population. To avoid a one-sided image of the ERP implementation, respondents from both the project team and the business will be interviewed.

Reliability

The results from the different literature studies performed by other researchers will be compared in a meta-plan workshop, this leads to a list of criteria that is based on multiple independently performed literature studies, which increases the amount of literature that is covered. By discussing the criteria with subject matter experts, the chance of missing or misinterpreting a specific criterion is reduced. Next to increasing the reliability of the list of criteria itself, all the researchers will use the same list of criteria to perform an empirical study. The results of these studies can therefore be compared to each other. The recording and transcription of the interviews also contribute to the reliability of this study, other researchers will be able to read these transcriptions and reproduce the steps that were performed to analyze the results.

Ethical aspects

Because of the intended response rate, the data from both the meta-plan workshop and interviews will be anonymized. This will prevent respondents from giving socially accepted answers and take away the fear of repercussions, especially when the project was less successful than managers or other important stakeholders hoped. This will be especially applicable to developers/consultants and key users. The selection of the ERP implementations will be discussed with the involved managers to make sure that the study will be performed with the mutual consent of all involved parties. To confirm the confidentiality of the study, all respondents (for both the meta-plan workshop and the interviews) will receive a letter of confidence which they will sign to permit the terms of the study. These letters can be found in appendix 6.

4. Results

4.1. Results of the meta-plan workshop

4.1.1. Evaluation of the process

As described in the third chapter, a meta-plan session was executed to create a definitive list of success criteria, grouped into criteria and sub-criteria. The population consisted of five subject matter experts, these can be found in appendix 8. The result of the meta-plan session met the goals that were described in chapter 3. There were, however, a few things that were not foreseen. In the first place, the timebox that was set was too narrow, especially for step 3. Two sessions were planned in advance, and a third session was optional. It turned out that three sessions were definitely needed, and the final sessions took twice as long as planned. Next to that, one of the experts was not available during the last session, this could potentially have influenced the results but because the elimination of the criteria was completely done in the second session, the final session was only used to group the criteria into categories. In this way, the remaining participants were able to consider the arguments of the missing participant which reduces the risk of divergent results.

4.1.2. Results

The first step in this process was to determine the level of abstraction to use for validating the success criteria. During the discussion, three possible options were derived to question the criteria. These options were weighted based on their advantages and disadvantages.

- Option 1: Question all individual criteria separately
- Option 2: Question the criteria on the level of their success dimension
- Option 3: Use a freeform interview, without a predefined list of criteria and/or dimensions

The first option would have the advantage that all defined criteria will be questioned, this will help steer the conversation. On the contrary, this would lead to a very long interview with the risk that the respondent loses focus. Next to that, it risks that the interviewer is steering the respondent in a specific direction. Finally, this would also risk missing important information and not finding arguments why the criteria are relevant. The second option has the advantage that the criteria are manageable to question during the interview. Focusing on the level of the dimensions will also give structure to the interview and finally, this leads to a larger chance of finding new information because the respondent has the opportunity to go into depth on specific topics and has room for interpretation. The disadvantage could be that the abstraction level is too high and that the respondent cannot come up with concrete examples. This can be countered by the interviewer, however, by bringing up these examples from the existing list. The third option would have the advantage that the respondent will not be influenced by any predefined criteria, this would lead to pure results. However, this could also lead to a lack of context for the respondent and the risk that the conversation will run out of scope. Furthermore, this could also result in a lack of relevant information from the interview. Finally, when using this form it is hard to determine the point of information satisfaction.

4.1.3. Conclusion

The questions that needed to be answered during the meta-plan workshop was: *Which criteria for success that were found in the literature are suitable for validating in practice?* The consideration above led to the conclusion that option 2: the level of success dimensions, would be the best fit because it has the most advantages and the disadvantages can be countered. It would lead to an open interview setting, in which the respondent can come up with their own ideas within the abstract criteria. If they cannot come up with concrete examples, the list from the meta-plan workshop can be used as a helpline or as inspiration. Based on the decision that the required abstraction level should be the level of success dimensions, the discussion about the criteria during step 3 of the meta-plan workshop, led to nine main success criteria in which sub-criteria can be accommodated. These main criteria will be used as a common thread during the interviews. These criteria are also connected to the earlier described continuum of short-, medium-, and long-term success. Although this distribution is relevant for this study and to give structure to the interview, it won't be a specific topic that will be questioned during the interviews. It will be used further on in the process to analyze the result of the interviews though. In appendix 5, the final list of the criteria and their descriptions, including their sub-criteria, and distribution on the success continuum can be found.

4.2.   Design of the interviews

Based on the outcomes of the meta-plan workshop, a common list of questions was created to use for the interviews, this was done in collaboration with the participants of the meta-plan workshop. This list is not an explicit list with questions, but a list of the nine success criteria including the questions: *Is the criterion relevant? Why is the criterion relevant? Could you give an example?* For every criterion, the interviewer would have the freedom to ask more in-depth questions that become relevant during the interview. The design of the interview can be found in appendix 7. This list was used as a structure by all researchers that were participating in the meta-plan workshop in their further research. During the test interview, a few adjustments came up for the definitive interviews, which were taken into account. These can be found in appendix 7.

4.3.   Results of the interviews

4.3.1. Evaluation of the process

In this study, six interviews were performed. In these interviews, the model which is described above was verified by questioning six respondents based on the nine success criteria. With taking the above adjustments in mind, all six interviews were successfully performed and analyzed. In appendix 8, a list of the respondents and whether they met the requirements for this study can be found. The analysis is based on the coding methodology which is described in chapter 3, the final coding of the interviews can be found in appendix 9. The two questions that needed to be answered in the interviews were *Which criteria for success that were determined in RQ3 are identified as relevant in practice by field experts?* and *Are there any new criteria that derive from the empirical study that are not described in earlier studies?* These two questions will be answered for every success criterion below.

4.3.2. Results: Short-term success

1. Project

The criterion Project was found relevant for measuring success. First of all, there were some mixed opinions among the respondents on whether the project phase was a relevant phase for measuring success. One respondent thought that after delivering the project, success was not yet visible. Other respondents, however, thought that during the execution of the project some indicators were visible about the outcome, and the success of the project. In general, most of the sub-criteria that were defined within the project success criterion were mentioned by the respondents. There is consensus about the fit between business process and the ERP, the need for technical specifications, and expectation management. On the contrary, most respondents argued that the existence of (extensive) documentation is not relevant for measuring success. Another sub-criterion that was consensus about is the relevance of the iron triangle, which includes budget, schedule, and scope. An important addition to this set of sub-criteria is that they are all dependent on each other. Separately, they are not relevant for measuring success. Most of the respondents also thought that stakeholder satisfaction is a relevant sub-criterion. Next to conformance to the project goals and expectations, two of them added a new element to this criterion which is the creation of an element of surprise in delivering the system, or the 'wow-factor'. This was not found in the literature initially.

A search on the terms 'ERP' in combination with 'Wow', led to an article written by Piturro and Marlene (1999). They discuss the decision process of how midsize companies are buying ERP. They mention that 'the wow factor' could be a valid argument for buying a specific ERP from a vendor. However, this is the only scientific publication that was found about this potential criterion. Finally, half of the respondents mentioned stakeholder involvement, which included aspects like common goals, decision-making power, and commitment/ownership of stakeholders. This sub-criterion was not in the model because it was eliminated during the meta-plan workshop, the sub-criterion was mentioned in the project management dimension by Gollner and Baumane-Vītoliņa (2016).

4.3.3. Results: Medium-term success

2. User experience

The criterion of User experience was found relevant for measuring success. The criterion turned out to be somewhat mixed up with the system criterion. A lot of sub-criteria that were defined for this criterion, were not mentioned while discussing it with the respondents but were mentioned later on in the interview. Next to that, a few of the sub-criteria seemed to be very similar and were combined in the interview. Some of them were explicitly mentioned, namely the enjoyment by users, system task orientation, and interface (look and feel). One respondent mentioned that look and feel are important, but that functionality is more important. The ease of use, learning, and intuitiveness were mentioned in combination by four of the respondents. One of the respondents mentioned that the system should be as intuitive as possible, but that it can also be intuitive in combination with training, because of its complex nature. Two sub-criteria that also turned out to be quite related were effectiveness and efficiency. The most prominent argument is that the system should make the daily job of users easier.

3. Usage

The criterion Usage was found relevant for measuring success. The respondents were unanimous about the sub-criterion actual use of the system. All respondents mentioned the importance of not

using workarounds for the system. One respondent mentioned that if the system does not support all processes properly, people will become 'creative' and start working with spreadsheets or separate lists of information. Other sub-criteria that were mentioned were the personal value of the system and the extent of use. Recurring use and intention to (re)use turned out to be quite similar and were mentioned in combination with each other. Within this criterion, there were some mixed opinions on whether the use of statistical data was relevant for measuring success. The sub-criterion nature of use and user satisfaction were not mentioned in the light of the usage criterion.

4. Information

The criterion Information was found relevant for measuring success. Next to the user interface, the information criterion was also hard to separate from the system criterion. For this criterion, also a lot of sub-criteria were mixed up between the two main criteria. Also, a lot of sub-criteria within this criterion seemed to be connected to the internal business value criterion, because the information is the base for sub-criteria like process improvement and improved decision making. The sub-criteria that were explicitly mentioned here were the usability of the information, data currency of the system, and comprehensibility of the data. Data consistency, integrity and uniqueness of the information were mentioned in combination with each other. The conciseness, availability, reliability, and scope of information were not mentioned explicitly and seemed a bit like a predecessor for the sub-criterion usability of the information. The same applies to the accuracy, completeness, and input accuracy of the data.

5. Infrastructure

The criterion Infrastructure was found relevant for measuring success. From top of mind, almost all of the respondents found it difficult to determine the relevance of the infrastructure criterion. Most of them thought that infrastructure was more like a critical success factor, like one respondent mentioned "It is a precondition for success most of all, and not something on which success can be determined". After discussing the topic in more depth, however, most of the sub-criteria came up anyway. One of them was hardware performance, which actually looks like a combination of server/database capacity and speed of network connection. Bad hardware performance could totally overrule the success of the user experience and system criterion, according to one of the respondents. Other sub-criteria that were mentioned were security, user authorization, and data backup and recovery mechanism. In the light of this criterion, two new sub-criteria also came up. The first one is support for different/mobile devices. A sub-criterion that was in the model which looks a bit like this, is the configuration of user's PCs but it does not actually cover the load of what was mentioned. Cross-platform support seems a more modern application of ERP systems, which is probably not mentioned in earlier models and could probably be outdated.

A new search query using ERP in combination with cross-platform support gives a few relevant hits. According to Pinto (2018), access to information is essential to the efficiency of organization operations. Therefore, access to information systems from mobile devices is crucial. This is also confirmed by Capek et al. (2018) who studied the application of a cross-platform configurable ERP framework. Another sub-criterion that was not present in the model was scalability, especially of the system and network, this is more related to cloud solutions. According to Abd Elmonem et al. (2016), scalability is a benefit that could derive from cloud base ERP implementations and could therefore lead to ERP success. Other sub-criteria which were mentioned in the light of the infrastructure criterion are also mentioned, like rapid implementations, using advanced technology, and rapid updates and upgrades. They also mention several risks, which also apply to this criterion, like performance and security, which should be considered when moving to a cloud-based ERP system.

While the economic and IT benefits promised by cloud vendors are attractive, the success of cloud ERP adoption can be affected by a range of critical challenges related to different organizational and management aspects (Peng & Gala, 2014), these should be taken into account.

6. Service

The criterion Service was found relevant for measuring success. Most of the sub-criteria in the service criterion were mentioned by the respondents, apart from individual support. The most obvious sub-criteria that were mentioned were the knowledge and skills of IT staff and the reliability of service. These were mostly mentioned in combination with each other. Next to that, flexibility, empathy, responsiveness, the intrinsic quality of service, and simplification of the IT inquiry process were also specifically mentioned. One of the respondents thought that service was not relevant for determining ERP success but all other respondents argued that it was. The sub-criterion tangibles of service was also pointed out as irrelevant by one of the respondents, the others did not mention this, therefore this criterion can be removed from the model.

7. System

The criterion System was found relevant for measuring success. As discussed for the user interface and information criterion, the system criterion was also a bit difficult to separate from the other criteria. The sub-criteria with the most consensus were the detection and prevention of data errors and data integrity, which were mentioned in combination with each other. Three of the respondents mentioned that the correct input of data is crucial for the working of the ERP. If incorrect/corrupt data is entered, this will pollute the whole of the system which can lead to a wide scale of unfortunate events while working with the system. Half of the respondents mentioned the consistency of the interface design as an important sub-criterion, which also included a limitation on the customizability of the user interface. Two other sub-criteria that were mentioned by almost all of the respondents were flexibility of the system and customization of the system, these were also mentioned in combination with each other. The same applies to regular upgrades, enhancement, and sophistication of the system. Others that were mentioned were system reliability, stability, accessibility, availability, the technical ability of the system, system navigation, format of the information, tracking and control, integrated help menu/user support, and system response time.

4.3.4. Results: Long-term success

8. Internal business value

The criterion Internal business value was found relevant for measuring success. This internal business value criterion was mentioned on the surface while discussing the other criteria in both the short- and medium-term, as internal business value seems to be a result of success in other criteria. The sub-criterion that was mentioned first by most of the respondents was improved business process. This was also mentioned in combination with organizational learning. All of the respondents mentioned the sub-criteria improved decision making and keeping management informed. Most of them mentioned this in the light of more data-driven decision-making. Labor requirements and job effectiveness were also mentioned by most of the respondents. Most of them focused on the changing role of employment within the organization. One of the respondents mentioned a shift from more simple tasks to more complex tasks for employees, because of the automation of processes by the ERP. Another sub-criterion that was mentioned by almost all respondents was organizational morale and in light of that the happiness of employees and job satisfaction. Others that were mentioned were management efficiency, improved planning, improved creativity, and cross-functional collaboration.

Overall/increased productivity, the efficiency of organizational units, performance, timeliness of decisions, process cycle time, reduced inventory, workload, and cost reduction were not specifically mentioned by the respondents. In general, most of the respondents seemed to focus on the more 'soft' aspects of internal business value.

9. External business value

The criterion External business value was found relevant for measuring success. Almost all of the sub-criteria from the external business value criterion were mentioned by the respondents, except improved product quality. A lot of sub-criteria were mentioned in combination with each other, however. Especially the sub-criteria competitive advantage, market efficiency, and increased market share. Improved reputation and service and satisfaction of customers and suppliers were mentioned specifically. Regarding return and investment were some mixed opinions. One of the respondents thought that return on investment was not relevant for ERP success because the projects are not meant to 'make money' but to invest and improve in the longer term. Sometimes, according to the respondent, it could even mean the prevention of loss. One sub-criterion came up here that was not in the model, which is to adapt to outside influence, like the conformance to legal requirements and changes, and to prevent bankruptcy and downfall of the organization. In other words, the organization has no choice but to implement a (new) ERP system. After a search using the terms legal and ERP implementation, however, several publications were found that describe this topic. But both Dezdar and Ainin (2011), Plant and Willcocks (2007) and Menon (2020) describe this as a critical success factor. There was no publication found which describes this as a (sub)criterion for ERP success.

4.3.5. Conclusion

Two questions need to be answered during the interviews. In the first place: *RQ4: Which criteria for success that were determined in RQ3 are identified as relevant in practice by field experts?*

To answer the first question, when looking at the abstraction level of success dimensions, all of the criteria were found relevant in practice. The user interface, information, and system criterion seemed a bit intertwined in some cases, but for all of these criteria, the respondents managed to come up with several sub-criteria that were on the list for this criterion. In general, about half of the sub-criteria from the list could be combined or interpreted, but this is very dependent on the respondent. Therefore, they should be left on the list, because there were all mentioned. Next to that, the focus is on the abstraction level of the criterion, not the specific sub-criteria. An important aspect of the Project criterion is that the sub-criteria which derive from the iron triangle should be considered together and not separately. This falls back on the literature about these criteria, as it is called the iron *triangle* for a reason, namely that the elements of the triangle interact with each other. The infrastructure criterion initially seemed a bit difficult for the respondents to determine as a relevant success criterion. This was because the criterion could also be seen as a critical success factor. After going deeper into the subject, however, it turned out that the criterion is relevant. For the internal business value criterion, the respondents seemed to focus more on the 'soft' sub-criteria. The more 'hard' sub-criteria, like cost reduction and organizational performance, were not explicitly mentioned. It was, however, not specifically mentioned that these sub-criteria are not relevant so they should stay in the model.

The second question, *RQ5: Are there any new criteria that derive from the empirical study that are not described in earlier studies?* also leads to a few new insights. For the project criterion, one sub-criteria could potentially be added, namely the element of success/'wow-factor' but this would require more in-depth research. Next to that, the stakeholder involvement sub-criterion, which was eliminated

during the meta-plan workshop, should be returned to the model. To the infrastructure criterion, two sub-criteria could be added, this is cross-platform support and scalability. These two sub-criteria were not in the original model, probably because the studies the criteria derived from were performed during the beginning of the 21st century, in a different technological landscape that was heavily focused on PC usage. Finally, some of the respondents mentioned adaption to outside influences, like conformance to legal requirements, however, a short literature review turned out that this is a critical success factor, so it will not be added to the list. The final model can be found in appendix 11.

5. Discussion, conclusions, and recommendations

5.1.   Discussion – reflection

The main goal of this study was to determine by which criteria the successfulness of ERP implementations could be determined afterward. During the exploration of the topic, it turned out that there was a gap in the literature about the post-implementation phase of ERP projects. There was no specific model to determine the success of an ERP implementation after the project is finished. In the following literature study, a few usable models, which use different approaches came to light which could be combined and transformed into a model that applies to ERP success criteria. Using a meta-plan workshop, a new model is derived from the existing models, which combines them all. The results of the empirical study generally matched the expectations derived from the theory. Although some new sub-criteria were found during the interviews, these do not conflict with the existing knowledge but form an addition to it. All of these 'new' criteria could be accommodated within the nine main success criteria that were found. This underlines the positive impact of combining multiple models based on a wide literature review which is also discussed by several researchers on the topic.

The abstraction level that was determined during the meta-plan workshop, the abstraction level of success dimensions, turned out to be effective for questioning the success criteria. This led to structured interviews with a high information density and all respondents could relate to the nine main criteria that were found. Because of the chosen abstraction level, respondents were able to understand what the criteria meant and discuss several examples and come up with sub-criteria by themselves. When respondents struggled with the concrete interpretation of the questioned criteria, giving examples of sub-criteria from the predetermined list helped them to give further substance to the criteria.

Validity and reliability

To increase the validity of the study, several aspects have been taken into account in the methodology of the study. The conditions for all the steps of the empirical study were precisely determined and fluctuations in the conditions were excluded as much as possible, this plan has been followed during the execution of the empirical study. This reduced the influence of external factors which increased the internal validity. To contribute to the external validity, the relatively small research population for the empirical study was composed of respondents that were able to discuss ERP implementations from a wider and also from different perspectives. To increase the reliability, the meta-plan workshop was performed. This led to a larger coverage of the existing literature and more broadly supported arguments about relevant success criteria. Next to that, this approach also paved the way for comparing the results of all studies that were performed by the participants. Finally, the ethical aspects were taken into account precisely and all respondents were aware of the course of the study and were able to talk freely.

Limitations

Some struggles arose during the execution of the meta-plan workshop, namely the lack of experience of the researchers in performing such a session in combination with underestimation of the time the sessions would cost. During the meta-plan workshop sessions, these issues were immediately solved by fine-tuning the approach, for example by planning an extra session and asking the moderator to control the spreadsheet which was used to categorize the success criteria. Therefore, although the

meta-plan workshop did not exactly go as planned, it turned out to be a fertile base for creating a structure for the interviews.

The data collection during the interviews went well. There is, however, one limitation to the respondent population that should be taken into account. The ERP implementations that were used as a criterion for selecting the respondents, were all done with the same platform, by the same company, in the Netherlands. This could potentially influence the results and have a negative impact on the external validity. However, all respondents were experienced in the ERP field and were interviewed as an expert in their discipline, not as an employee of the company, in this way, there was strived for as objective result as possible.

5.2.   Conclusions

The meta-plan workshop concluded that the abstraction level to use when determining the relevance of success criteria was on the level of success dimensions This led to nine main success criteria, which all include a list of more specific sub-criteria. During the interviews, all of these main criteria turned out to be relevant in practice, including a few additions of sub-criteria that were not present in the previous models, these sub-criteria could be incorporated into the nine main criteria that were determined. This leads to the answer to the main research question that the successfulness of ERP implementations can be determined by evaluating nine success criteria. These criteria include sub-criteria that can or cannot, apply to a specific ERP implementation, based on the specific goals and circumstances of that implementation. This measurement should take place after the project is finished for a longer period, to make sure that all criteria within the continuum of short-, medium- and long-term success can be evaluated properly.

5.3.   Recommendations for practice

The result of this study is a model which includes all success criteria for measuring ERP success afterward. In practice, this means that this model can be used as a predecessor for a measurement or evaluation tool. The model, including the additions that were done during the empirical study, contains all elements that can also be used for such a tool as is. It can be used by project/business managers to evaluate ERP implementations by using the list with criteria and their sub-criteria. They could use a Likert scale, for example, to score all criteria. This could give them a good insight into the success of the ERP implementation. Such a tool can be used by consultancy firms/ERP vendors who perform ERP implementation projects or by the companies that are doing the ERP implementation themselves.

However, there is no gradation of importance within the criteria and their sub-criteria and there are no specific indicators added to the different criteria. For practical use, managers could determine the importance of these criteria based on their own organizational characteristics/goals, the project goals, or based on their personal experience. Next to that, the list of criteria can also be used on the intake/start of a new ERP implementation project to determine aspects of the project that should be focused on. By knowing what achieving success with the implementation means, measurements can be taken to increase the success based on the success criteria.

5.4.　Recommendations for further research

First of all, as mentioned in the reflection paragraph, the population that is used for the empirical part of this study is limited. The first step in further research would therefore be to validate the newly created model within a broader population. Important variables for this population would be the ERP platform that is used and the country of the company which is implementing the ERP. After the model is further validated, the criteria can be prioritized, and finally, a tool could be developed based on the prioritized model. In this tool, statistic indicators (KPIs) can be defined which can be used for measurement of success. It could also be useful to link such indicators to the Balanced scorecard or other known measurement models for organizational performance in general. This could be relevant because ERP implementations have such a deep impact on the whole of organizations.

Next to further validation of the model, a few highlights that came up during the analysis of the results could be further researched. In the first place, this is the element of success or the 'wow-factor'. Although there are very few scientific publications about this topic, there is a lot of pseudo-science about it, especially within the field of requirements engineering and UI/UX, which underlines the importance of the 'wow-factor'. It would be useful to study this on a more scientific level because it could give a new addition to the theory about project success. Another interesting topic for further research is cross-platform support and scalability. Although these are added within the model now, they did not derive from the initial literature study about project success. Especially cloud ERP and its relation to project success seems like an underexplored area so far. Finally, the urge to focus on soft success criteria within the internal business value criterion. It would be useful to find out whether this is due to the selected population of this study, or whether this is something that is more widely supported.

6. Appendix

6.1.   Appendix 1. Search queries

Queries:

RQ 1:
1. (TitleCombined:(criteria)) AND (TitleCombined:(success)) AND (ERP)
2. (TitleCombined:(criteria)) AND (TitleCombined:(success)) AND (Enterprise)
3. (TitleCombined:(criteria)) AND (TitleCombined:(success)) AND (TitleCombined:(project))
4. (TitleCombined:(implementation)) AND (TitleCombined:(success)) AND (TitleCombined:(enterprise))

RQ2:
5. (TitleCombined:(project)) AND (TitleCombined:(success)) AND (timing) AND (reflecting)
6. (TitleCombined:(project)) AND (TitleCombined:(success)) AND (phase) AND (reflecting)

Added queries for RQ1:

7. (TitleCombined:(success)) AND (ERP) AND (implementation) NOT (critical success factor) NOT (CSF)

8. (TitleCombined:(success)) AND (TitleCombined:(information system))

6.2.   Appendix 2. Query results

Query results

Query	Total Results	# selected based on title	# selected based on abstract	# selected based on intro/conclusion
1	4	3	2	1
2	23	7	2	0
3	37	13	5	3
4	45	16	2	2
5	15	0	0	0
6	49	6	3	1

Query	Total Results	# selected based on title	# selected based on abstract	# selected based on intro/conclusion
7	95	12	5	4

Query	Total Results	# selected based on title	# selected based on abstract	# selected based on intro/conclusion
8	359	17	8	5

6.3. Appendix 3. D&M model

Success dimension	Definition	Measures (criteria)
System quality	These measures typically focus on usability aspects and performance characteristics of the system under examination.	Access, Convenience, Customization, Data accuracy, Data currency, Ease of learning, Ease of use, Efficiency, Flexibility, Integration, Interactivity, Navigation, Reliability, Response time, Sophistication, System accuracy, System features, Turnaround time.
Information quality	This constitutes the desirable characteristics of the information system's output. This is also seen as a key antecedent for user satisfaction.	Accuracy, Adequacy, Availability, Completeness, Conciseness, Consistency, Format, Precision, Relevance, Reliability, Scope, Timeliness, Understandability, Uniqueness, Usability, Usefulness.
Service quality	This represents the quality of the support that the users receive from the information system department and IT support personnel.	Assurance, Empathy, Flexibility, Interpersonal quality, Intrinsic quality, IS training, Reliability, Responsiveness, Tangibles.
Intention to use/Use	This success dimension represents the degree and manner in which the IS is utilized by its users. Several perspectives have to be taken into account here, because the use of an information system is not always voluntary. That is why a combination of intention to use and use is made.	Actual use, Daily use, Frequency of use, Intention to (re)use, Nature of use, Navigation patterns, Number of site visits, Number of transactions.
User satisfaction	This constitutes the user's level of satisfaction when utilizing the information system. This is considered one of the most important measures of IS success. Especially when the use is mandatory.	Adequacy, Effectiveness, Efficiency, Enjoyment, Information satisfaction, Overall satisfaction, System satisfaction.
Net benefits	This constitutes the extent to which the information system is contributing to the success of the different stakeholders. It is considered as a direct measurement of the benefits, in addition to the indirect benefit. These results are more quantitative by nature than the other ones.	Awareness/Recall, Decision effectiveness, Individual productivity, Job effectiveness, Job performance, Job simplification, Learning, Productivity, Task performance, Usefulness, Task innovation.

6.4. Appendix 4. Gollner & Boumane-Vitolina model

Success dimension	D&M dimensions	Short- medium- or long term	Measures (criteria)
Project management	Within specifications	Short	Technical requirements specified at commencement of the execution phase, Conformance to functional and technical specifications
	Project stakeholder satisfaction	Medium	Met client's requirements, Steering group satisfaction, Sponsor satisfaction, Met organizational objectives
	Quality of project management process	Short	Efficiency, Anticipating all project requirements, Sufficient resources, Dealing with issues early on, Keeping management informed, Effective coordination of relations, Participative decision-making, Minimum scope change, Minimum disturbance to flow of work/corporate culture, Completeness of termination
	Service quality	Short	Assurance, Empathy, Flexibility, Interpersonal quality, Intrinsic quality, IS training, Reliability, Responsiveness, Tangibles.
	Intention to use/Use	Medium	Actual use, Daily use, Frequency of use, Intention to (re)use, Nature of use, Navigation patterns, Number of site visits, Number of transactions.
Time and budget	Within time	Short	Schedule over/underrun percentage of initial plan
	Within budget	Short	Cost over/underrun percentage of initial budget
	Within specifications	Short	Technical requirements specified at commencement of the execution phase, Conformance to functional and technical specifications
	Quality of project management process	Short	Efficiency, Anticipating all project requirements, Sufficient resources, Dealing with issues early on, Keeping management informed, Effective coordination of relations, Participative decision-making, Minimum scope change, Minimum disturbance to flow of work/corporate culture, Completeness of termination
ERP system quality	System quality	Medium	Access, Convenience, Customization, Data accuracy, Data currency, Ease of learning, Ease of use, Efficiency, Flexibility, Integration, Interactivity, Navigation, Reliability, Response time, Sophistication, System accuracy, System features, Turnaround time.
	Information quality	Medium	Accuracy, Adequacy, Availability, Completeness, Conciseness, Consistency, Format, Precision,

			Relevance, Reliability, Scope, Timeliness, Understandability, Uniqueness, Usability, Usefulness.
User satisfaction	Intention to use/Use	Medium	Actual use, Daily use, Frequency of use, Intention to (re)use, Nature of use, Navigation patterns, Number of site visits, Number of transactions.
	User satisfaction	Medium	Adequacy, Effectiveness, Efficiency, Enjoyment, Information satisfaction, Overall satisfaction, System satisfaction.
Economic value	Project stakeholder satisfaction	Long	Met client's requirements, Steering group satisfaction, Sponsor satisfaction, Met organizational objectives
	System quality	Long	Access, Convenience, Customization, Data accuracy, Data currency, Ease of learning, Ease of use, Efficiency, Flexibility, Integration, Interactivity, Navigation, Reliability, Response time, Sophistication, System accuracy, System features, Turnaround time.
	Information quality	Long	Accuracy, Adequacy, Availability, Completeness, Conciseness, Consistency, Format, Precision, Relevance, Reliability, Scope, Timeliness, Understandability, Uniqueness, Usability, Usefulness.
	Net benefits	Long	Awareness/Recall, Decision effectiveness, Individual productivity, Job effectiveness, Job performance, Job simplification, Learning, Productivity, Task performance, Usefulness, Task innovation.

6.5. Appendix 5. New model

Term	Criterion	Sub-criterion	Description
Short	Project	Fit between business processes and ERP	The extent to which ERP and redesigned business processes match each other and the organisation goals.
		Conformance to functional and technical specifications	The extent to which the ERP meets the functional and technical specification that were defined beforehand.
		Well defined and documented	The job roles, standards, steps, inputs and outputs of the new ERP-enabled processes are explicitly defined and documented.
		Product within intended purpose	Was the project delivered according to the intended purpose?
		Within budget	Was the project delivered within budget?
		Within schedule	Was the project delivered within schedule?
		Within scope	The extent to which the scope is complete; goals, tasks, costs, deadlines and requirements.
		Stakeholder satisfaction	Were stakeholders satisfied with the termination of the project?
		Met organizational objectives	The extent to which the ERP contributes to the organizational objectives.
Medium	User experience	Overall satisfaction	The extent of overall satisfaction about the ERP in general.
		Effectiveness for users	The extent to which the users experience the ERP effective for performing their job.
		Efficiency for users	The extent to which the users experience the ERP efficient for performing their job (they can perform their job in the most efficient and least time consuming way).
		Flexible system interaction and use	The possibility for ERP users to interact with the system and perform tasks through multiple pathways.
		Ease of use	The extent to which ERP functions can be easily used by end users.
		Enjoyment by users	The extent to which users enjoy using the ERP.
		Ease of learning	How difficult users find learning the functions of ERP.
		Adequacy for users	The extent to which the ERP supports the tasks and information needs of the user.
		Recall information	The extent to which the ERP user can reproduce the information.
		Intuitiveness of the system	The extent to which users know directly how to navigate the system and to which extent the system feels intuitive to use.
		Readability	The extent to which ERP users can understand the information/data, depending on content and presentation.
		Navigation of system	The extent to which the user can navigate efficiently through the ERP and find the information they need.
		System task orientation for user's work	The extent to which the ERP is task oriented for users.
		Interface (look and feel)	The extent for ERP users to understand the information/data, depending on content and presentation.
	Usage	Nature of use	Does the nature of use fit the role of the end user?
		User acceptance	Do the end users accept the system?
		User satisfaction	Are end users satisfied with the system?
		Personal value of the system	The extent to which the ERP is of added value for the user.
		Extent of use	The extent to which the ERP is used.
		Actual use	The extent to which the users actually use the ERP and do not fall back to workarounds.
		Recurring use	The extent to which the users reuse the ERP system.
		Intention to (re)use	The extent to which users are willing to (re)use the ERP, based on their experience with the ERP.

	Information	Data currency of system	The financial significance of the data to the organization (expressed in a monetary value).
		Overall output quality	ERP improves the standard and quality of the organisation's output.
		Comprehensibility of the data	The extent to which users are able to draw conclusions based on the information in the ERP.
		Conciseness of the information	The extent to which the information in the ERP is complete.
		Availability of the information	The extent to which the information in the ERP is available to the users.
		Reliability of the information	The extent to which the information in the ERP is reliable (correct).
		Usability of the information	The extent to which the information in the ERP is useful.
		Data consistency	The extent to which data in database is consistent between applications and across the whole firm.
		Data integrity	The extent to which data in database is integrated across the whole system.
		Scope of the information	The extent to which the information in the ERP covers all required areas.
		Accuracy of data	The extent to which data is correct and precise.
		Input data accuracy	The extent to which data is inputted correctly and precisely.
		Uniqueness of the information	The extent to which the information in the ERP is unique (and not redundant), and to which extent this is enforced by the ERP.
		Completeness of the data	The extent to which data is inputted completely without missing elements.
	Infrastructure	User authorisation	Users are granted appropriate data and system access rights.
		Data backup and recovery mechanism	Policies, plans and procedures adopted to back up and recover ERP data to avoid potential data loss.
		Configuration of user PCs (devices)	User PCs have adequate and even the latest configurations to support the running of ERP.
		External integration (compatibility) of ERP	The possibility for ERP to be integrated and exchange data with other IS applications.
		Internal integration of ERP	Different modules of the ERP system are seamlessly integrated together to share data.
		Infrastructure security	The capacity of IT infrastructure to prevent the firm from both internal and external security threats.
		Server and database capacity	The server and database are of sufficient size to support smooth running of ERP.
		Speed of network connection	The speed of network connection is good enough to avoid potential delay of ERP data processing.
	Service	Availability of IT maintenance staff	The extent to which IT support is accessible when users need it.
		Reliability of service	The extent to which the service organization is reliable in their support, based on clear processes.
		Flexibility in service	The extent to which the service organization is flexible in their support.
		Individual support	Availability of personalised one on one support for users.
		Empathy in service	The extent to which the employees of the service organization perform their jobs in an emphatic way.
		Intrinsic quality of service	The extent to which the employees of the service organization feel responsible for the quality of the service.
		Knowledge and technical skills of IT staff	Support staff have sufficient knowledge and experience of the system to handle user queries.
		User support materials	Availability and helpfulness of system manuals.
		Responsiveness of IT maintenance staff	User requests for help are handled and responded promptly.
		Simplification of the IT inquiry process	Number of steps that users need to go through when seeking IT support.
		Tangibles of service	The appearance of physical facilities, equipment, personal and communication materials.
	System	Consistency of interface design	ERP interface design is uniform and menu options are persistent across the whole system.

		Availability of reports	Users can always access relevant ERP reports and outputs when needed.
		Turnaround time of system	The extent to which the ERP contributes the lowest possible turnaround time.
		Efficiency of system	The extent to which the ERP operates in an efficient way (from a performance perspective).
		Flexibility of the system	The extent to which the system is capable to handle a variety of products.
		Integrated help menu or user support	The extent to which technical support and user manuals are embedded in ERP systems, including formal instructions for users.
		Information awareness	The extent to which the ERP system contributes to information awareness.
		Interactivity of system	The extent to which the system is considered to be interactive, both from a technical as functional perspective.
		Usefulness of system functions and characteristics	The extent to which the ERP system functions and characteristics are useful.
		Detection and prevention of data errors	The ability of ERP system to automatically detect and prevent the input of incorrect data.
		Tracking and control	The ability of ERP system to enable users to track and modify transactions and inputted data as they progress through a task.
		System response time	The time between sending a user request and receiving a system reply to that request.
		Regular system upgrade/enhancement	The ERP system is properly upgraded and enhanced to meet emergent business needs.
		System stability and availability	The frequency of system crashes and periods when users are unable to access the system due to technical failure.
		Technical ability of the system	The technical capabilities of the system to execute specific tasks.
		Timeliness of the data	Is the accessibility and availability of information timely to make the right decisions?
		Sophistication of system	The extent to which the ERP uses the latest and best technologies and is designed properly.
		Visibility of system (progress)	The ability of ERP system to display a user's progress when doing a multi-step task.
		Customization of system	The amount of customization options of the system.
		Format of the information	The extent to which the format of the information contributes to better interpretable information.
		Compatibility of output (external)	The ability of ERP systems to provide output that can be opened or imported by other software.
		Allows for data integrity	The ability of the ERP system to allow data integration.
		System reliability	The extent to which ERP is free of technical bugs and errors and so can consistently perform its intended functions.
		Technical security of the system	The inbuilt capacity of ERP to resist internal and external security threats.
Long	Internal business value	Cross-functional collaboration and communication	ERP aids information exchange and joint projects between employees and departments.
		Overall productivity	ERP helps the organisation create a greater quantity of its output.
		Labour requirements	The organisation needs a low number of workforce with support and automation enabled by ERP.
		Efficiency of organizational units	The extent in which the efficiency of organisational units is improved.
		Management efficiency	ERP improves the organisation's capacity in managing, monitoring and controlling.
		Keeping management informed	The extent to which the ERP supports the information provision for management to make the best possible business decisions.
		Individual productivity	The extent to which the ERP supports the productivity of individual employees.
		Cost reduction	Does the ERP reduce operating expenses?
		Organisational learning	ERP adds to the organisation's ability to adapt and learn in response to internal and external stimuli.

		Organisational morale	ERP positively adds to the organisational morale and optimism.
		Improved business process	Does the ERP improve business processes?
		Job effectiveness	The extent to which the ERP increases the effectiveness of jobs in the organization.
		Task performance	The extent to which the ERP increases the performance of individual tasks in the organization.
		Process cycle time	The time taken to complete each new business process is acceptable.
		Timeliness of decisions	The extent to which the ERP system ensures that decisions can be made on time.
		Improved decision making	Does the ERP contribute to better substantiated decision making?
		Improved planning efficiency	ERP improves the organisation's capacity in planning and scheduling.
		Improved creativity	ERP improves the creativity of the users.
		Reduce inventory	The extent to which the ERP reduces the amount of stock held by the organization.
		Workload	The extent to which the ERP reduces the amount of work for individual employees.
	External business value	Competitive advantage	ERP helps the organisation achieve a favourable position compared to rival organisations.
		Market efficiency	Does the ERP contribute to a better market position?
		Return on investment (ROI)	Does the ERP help to increase the ROI of the organization?
		Service and satisfaction of customers and suppliers	Does the ERP increase the customer and supplier satisfaction?
		Improved income revenues	Does the ERP contribute to a higher income generation?
		Improved revenue	Does the ERP contribute to a higher revenue?
		Improved product quality	Does the ERP improves the product quality?
		Improved reputation	Does the ERP increase the reputation of the organization?
		Improved profit	Does the ERP contribute to higher profit?
		Increased market share	Does the ERP increase the market share?
		Improved sales	Does the ERP increase sales revenues?

6.6. Appendix 6. Information letters

6.6.1. Meta-plan workshop

Geachte heer / mevrouw,

We vragen u om deel te nemen aan een focusgroep in het kader van een wetenschappelijk onderzoek uitgevoerd binnen de opleiding Business Process Management & IT aan de Open Universiteit. Deelname is vrijwillig. Om u te kunnen laten deelnemen, hebben we uw schriftelijke toestemming nodig door middel van ondertekening van deze brief.

1. Doel van het onderzoek

Het doel van het onderzoek is om te bepalen met behulp van welke criteria achteraf de succesvolheid van een ERP-implementatie bepaald kan worden.

2. Doelstelling van de focusgroep

Er is door de onderzoekers reeds vooronderzoek gedaan naar succescriteria door middel van literatuuronderzoek. Dit heeft bij elk van de onderzoekers geleid tot een lijst aan succescriteria. De doelstelling van de focusgroep is om vanuit deze verschillende resultaten te komen tot een universele samengestelde lijst. Hierbij dient het juiste abstractieniveau voor deze samengestelde lijst bepaald te worden en zullen de diverse criteria beoordeeld worden op geschiktheid. Het resultaat zal een uniforme lijst zijn die in het vervolgonderzoek gebruikt worden door de onderzoekers.

3. Wat betekent deelname en wat wordt er van u verwacht?

U bent gevraagd om deel te nemen aan de focusgroep, omdat u kennis heeft wat een ERP implementatie inhoudt en u bekend bent met succescriteria die succes achteraf kunnen bepalen.

De focusgroep bijeenkomsten zullen via online tooling plaatsvinden (Microsoft teams). Twee overleggen zijn reeds gepland:

- Dinsdag 22 februari – 19.00 - 21.00 uur
- Dinsdag 1 maart – 19.00 - 21.00 uur

De eerste sessie zal gebruikt worden voor het wegnemen van redundantie in de modellen die door de onderzoekers reeds zijn vastgesteld. Daarnaast dient er bepaald te worden op welk abstractieniveau de succescriteria uitgevraagd kunnen gaan worden in interviews.

De tweede sessie zal gebruikt worden om de criteria vast te stellen die bevraagd kunnen gaan worden in interviews en tevens hoe deze criteria het beste bevraagd kunnen worden. Deze sessie vereist van alle deelnemers een voorbereiding om de succescriteria door te nemen en deze zelfstandig te beoordelen zodat deze tijdens de sessie besproken kunnen worden. De verwachting is, dat deze voorbereiding ongeveer een uur tijd zal kosten.

4. Mogelijke voor- en nadelen

Het voordeel van deelname is dat u een bijdrage kunt leveren aan wetenschappelijk onderzoek en dat uw expertise hierin meegenomen kan worden. Tevens is dit een mogelijkheid om kennis uit te wisselen met andere experts binnen het vakgebied. Een mogelijk nadeel kan de gemoeide tijdsinvestering zijn van twee keer 2 uur en de voorbereidingstijd die wij vragen voor de tweede sessie.

5. Als u niet wilt deelnemen of wilt stoppen met het onderzoek

U beslist zelf of u meedoet aan het onderzoek. Deelname is vrijwillig. Als u niet wilt deelnemen heeft dat geen nadelige gevolgen voor u. Als u wel meedoet, kunt u zich altijd bedenken en toch stoppen, ook tijdens het onderzoek. U hoeft niet te zeggen waarom u stopt. De gegevens die tot dat moment zijn verzameld, mogen worden gebruikt voor het onderzoek, tenzij u ervoor kiest om ook de gegevens die u hebt verstrekt, in te trekken.

6. Einde van het onderzoek

Uw deelname aan het onderzoek eindigt wanneer de focusgroep discussie stopt. Het hele onderzoek is klaar als alle deelnemers klaar zijn. Na verwerking van de focusgroep gegevens zullen de uitkomsten met u worden gedeeld indien gewenst.

7. Gebruik en opslag van uw gegevens

Voor dit onderzoek worden geen persoonlijke gegevens verzameld, gebruikt en opgeslagen. We gebruiken uw gegevens slechts bij het plannen van de bijeenkomsten.

8. Vertrouwelijkheid van uw gegevens

De bijeenkomsten worden opgenomen. Om uw privacy te beschermen, zullen de opnames worden verwijderd nadat de onderzoeksresultaten verwerkt zijn. Tevens zullen eventuele persoonsgegevens worden verwijderd. Alleen de onderzoekers en eventueel de directe afstudeerbegeleider hebben toegang tot de informatie tijdens het onderzoeksproces.

9. Meer informatie over uw rechten bij de verwerking van gegevens

Voor algemene informatie over uw rechten bij de verwerking van persoonsgegevens kunt u de website van de Autoriteit Persoonsgegevens raadplegen. De privacy disclaimer van de Open Universiteit is te vinden op www.ou.nl/privacy.

10. Heeft u vragen?

Als u vragen heeft, neem dan contact op met één van de onderzoekers.

11. Ondertekening van het toestemmingsformulier

Wanneer u voldoende bedenktijd heeft gehad, wordt u gevraagd te beslissen over deelname aan dit onderzoek. Door uw schriftelijke toestemming geeft u aan dat u de informatie heeft begrepen en instemt met deelname aan het onderzoek. Zowel uzelf als de onderzoeker ontvangen een getekende versie van deze toestemmingsverklaring.

Naam deelnemer:
……………………………………………………………………………………………………
…………………

Datum: ……………. - ……………….. - ………………

Handtekening:

6.6.2. Interview

Geachte heer / mevrouw,

U bent gevraagd om deel te nemen aan een wetenschappelijk afstudeeronderzoekonderzoek: Het bepalen van succes van een afgerond ERP-implementatie aan de hand van criteria. Deelname is vrijwillig. Om u te kunnen laten deelnemen, hebben we uw schriftelijke toestemming nodig. Voordat u beslist of u wilt meedoen aan dit onderzoek, krijgt u uitleg over wat het onderzoek inhoudt. Lees deze informatie rustig door en vraag de onderzoeker uitleg als u vragen heeft.

1. Doel van het onderzoek

Het doel van het onderzoek is om te bepalen met behulp van welke criteria achteraf de succesvolheid van een ERP-implementatie bepaald kan worden.

2. Achtergrond van het onderzoek

Hoe kunnen we achteraf bepalen of een ERP-implementatie een succes was of niet? Om dit te kunnen bepalen zijn criteria nodig en een meetinstrument. Met deze kennis kan de wetenschap vooruit, maar ook de praktijk. Daarom is voor dit onderzoek eerst literatuuronderzoek uitgevoerd. In het literatuuronderzoek kwamen diverse criteria naar voren, echter is er nog te weinig bewijs uit de praktijk of deze criteria juist en volledig zijn.

3. Wat betekent deelname en wat wordt er van u verwacht?

U bent gevraagd om deel te nemen aan een interview t.b.v. het eerder genoemde wetenschappelijk afstudeeronderzoek, omdat u kennis heeft over ERP-implementaties. Wij willen u verzoeken om voor aanvang van het interview kennis te nemen van de definities zoals genoemd in bijlage 1 van dit document. Voor het interview is anderhalf uur ingepland. Het interview zal plaatsvinden via Microsoft Teams. Hiervoor heeft u reeds een uitnodigingsmail met een link ontvangen. Het interview zal ook worden opgenomen via Teams. De onderzoeker zal tijdens het interview de rol van interviewer aannemen. Na een korte inleiding zal de interviewer u vragen stellen over uw ervaring met succescriteria aan de hand van voorbeelden uit de praktijk. Daarna zal de interviewer reeds gevonden criteria uit het literatuuronderzoek met u doornemen en bevragen.

4. Mogelijke voor- en nadelen

Het voordeel van deelname is dat u een bijdrage kunt leveren aan wetenschappelijk onderzoek en dat uw expertisen hierin meegenomen wordt. Tevens zal de uitkomst van dit onderzoek met u gedeeld worden. Dit zal mogelijk kunnen leiden tot nieuwe inzichten met betrekking tot uw werk. Een mogelijk nadeel kan de gemoeide tijdsinvestering zijn.

5. Als u niet wilt deelnemen of wilt stoppen met het onderzoek

U beslist zelf of u meedoet aan het onderzoek. Deelname is vrijwillig. Als u niet wilt deelnemen heeft dat geen nadelige gevolgen voor u. Als u wel meedoet, kunt u zich altijd bedenken en toch stoppen, ook tijdens het onderzoek. U hoeft niet te zeggen waarom u stopt. De gegevens die tot dat moment zijn verzameld, mogen worden gebruikt voor het onderzoek, tenzij u ervoor kiest om ook de gegevens die u hebt verstrekt, in te trekken.

6. Einde van het onderzoek

Uw deelname aan het onderzoek eindigt na afloop van het interview. Het hele onderzoek is afgerond wanneer alle deelnemers geïnterviewd zijn en de gegevens zijn verwerkt. Na verwerking van alle gegevens informeert de onderzoeker u over de belangrijkste resultaten van het onderzoek. Dit gebeurt ongeveer twee tot drie maanden na uw deelname.

7.   Gebruik en opslag van uw gegevens

Voor dit onderzoek worden persoonlijke gegevens verzameld, gebruikt en opgeslagen. Het gaat hier om uw naam bij het ondertekenen van dit formulier en om informatie over in welke mate u aan de deelnemerseisen heeft voldaan. Het verzamelen, gebruiken en bewaren van uw gegevens is noodzakelijk om de vragen die in dit onderzoek worden gesteld te kunnen beantwoorden. De resultaten van het onderzoek worden gedeeld met de afstudeerbegeleiders. De gegevens die worden gedeeld, bevatten geen informatie die tot u of uw organisatie herleidbaar is. Daarnaast zijn gegevens die gebruikt worden in rapporten en publicaties die betrekking hebben op het onderzoek niet tot u of uw organisatie te herleiden.

8.   Vertrouwelijkheid van uw gegevens

Om uw privacy te beschermen, krijgen uw gegevens een code. Uw naam en andere gegevens die u onmiddellijk kunnen identificeren, worden weggelaten. Uw gegevens worden op deze manier gecodeerd. De sleutel van de code wordt veilig opgeslagen door de onderzoeker. Alleen de onderzoeker en de directe afstudeerbegeleider hebben toegang tot de niet versleutelde informatie. Daarnaast zal het interview door de standaard opname functionaliteit van Microsoft Teams worden opgenomen. De opname is alleen bestemd voor de onderzoeker voor het transcriberen van het interview en zal direct nadat het transcriberen is uitgevoerd worden verwijderd.

9.   Toegang tot uw gegevens voor controle

Om te kunnen beoordelen of deelnemers aan het onderzoek op een juiste manier zijn geïnformeerd kunnen leden van een visitatiecommissie inzage krijgen in dit ondertekende informatieblad. Om het verloop van het onderzoek te beoordelen krijgt de begeleidend docent inzicht in het transcript.

10.   Bewaartermijn gegevens

Uw (geanonimiseerde) gegevens moeten 10 jaar worden bewaard door de Open Universiteit.

Meer informatie over uw rechten bij de verwerking van gegevens: Voor algemene informatie over uw rechten bij de verwerking van persoonsgegevens kunt u de website van de Autoriteit Persoonsgegevens raadplegen. De privacy disclaimer van de Open Universiteit is te vinden op www.ou.nl/privacy.

11.   Vragen?

Mochten er nog aanvullende vragen zijn met betrekking het bovenstaande neem dan contact op met de onderzoeker.

12.   Ondertekening van het toestemmingsformulier

Wanneer u voldoende bedenktijd heeft gehad, wordt u gevraagd te beslissen over deelname aan dit onderzoek. Door uw schriftelijke toestemming geeft u aan dat u de informatie heeft begrepen en instemt met deelname aan het onderzoek.

Naam deelnemer: ………………………………………………………..…………………….…………..... Datum: ……-……-…………

Functie:……

Handtekening:

……

Bijlage 1

Belangrijke begrippen en extra toelichting

Voor dit onderzoek is het van belang dat de juiste terminologie wordt gebruikt en dat hierover geen verwarring ontstaat. Er is namelijk al veel onderzoek gedaan naar informatiesystemen en kritieke succesfactoren, echter in dit onderzoek gaat het om implementaties van ERP systemen en succes criteria. Daarom hieronder de verschillende definities van de begrippen, zoals ze in dit onderzoek worden gebruikt.

ERP systeem: een informatiesysteem waarin bedrijfsinformatie is geïntegreerd.

Succes criteria: Criteria waarmee succes gemeten kan worden, nadat het traject is afgerond. Dit kan gezien worden als een gevolg van succes (of geen succes).

Kritieke succes factor: Een factor die het succes beïnvloed tijdens het traject. Dit kan meer gezien worden als een voorwaarde voor succes.

6.7. Appendix 7. Interview questions

Intro

Zoals ook beschreven in de informatiebrief, heeft dit onderzoek als doel te ontdekken met welke criteria achteraf het succes van ERP-implementaties bepaald kan worden. Hierbij heeft reeds een literatuuronderzoek plaatsgevonden waaruit een aantal modellen met criteria naar voren zijn gekomen. Deze wil ik graag verifiëren met u tijdens dit interview, om zo te kijken of deze ook in de praktijk als relevant beschouwd worden en of deze compleet zijn. Dit interview zal starten met enkele praktische en inleidende vragen en daarna worden de reeds gevonden succescriteria doorlopen.

Adjustments after test interview:
- The concepts that were described in the information letter should be verified during the interview. Especially the difference between critical success factors and success criteria should be pointed out.
- It has to be explicitly told to the respondent that he or she is questioned as an expert on their discipline and not specifically in the light of a specific ERP implementation they were part of.
- The success criteria in the mid-term tend to run together, this should be taken into account when discussing these criteria.
- During the interview, it helps the respondent to receive handles from the interviewer when he or she cannot come up with their own example for a specific criterion.

Start met de opname

Voordat we beginnen, allereerst een aantal praktische vragen:

- Was het toestemmingsformulier duidelijk?
- Heeft u nog vragen omtrent het onderzoek voordat we beginnen?
- Zijn de begrippen u hele maal duidelijk zoals beschreven in de informatiebrief?
    - o Indien ja, doorgaan naar de criteria vragen
    - o Indien nee, toelichting geven

Algemeen:
U doet mee aan dit onderzoek omdat u een rol heeft (gehad) in één of meerdere ERP implementaties. Voordat we de verschillende dimensies gaan bespreken ben ik benieuwd naar wat volgens u criteria zijn om succes van ERP implementaties achteraf te bepalen. Met andere woorden, waaruit blijkt nou achteraf dat de ERP implementatie een succes is?
Dat mag betrekking hebben op [project X], maar ook op andere implementaties waar u bij betrokken geweest bent.

- Wat zijn volgens u criteria om succes te bepalen nadat een ERP-implementatie is afgerond?
- Waarom? (per criterion)
- Kunt u daar voorbeelden van geven? (per criterion)

Per succesdimensie:

Short term success

Hier eerst even een bruggetje maken naar: U heeft nu 'x' gezegd, dat is een onderdeel waar ik zo meteen graag nog op terug kom bij de dimensie 'z'.
Ik wil nu graag met u aan de hand van negen succesdimensies gaan bespreken in hoeverre deze relevant zijn, in uw optiek, om het succes van de ERP implementatie achteraf te kunnen bepalen.

- **Project scope** (uitleggen wat dit inhoudt), is dit duidelijk wat hiermee wordt bedoeld?

This includes every success criterion that belongs to the evaluation of the ERP implementation project. This includes the time period from the start of the project until the final termination of the ERP implementation, right after the aftercare period.

  - Wat vindt u, hoort deze bij de succescriteria?
  - Waarom?
  - Kunt u daar een voorbeeld van geven?

Medium term success

- **User experience** (uitleggen wat dit inhoudt), is dit duidelijk wat hiermee wordt bedoeld?

This includes all criteria that belong to the experience of the people that will be using the new implemented ERP system. NB: Deze is dus meer KWALITATIEF, wat vindt men er van?

  - Wat vindt u, hoort deze bij de succescriteria?
  - Waarom?
  - Kunt u daar een voorbeeld van geven?

- **Usage** (uitleggen wat dit inhoudt), is dit duidelijk wat hiermee wordt bedoeld?

This includes all criteria that tell something about the actual use of the ERP system, based on more quantitative data. NB: Deze is dus meer KWANTITATIEF, hoe veel gebruikt men het?

  - Wat vindt u, hoort deze bij de succescriteria?
  - Waarom?
  - Kunt u daar een voorbeeld van geven?

- **Information** (uitleggen wat dit inhoudt), is dit duidelijk wat hiermee wordt bedoeld?

This includes all criteria that tell something about the quality of the information that derives from the system.

  - Wat vindt u, hoort deze bij de succescriteria?
  - Waarom?
  - Kunt u daar een voorbeeld van geven?

- **Infrastructure** (uitleggen wat dit inhoudt), is dit duidelijk wat hiermee wordt bedoeld?

this includes all criteria that tell something about the quality of the infrastructure of the ERP from a more technical approach.

- Wat vindt u, hoort deze bij de succescriteria?
- Waarom?
- Kunt u daar een voorbeeld van geven?

- **Service** (uitleggen wat dit inhoudt), is dit duidelijk wat hiermee wordt bedoeld?

this includes all criteria that tell something about the quality of the service staff and IT-consultants towards the end users of the ERP.

- Wat vindt u, hoort deze bij de succescriteria?
- Waarom?
- Kunt u daar een voorbeeld van geven?

- **System** (uitleggen wat dit inhoudt), is dit duidelijk wat hiermee wordt bedoeld?

this includes all criteria that belong to the quality of the ERP system itself, form a more functional perspective.
- Wat vindt u, hoort deze bij de succescriteria?
- Waarom?
- Kunt u daar een voorbeeld van geven?

Long term success

- **Internal business value** (uitleggen wat dit inhoudt), is dit duidelijk wat hiermee wordt bedoeld?

this includes all criteria that tell something about added value to the organization from a process improvement perspective.

- Wat vindt u, hoort deze bij de succescriteria?
- Waarom?
- Kunt u daar een voorbeeld van geven?

- **External business value** (uitleggen wat dit inhoudt), is dit duidelijk wat hiermee wordt bedoeld?

this includes all criteria that tell something about the added value to the organization from a financial and strategic perspective.

- Wat vindt u, hoort deze bij de succescriteria?
- Waarom?
- Kunt u daar een voorbeeld van geven?

Afsluitende vragen:

We hebben nu negen criteria besproken om achteraf succes te kunnen bepalen van ERP implementaties.

- Heeft u het idee dat deze negen criteria alles omvatten?
  - Zo nee, wat mist u nog?
  - Zo ja, welke? (Heeft u hier ook voorbeelden bij vanuit de praktijk?)
  - Waarom?
- En afsluitend, heeft u in het algemeen nog iets toe te voegen over dit interview?

Stop met de opname

<u>Afronding (buiten opname)</u>

- Hoe heeft u het interview ervaren?
- Heeft u verder nog vragen over het verloop van het onderzoek?
- Wilt u op de hoogte gehouden worden van de resultaten van het onderzoek?

6.8. Appendix 8. Requirements/Overview of the respondents

6.8.1. Meta-plan workshop

Requirements:

The participants of the meta-plan workshop should meet the following requirements:

- They should be considered as a subject matter expert on the topic of ERP success. This means that they studied the topic on a scientific level for at least three months, this indicates that they have studied a significant amount of relevant literature and are familiar with different models for ERP success that derive from the existing body of knowledge.
- They should all be familiar with the terminology within the domain of ERP implementations and Business and IT in general.
- They should be available to participate in at least two sessions and able to prepare for the second session, this preparation should take a maximum of two hours.

Respondent	Research role	Studied topic at least 3 months	Familiar ERP/business terminology	Available for 3 sessions
1	BPMIT master student	Yes	Yes	Yes
2	BPMIT master student	Yes	Yes	Yes
3	BPMIT master student	Yes	Yes	Yes
4	BPMIT master student	Yes	Yes	Yes
5	BPMIT Teacher/researcher	Yes	Yes	No (only 2)

Moderator	Business role	Experience in leading sessions	Familiar with ERP concepts	Available for 3 sessions
1	Scrum master	Yes	Yes	Yes

6.8.2. Interviews

Requirements:

The respondents should meet the following requirements

- They should at least have 5 years of experience in the ERP business, this will determine a certain level of experience and knowledge about ERP implementations which is required to extract relevant information for this study.
- They should be actively involved in a recently completed (2-5 years) ERP implementation to make sure that their experience and knowledge are not outdated.
- They should be available for 1.5 hours during the study.

Respondent	Business role	5 years ERP experience	Involved in recent implementation (2-5 years)	Available 1.5 hours
1	ERP consultant (external)	Yes	Yes	Yes
2	CEO (interal)	Yes	Yes	Yes
3	Project manager (external)	Yes	Yes	Yes
4	ERP consultant/developer (external)	Yes	Yes	Yes
5	ERP developer (internal)	Yes	Yes	Yes
6	Project manager (external)	Yes	Yes	Yes

6.9. Appendix 9. Coding of the interviews

Criterion	Axial code	Open code	Relev.	Resp.	Text fragment(s)
Project	Project phase relevant **MIXED OPINIONS**	Success NOT visible during project execution/delivery	n	1	"Nou, dan zeggen we eigenlijk van aanvang tot aan het moment van dat het project is opgeleverd en dat je dan succes hebt. Je weet niet of het succesvol is, denk ik."
		Success visible during project execution/delivery	y	3	"je dat vooraf hè, dus goed dat valt dan ook wel binnen de scope van het project natuurlijk, de opstartfase van een project, daarin kun je al vaak afmeten of proeven (…) daarmee heb je al wat heb je al wat ja succes criteria dimensies te pakken waarin je kunt aanvoelen van gaat dit de goede kant op."
				4	"hoe stabiel het is of er veel fouten naar voren komen in het begin en of er nog veel werk gedaan moet worden of dat het gewoon in één keer staat als een huis dat is natuurlijk ook heel bepalend voor je succes"
				5	"En ze minimaal hetzelfde moeten kunnen met het systeem als ze al die jaren daarvoor hadden kunnen doen, dus daar was en het beginstadium volledig op gestuurd en op korte termijn om het doel halen. En dat doel is uiteindelijk ook gehaald. En daarmee is ook een Ja mee dat resultaat behaald op die korte termijn."
	Met organizational objectives	Expectation management during project	y	4	"als je duidelijke verwachtingen hebt van tevoren en iedereen is zit op een pagina zeg maar over wat er gaat gebeuren en wat er wel en niet bij hoort en als je daar dan aan het einde aan voldoet dan denk ik wel dat dat een indicatie is voor hoe succesvol project is geweest"
				5	"En het is natuurlijk een heel groot stuk verwachtingsmanagement …dus als dat aan de voorkant al niet goed zit dan is het natuurlijk ja dan zal die persoon die zes weken dacht en het duurt twee jaar die zal het nooit als succes gaan zien"
	Conformance to functional and technical specifications	Technical specifications and clear expectations required	y	1	"Technische specificaties (…), ja het kan wel succes zijn, kan wel bepalend zijn voor het succes."
				2	" Je bedoelt of in de voorbereiding de documentatie de wensen goed vastgesteld zij? Ja, ja je zal een globale structuur en een structuur moeten definiëren je kan natuurlijk niet out of the blue een systeem gaan bouwen"
		Comformance to requirements	y	5	"je hebt een aantal factoren die verwacht worden door een gebruiker dat je systeem aan voldoet. Als je daar niet aan voldoet, dan weet je zeker dat het een negatieve impact heeft, dus die moet je aan voldoen (…)"
	Well defined and documented **NOT**	Extensive documentation NOT relevant for success	n	1	"Uitgebreide documentatie (…)Het is misschien wel de minst belangrijke en die eerste die je noemde zal altijd op de tweede plaats staan."
				4	"je kunt best wel een succesvolle applicatie hebben waarbij geen documentatie van is, dat en soms heb je ook dat van tevoren echt alles vastgelegd is wat er moest gebeuren maar gaandeweg dat toch weer losgelaten wordt en niet bijgehouden wordt en dan kun je wel hele mooie documentatie in specificaties hebben maar staat er een compleet andere applicatie dus nee dat zegt niet perse wat."
				5	"Je kunt er succes uit aflezen maar het is dus niet altijd noodzakelijk? (…)Zeker, Ja dat klopt ja, want Ik denk dat <company 1> voorbeeld is waarin het niet werkt om requirements heel uitgebreid van Tevoren te beschrijven."
	Within budget – schedule – scope **COMBI**	Interaction between budget scope and schedule	y	1	"Ik denk als iets uit budget loopt, dat het nog steeds een succes zou kunnen zijn. Als het uit scope loopt, kan het ook nog zeker een succes zijn. En als dat planning is, eigenlijk ook wel (…) "Jij bedoelt dat een grijs gebied is van wanneer het, wanneer het positief bijdraagt aan het succes of negatief bijdraagt aan succes, dat is wat jij bedoelt? (…) Oké, dat denk ik zeker"

				3	", dus is de tijdsfactor, is die in combinatie met budget of niet? (…) dat soort vraagstukken, dus je ziet altijd wel die afhankelijkheid met elkaar."
				4	"Dus ik denk niet dat je per definitie kan zeggen dat het binnen budget scope en planning blijven dat betekent dat het succesvol is, ja maar er zijn natuurlijk wel goede in indicaties om mee te nemen"
		Iron triangle dependant on size of company	y	5	"Dat de kleine klanten, die zullen dan veel harder op sturen en dan wat grotere klanten die zien. Meer belangen en jullie kijken verder vooruit. Ja dus, die hebben ook ervaring met grote projecten Aan weten dat het niet altijd goed is om volledig te sturen op een budget."
		Scope of project connected to way of working	y	2	"(…) als je nu praat over het operationeel brengen van je ERP pakket, ja, wil je zo dicht mogelijk bij je bestaande werkwijze blijven en dat kon <company2> ons bieden op dat moment hè dus ja, ik denk wel dat dat een belangrijke factor geweest is."
		Risk of scope that is too large	y	2	"Een andere risicofactor wat ik zou willen zeggen voor implementatie van het ERP systeem is, ja als je iedereen bij elkaar gaat roepen en zegt van, nou we moeten naar een ander ERP systeem, dan zijn de mensen geneigd om te zeggen van nou dat moet een soort alomvattend systeem zijn (…) kunt ook anders benaderen door te zeggen van nou we knippen een aantal dingen op"
	Stakeholder satisfaction	Create element of surprise/unexpected/Wow factor NEW	y	2	"Ja, in theorie wel hè want dan heb je voldaan aan de van tevoren gestelde grenzen, dus ja in theorie kun je dat dan afvinken, zeg je van nou het is een succes maar je wil je wil eigenlijk meer hè, je wil je wil eigenlijk een soort, eigenlijk wil je een soort, je wilt situaties creëren waarin mensen verrast worden wat je van tevoren eigenlijk niet had gedacht dat dat mogelijk is"
				5	" (…) pak in ieder geval een wow factor mee waarmee je de hele mindset van zou gebruiken eigenlijk al veel positiever kan krijgen (…)Dan krijg je nooit die die mega positieve reactie die zij uiteindelijk voor zichzelf ook zullen bepalen als een succes."
		Satisfaction not a goal in itself	n	2	dus als het gaat over tevredenheid dat moet geen doel zijn op zich dat je de mensen tevreden maakt (…)in de theorie klinkt het goed van ja je moet dus de gebruikers allemaal dat ze allemaal happy worden maar dat is ook niet zo."
		Satisfaction of management	y	5	"Als het er eenmaal is? Dus niet per se de gebruikers. Hoe die? Tevreden ermee zijn maar ook ook het management (…) Ik denk wat Natuurlijk wel criterion stakeholder satisfaction, die is ook vrij breed. Zou die daarbij passen misschien? (…) Jazeker."
				6	"Ja zeker kun je daar iets over afleiden die zin van Er zijn bepaalde doelen die bijvoorbeeld een directie nodig heeft"
				6	"Ja dus in die zin zou je kunnen zeggen, Als je dat heel goed gedaan hebt en je heb het MT overtuigd, Dat het dan eigenlijk ook een succes is? (…) Klopt ja."
	Fit between business processes and ERP	Coveres (all) core business processes for several deparments	y	1	"Alles wat je dagelijks nodig hebt of wekelijks maandelijks of zo dat zou daar inclusief moeten zijn"
				2	" (…) dat er geen parallelle processen zijn die eigenlijk in het ERP systeem uitgewerkt worden waardoor die controle van de ene afdeling naar de andere een sluitend systeem is dat dat is ook een belangrijk criterion"
				4	"ik denk elk bedrijf heeft natuurlijk zijn kernprocessen zeg maar, de dingen die voor hun het meest belangrijk zijn of eigenlijk zou iets stellen denk ik als dit proces wegvalt kunnen wij niet meer functioneren. Als het ERP die processen ondersteunt dan ben je een heel eind op weg."
				5	

					"Maar je zou natuurlijk een aantal basisbegrippen van de ERP systeem kunnen benoemen. Ja, want dan kom je vaak niet verder dan verkoop inkoop productie, noem maar op."
	Stakeholder involvement **WAS ELIMINATED**	Stakeholders should be reflection of organization	y	3	"stakeholders, die vanuit de organisatie natuurlijk een afspiegeling moeten zijn van de mensen die daar mee gaan werken en zijn zij in staat geweest om die verwachtingen vooraf ook te vertalen naar uiteindelijk de eind applicatie"
				6	"Als je in Het begin van een project Die infrastructuur afdeling erbij kunt betrekken en ook constant betrokken kunt houden, Dat de belangen allemaal Afgestemd zijn dat je Samen met ons succes kunt komen"
		Common goal	y	4	"Ja, zeker helemaal als je te maken hebt met verschillende afdelingen (…)Ja ik denk dat een zeker besef van een gezamenlijk doel wel essentieel is ja"
		Decision making power	y	4	"Als het niet lukt om de hele ja stakeholdergroep op één lijn te krijgen dan moet je in ieder geval iemand daarboven hebben staan die gewoon kiest (…)ik denk dat je hem wel om kan draaien dat je na afloop dat wel kan gebruiken om te bepalen of het of misschien zelfs als je weet dat het niet succesvol is dat je dan wel terug kan redeneren van het was minder succesvol omdat daar niet aan voldaan is nou dat denk ik wel."
		Commitment during the project	y	3	"Dat is ook wel een beetje denk ik het doel tijdens zo'n proces hè, dat dat dat commitment zien te zien te bereiken aan de voorkant dat helpt je gedurende project om succesvol een applicatie te maken. (…) en als je dat hebt bereikt dan dat is één van de van de succescriteria denk ik of misschien wel een kritieke succes criteria dan die zin."
User Experience	Enjoyment by users	Users enjoy working with the system	y	2	"Ja misschien wat ik nog mis van is van, misschien heb je het wel genoemd hoor, in hoeverre de mensen ook gewoon plezierig vinden om daarmee te, werken gewoon het gewoon het de lol van"
				3	"Ze hebben, maar dat is wel wat dat is wel wat ik meekrijg hoor dat mensen blij zijn dat ze met een applicatie werken die uit die eindelijk wel doet wat ze willen"
				4	"Nou ja enthousiasme denk ik van mensen die dit zien wat er gemaakt wordt wat er ontstaat, ik denk dat enthousiasme een hele belangrijk is"
				6	"OK dan is er nog eentje die er nog niet ja je noemde net. Ik hoorde jou zeggen dat er een lach op het gezicht van mensen zit. Mag ik daarmee concluderen dat dat relevant is? (…) Zeker? Absoluut, ja"
	Ease of use/learning/intuitiveness **COMBI**	System should be easy to use and easy to learn	y	3	"Je kan wel heel mooi op ERP systeem hebben wat precies doet wat het moet doen, maar als je eerst door dertig pagina's handleiding heen moet, maar goed dan heb je je voorgaande succescriteria ook al niet te pakken"
				4	"(…)maar meer van dat dat de gebruikers ook weten hoe ze bepaalde dingen moeten doen dus dat het eigenlijk voor zich spreekt. Dan zal je gebruiksgemak maar wel dat dat ze niet plotseling iets op een hele andere manier moeten gaan doen."
				4	(…) maar ook inderdaad het gebruiksgemak én de flow denk ik ook die in een applicatie zit dus de logische opbouw en dat eigenlijk iemand die nieuw erbij komt dat die ook moet snappen wat hij moet doen zonder al te veel hulp"
				5	In combinatie met het trainen, denk ik. Dus het systeem moet intuïtief werken en waar dat niet voldoende is, moet dat getraind worden."
				6	"Dat relevant is absoluut ja, een systeem moet Ja zo intuïtief mogelijk zijn het beste zal zijn als een proces Zonder uitleg gebruikt kan worden, dus dat het zelflerend zelfsturend, dus Het is niet altijd mogelijk, maar als dat kan, is dat een."

		Ease of entering data by users	y	3	Dat is dan een beetje de link die ik dan gelijk leg, dat je in je ERP alle data die je kwijt wil daar in kwijt kan. En dus dat is en dat daar dan de belangrijkste factor, maar het gemak ervan dat ligt meer aan users experience kant dan, hoe eenvoudig kan je het inbrengen die die informatie.
	Effectiveness/efficiency for users **COMBI**	System is effective for users	y	4	"Ja ik denk dat een ERP echt succesvol is op het moment dat het dagelijks werk van de medewerkers en makkelijker door wordt."
	System task orientation for user's work	System should match with user processes/tasks	y	1	"Ja en dan is intuïtief ook nog wel een beetje, bij het proces van de organisatie."
				3	"dan is het vanuit de gebruiker niet succesvol, dus wat is de vertaalslag tussen enerzijds het proces en anderzijds het gebruik, daar moet je de succesfactor zien te vinden ja."
				4	"In hoeverre het het dagelijks van ja, hoe noem je dat, het dagelijks draaien zeg maar van zo'n bedrijf ook daadwerkelijk ondersteund wordt door datgene wat geïmplementeerd is dus dat het echt daadwerkelijk ondersteunend is in de dagelijkse werkzaamheden"
				5	"het is meer dat denk ik dat de bedrijfsprocessen goed ondersteund worden ik denk dat dat het belangrijkste is."
	Interface (look and feel)	Functionality over looks	y	4	"Nee ik denk dat ze het zo'n ding over van function over looks. Wat denk dat dat bij ERP wel echt geldt dat hoe het werkt gewoon belangrijker is, dan hoe het eruit ziet ja."
		Look and feel is absolutely relevant	y	6	"(…) look and feel van Het ERP, dus dat het ja dat het er mooi uitziet dat het er goed uitziet, ja Is dat relevant? (…) Absoluut relevant. (…)Dat is zeker Een criteria voor de beleving, ja"
Usage	Personal value of the system	Possibility to bring in new ideas for process improvement	y	1	"En als zij zelf met goede ideeën komen hoe iets in het proces verbeterd zou kunnen worden, dat ze dat gewoon terug kunnen zien, en daarmee wordt de acceptatiegraad van het ERP systeem gewoon veel makkelijker, en kan het zo veel succesvoller zijn."
	Actual use	The extent to which workarounds are used/Excel	y	1	"Ja ik denk dat het niet succesvol is als jij nog allerlei Excelsheets er naast moet gaan houden omdat het systeem niet bijhoudt wat jij zou willen bijhouden of niet teruggeeft wat je zou willen zien."
				2	"dus dat dus dat vind ik een tweede succes criterion is het en ook een sluitend systeem zodat mensen niet meer daarnaast nog op Excel sheets buiten systeem om dingen regelen of organiseren."
				3	"dat dat dat mensen gewoon zeggen van nou leuk dat ERP maar qua gebruik is het zo onhandig ik ga het met Excel doen (…) dan zeg je van nou ik heb vooraf bedacht en we gaan tien duizend gebruikers van werken en na een jaar werken ze allemaal nog mee ja, dan is dan kun je dat wel als succesfactor succes criteria hanteren ja. Ja dus de afhakers de mate van afhaking, zegt iets over het succes van de middellange termijn."
				4	"als de gebruikers zelf een andere manier van werken gaat bedenken met het systeem dan dat van tevoren bedacht is, dat ook niet echt een goed teken van de user experience"
				5	"Dan worden ze vaak heel creatief met Excelletjes eromheen of (…)is eigenlijk zeker als die als dat eigenlijk wel ondersteund had moeten zijn met je op systeem dat doel was. En dan is het toch wel iets mis gegaan."
				6	"Is het zo dat een gebruiker gaat teruggrijpen naar workaround, dan betekent dat die niet goed is verwerkt in de oplossing, Dus ja is absoluut een succescriteria. Ja."
	Recurring use/intention to (re)use	Usage statistics relevant	y	1	"Ja dat denk ik eerder, clicks vind ik een beetje te, hoeveel mensen er dagelijks ingelogd zijn ja dat zal wel een heel belangrijk criterion kunnen zijn."
				4	"AI tracking en dat soort zaken om te bepalen hoe succesvol zeg maar hoe goed een bepaald onderdeel van die website

Category	Theme	Code		#	Quote
					"aanslaat en dan kan je ook precies zien dat het aantal clicks of weet je wel bij \<company3\> van hoeveel gebruiken mensen de filters en hoeveel gebruiken ze de categorieën daar is echt het big data concept wel van toepassing denk ik."
				6	"Ja je kan meer meten is als jij je je ERP systeem zeg maar geconfigureerd hebt en je hebt met zijn allen bepaalt dit gaan we gebruiken (…)Dat zegt denk ik niet zoveel iets maar meer dat het überhaupt gebruikt wordt, zegt natuurlijk wel wat."
		Usage statistics NOT relevant	n	6	"Nou aan te bekijken is iemand wel ingelogd, want je weet nog niet precies wat hij aan het doen is of het Wel goed gebruikt of Dat er Misschien toch ontevredenheid is Omdat het niet helemaal aansluit."
	Extend of use	Extend of use	y	6	"Als het lukt om daar meer gebruikers groepen In te trekken dus dat meer gebruikers groepen het systeem gaan gebruiken. Dat vind ik een heel erg groot succes"
Information	Usability of the information	New insights based on data	y	1	"Als je op onverwachte momenten toch dingen kunt herleiden of kunt bepalen aan de hand van je data."
				6	"Of jouw prijs bepalingen goed is, Je kunt dat Echt heel goed Gebruiken en Bekijken en dan op die manier naar toekomst die prijs bepalingen beter af te wegen"
		Information is usable on the longer term	y	1	"Input informatie (…) nou als je daar goed over nagedacht hebt en het is ook houdbaar op langere termijn, dan is het zeker een bijdrage aan succes want dan weten ze dat je het goed gedaan hebt."
	Data currency of the system	Valueable data	y	1	"Ja volgens mij is het heel belangrijk en je kunt toch goed op inspelen als die data, die blijft gewoon schoon en waardevol ja dan heb je succes."
				4	"hoeveel van onze productie gaat te langzaam of lopen we vertraging op waardoor komt dat dan of dat perse, en succescriteria is ik denk dat het wel eens zou kunnen zijn maar niet altijd."
		Currency of the data	y	2	"Currency of the data in the system (…) is dat relevant? (…) Ja absoluut"
				6	"Waarde van data (…) Een deel daarvan past zeker ja (…)Ja, er staat ook een financiële waarde aan vast."
	Comprehensibility of the data	Decisions and operations are more data driven, required data available	y	2	"of bijsturen van het proces of wat dan ook. Als je ziet dat, dat die sneller kan plaatsvinden en rationeler is op basis van omdat hij meer data eenvoudiger tot zijn beschikking heeft, dan is het een succes"
				3	"Dat zou dan het succes zijn, en ja heb ik alle informatie als bedrijf, kan ik heb ik al mijn informatie die ik nodig heb om bedrijfsvoering rondom een ERP uit te voeren"
				6	"Bijvoorbeeld dat er zit een al zit er constante performance meter in die wordt getoond naast de machine, die gegevens. Die komen uit dat die worden gevoed door gegevens Die die gebruiker heeft ingegeven en die geven die gebruiken dus constant feedback"
	Uniqueness of information/data consistency/data integrity **COMBI**	Consistency in data entry/uniqueness of information	y	4	"Ik denk dat dat ook belangrijk is. Dus daar dan weer die consistentie die ik er eerder ook kan noemden dat iedereen hetzelfde gegeven op dezelfde plek invult."
Infrastructure	Hardware performance **NEW (COMBI)**	Network quality/availability	y	1	" Jazeker, zeker. Nou weet je een beetje afhankelijk van de situatie. Als je het hebt over een kantooromgeving waar vaste computers staan, dan is het misschien niet zo heel relevant (…) Maar gebruik jij bijvoorbeeld op een heftruck ook gegevens en blijken jouw access points in je magazijn nog niet goed te functioneren (…) dan draagt het echt wel bij aan succesvol van iets."
		Peformance relevant for experience of system	y	6	"Ja is absoluut een heel belangrijk criteria. Ik denk een heel moeilijk criteria. En ikzelf dus gewoon een hele lastige Materie en vaak heb je ook te maken met een andere afdeling. Maar Er is essentieel om een Goede beleving van het totaalpakket te hebben"

Infrastructure general is critical success factor **MIXED OPINIONS**	Infrastructure is often more a critical success factor, not a criterion	n	1	"maar het één kan niet zonder het andere ik denk, als de infrastructuur goed is maar je hebt niet naar de gebruikers geluisterd wordt het ook geen succes."
			2	"Ja er zijn wel een aantal basis voorwaardes natuurlijk bijvoorbeeld snelheid van de van de systeem (…)Ja beveiligd ja, dat zijn meer voorwaardes denk ik."
			3	Nee het is het is, het is groot het is merendeel voorwaarde. Ja zonder kun je niet, zonder geen succes, alleen op zichzelf stand wordt het ook geen succes dus het is wel het is meer voorwaarden dan dat je daar het succes uit kan vanaf leiden.
			4	"Kan wel als, het volledige pakket in beheer is van die partij als inderdaad het grote project is dat zowel de server opgetuigd wordt en de applicatie gebouwd wordt door een partij ik denk alleen dat het in de praktijk misschien maar in tien procent van de gevallen het geval is. Dus het zou denk ik wel kunnen ik denk alleen dat het niet zoveel voorkomt."
Support for different/mobile devices **NEW**	Support for different/mobile devices	y	2	"Ja, je hebt het niet gehad over mobile devices en dat soort zaken hè dat je overal en altijd, heel makkelijk bij je data kan komen dat is misschien ook nog een iets ja dus dat je ja dan kom je meer op de combinatie van je je pc en dan je mobiele telefoon zeg maar."
			3	",(…) dus wat voor apparaten hebben ze, is dat relevant? (…) Ja dat is het zeker vanuit het vanuit het user experience perspectief sowieso, dat is wel dat is wel een dat is wel een succescriteria."
			5	"Devices waarop gebruikers werken (…)Ja hoort er zeker wel bij. Zeker met nu alle nieuwe technologieën die je voorbij ziet komen"
			6	Ja ja, de Dat is ook onderdeel van het totaalpakket, dus Als het op een device wordt gebruikt of dat nu een telefoonnummer scanner is, dan zal daar ook gewoon de totale plaatje efficiënt en normaal moeten kunnen functioneren
Infrastructure security	Demand for security by third parties	y	3	"als een bedrijf besluit om een ERP systeem te implementeren dat er zeker andere partijen zijn die eisen of vereisen dat daar aan security en design aandacht wordt besteed dus dat is zeker een succes criteria."
	Security is a critical success factor	n	5	"Security is zeker wel een belangrijk punt wat je wat je mee moet nemen (…)Ja dan speelt dan natuurlijk wel mee op je succesfactor"
	Prevention from hacks		6	"Bij <company 1>, zit echt in zijn situatie dan, daar is een stevige hack geweest eind vorig jaar. Aan, Dat is nogal wat veranderd In de infrastructuur, Wat gevolgen heeft voor Die snelheid Onder andere. Maar het is een belangrijke, Heel belangrijk criterion? Ja."
User authorisation	Autorization structure NOT relevant	n	4	"Een goed ingerichte autorisatiestructuur (…)per se te zeggen dat daarmee <system x> geen succesvol product is ik denk niet dat dat geld, ik zou niet succes zeggen dat dat een criterion voor succes is."
	Autorization structure relevant	y	5	"Hoe kan jij zorgen dat gebruikers precies kunnen doen wat ze moeten doen, maar niet bij alle andere informatie kunnen"
Scalability **NEW**	Scalability of system/network	y	5	"En Misschien ook nog bij infrastructuur is de schaalbaarheid van je applicatie (…)Niet per se gebruikers binnen een bedrijf, maar ook dat je meerdere bedrijven kan laten aansluiten."
Data backup and recovery mechanism	Backup mechanism	y	6	"Backuppen (…) Ja ja, ja, Dat is ook een criteria, ja. Kijk, grote bedrijven die hebben daar van tevoren al ruimschoots over nagedacht wat kleinere bedrijven Die hebben daar vaak wat advies bij nodig, Maar het is absoluut een criteria."
Service	Availability of IT maintenance staff	Availabilty of internal service department	y	1	"Ja, hoe belangrijk is het dan dat je kunt terugvallen op je eigen ict afdeling of van een consultant/het bedrijf waar je het van gekocht hebt, om jouw probleem te verhelpen. Kijk,

				als het niet succesvol is als dat niet goed is, dat het succes op langere termijn ook afneemt. Misschien draagt het niet bij aan het succes van de ERP applicatie zelf maar wel aan de hele implementatie daarvan."
			4	"Ik denk dat het wel een beetje beiden is ook weer hoor, ik denk inderdaad dat het een belangrijke voorwaarde is maar ook wel, ja als je als mensen altijd ergens terecht kunnen met hun vragen of hun klachten of problemen dan denk ik ook wel zeker dat het een indicatie is van hoe succesvol iets"
Knowledge and technical skills of IT staff/ Reliability of service **COMBI**	Knowledge and technical skills of IT staff	y	1	"er werkt een koppeling niet om wat reden, kan je eigen it afdeling kan je daar al wat mee doen? Kunnen ze al de fout vinden? Hoe snel heb je bij je leverancier contact om ze te helpen omdat het even niet meer werkt? met foute op te lossen. Dus ja, op de lange termijn daar gaat zeker bij."
			3	"Nou neem verstoringen die op kunnen treden hè, wordt dat met welke mate en snelheid wordt dat dan beantwoord en afgehandeld, ik denk dat dat zeker een succescriteria is"
			5	"Kan ik concluderen dat je er dan eigenlijk twee in noemt. Namelijk enerzijds de technische vaardigheden van die service, Omdat ze überhaupt weten hoe ze je moeten helpen en anderzijds een stukje respons met dus hoe snel dat dat dat dat je geholpen wordt. (…) Ja, dat zijn dingen wel twee belangrijke."
Intrinsic quality of service	Service is a knowledge partner	y	6	"Wat ik zelf een hele belangrijke vind Als je kennispartner kunt zijn, Is dat je niet een U vraagt wij draaien organisatie bent, Maar dat je ook echt kunt Als je t afdeling kunt meepraten met een gebruiker"
Empathy in service	Empathy in service	Y	6	"Inlevingsvermogen eigenlijk? (…) Dat is het meer, Je moet gewoon Als IT afdeling, Een proces of een applicatie breder kunnen zien. Je moet het kunnen zien In de ogen van een gebruiker In de ogen Van een organisatie."
Tanglibles of service **NOT**	resources that services has at their disposal not relevant for success	n	1	"Middelen die de service tot zijn beschikking heeft (…) Nee, dat denk ik niet. Je moet dan wat meer richting je IT staff of cosultant hebben die dat aangaat."
Service general **NOT**	Service is not relevant for success	n	2	"Nou het is niet, het is niet zo, je kan niet concluderen van als er weinig service is, dat dan de omgekeerd dat dan de ERP geen succes is (…)En vind jij dat ook het opzetten van een goede service organisatie is dat is dat iets wat hoort bij een ERP implementatie? Nou dat hoeft dus niet dat nee dat hoeft dus niet"
Flexibility in service	Flexibility of service in handling (change) requests and incidents.	y	3	"Dus dat zou je inderdaad ik denk dat flexibel zijn sowieso hè, dus niet alleen ja dus inderdaad gebied van changes, is op het gebied van het verhelpen van verstoringen dat je dat je daarmee een succes kunt zien ja."
Simplification of the IT inquiry process	Clear protocol for asking questions	y	5	"Maar ik denk dat dat het belangrijkste is dat je in ieder geval weet waar je je vragen kwijt kan en dat je dan ook binnen afhankelijk van de vraag een antwoord krijgt waar je wat mee kunt."
	Impact analyzing capabilities of incidents	y	6	"Na ja dat ook, maar ook op even een financiële impact (…) Als je daar iets over kan Benoemen en criteria en de prioriteit die je aan het incident geeft Dan is dat ook een bepaalde mate van Succes in ieder geval qua beleving van het succes."
	Prioritizing in service	y	6	"Ja, Als je heel goed kunt, heel goed en snel kan inschatten wat de prioriteit is van een incident. En daar ook op kunt handelen dan. Is dat zeker een meetbaar Criterion ja"
Responsiveness of IT maintenance staff	Responsiveness	y	5	"Kan ik concluderen dat je er dan eigenlijk twee in noemt. Namelijk enerzijds de technische vaardigheden van die service, Omdat ze überhaupt weten hoe ze je moeten helpen en anderzijds een stukje respons met dus hoe snel dat dat dat dat je geholpen wordt. (…) Ja, dat zijn dingen wel twee belangrijke."
			6	"Ja, Snelheid hoort er ook bij hoor, kijk het is dodelijk om niet te reageren."
User support materials	Availability of documentation	y	6	"Ja, kijk als jij Een goede instructie hebt die gebruikers sneller op weg kan helpen of die kan raadplegen als die weet waarmee je dus vragen aan die t organisatie kunt voorkomen,

					dan heeft dat zeker een toegevoegde waarde. Kijk het Succes zit dan vooral in denk ik dat het heel actief snel moet zijn"
System	System reliability	Reliablility	y	1	"Ja dat eerste, betrouwbaarheid zei je geloof ik he? Dat vind ik gewoon een van de belangrijkste"
				5	"Ja ja, dat is een beetje hetzelfde als jij als gebruiker van alles doet, maar je krijgt de hele tijd foutmeldingen om je oren dat het systeem niet goed werkt dat systeem crasht of dat soort dingetjes. Ja, dat denk ik zelf eigenlijk ook niet zo goed over na als succes, want dat het is gewoon een vereiste"
				6	"(…) gewoon naar kijken naar hoe betrouwbaar is die informatie nou, Het, klopt het? (…) Dat is zeker van toepassing."
	System stability and availability	Stabilty of system is essential	y	6	"Dus ja, stabiliteit is essentieel. Maar dat is eigenlijk ook iets wat niet benoemd succes is Omdat het gewoon Normaal is, stap je kan je dus gewoon essentieel dat."
	Technical ability of the system	Technical ability of system is obviously relevant	y	1	"Ja er staat hier bijvoorbeeld technical capabilities of the system to execute tasks (…) Ja dat is handig om het succes te maken, haha, we bouwen een systeem maar het doet niet wat het moet doen want"
	Detection and prevention of data errors/ Allows for data integrity **COMBI**	Prevention of data errors when entering data	y	2	"Jij noemde daar natuurlijk net al iets over het invoeren van data en het terugdringen van foutgevoeligheid op het moment dat het zo'n systeem dat goed ondersteund is dat een teken van succes? (…) Ja absoluut"
				3	"Absoluut, dan is het anders, kon foute informatie, de mogelijkheid om informatie foutief in kunnen voeren, wil zeggen dat er ook foute informatie uit gaat komen het is zeker een succes criteria om dat dat dat goed te beleggen."
				4	"Ja en ook inderdaad het feit dat je alert gemaakt wordt op het ontbreken van bepaalde gegevens of alert gemaakt wordt op hé dit is dit heeft deze waarde en dat zou niet moeten kunnen (…) Dus ja ik denk dat preventie van het voorkomen van foutieve vastlegging echt belangrijk is ja."
				5	"Dus ja, crap in is crap out, zeg maar. Alleen, Je moet zorgen dat het duidelijk is eigenlijk aan de voorkant, al waar je wat invoert, zodat aan de achterkant duidelijk is waar je naar kijkt."
				6	"Of eigenlijk gewoon dat ze zo efficiënt mogelijk input kunnen geven, het liefst met een voorstel wat het ERP kan geven."
	System navigation	System navigation is fast	y	2	"als het pakket gewoon snel als je snel door je door je menu's kan scrollen dat is dat is dat is wel heel belangrijk (…)"
				6	"Dat een gebruiker, ja, je hebt verschillende type gebruikers denk ik gebruiker moeite met zo min mogelijk inspanning Dus aan de inspanning kan zijn dat het zo min mogelijk zoekwerk is"
	Flexibility of the system/Customization of the system **COMBI**	Flexibility/customizability of the system	y	2	"Ja wat ik vind is dat als een ERP systeem zich kan aanpassen aan gewijzigde omstandigheden dan vind ik dat dan vind ik dat een succes"
				3	"als jij een dusdanig systeem hebt waarin je zonder al te veel, ja als je als je een ERP systeem kunt bouwen waarin je als gebruiker zelf je processen kunt buigen tijdens de tijdens de doorlooptijd, ik denk dat dat zeker een succescriteria is."
				5	"Dat is eigenlijk nog wel een interessante hoe goed je door kan ontwikkelen met zo een ERP systeem ook na de implementatie, want dat is ja zeker"
				6	"Ja en dat je, Dat dat een bepaalde manier van ERP of een denkwijze of hoe je een project aanpakt Per klant verschillend kan zijn en dat het niet altijd op de dat niet altijd de voorgeschreven Manier de manier is."

		Flexibility/customizability of reports	y	2	"(…) dat kun je niet van tevoren want die rapport ook veranderen ook dan is dat dan is het ook belangrijke succescriteria ja ja. (…) En ook als je dat bijvoorbeeld kan koppelen"
				5	"Maar ook de vrijheid die ne als gebruiker hebt om nog informatie om je eigen overzichten te maken om informatie aan elkaar te koppelen"
	Regular system upgrade/enhancement/Sophistication of the system **COMBI**	Prevent/replace legacy sofware	y	2	"(…) Legacy voorkomen (…)Ja nee dat is dat is wel van belang absoluut, essentieel zelfs nou ja absoluut."
				3	"het hangt ook van het type project af, maar merendeel zal het hun legacy moeten vervangen hebben volledig of het zal een bedrijfsproces volledig moeten ondersteunen, en in dat geval praat een klant al snel van een succes."
				4	"Ja ik denk het wel ik denk wel dat op het moment dat jij een systeem hebt neergezet wat je makkelijker kan converteren naar een andere omgeving, of ja weet je wel makkelijker zo kan (…) ik denk wel dat dat een indicatie is van hoe succesvol je bent."
		Should not only be an administrative tool	y	3	"maar dat dan moet je het ERP ook wel letterlijk nemen, nou waar staat de P voor? Dus ja is het alleen maar data in klopt, en nou ja leuk, dat hebben we vastgelegd, maar dan heeft het geen nut."
		Only administrative tool is NOT relevant	n	5	"Als het alleen al administratief gebruikt wordt. Dat kan ja, dat hangt ook weer van van je doel af, Maar het is niet perse een vereiste dat het meer dan dat moet zijn."
		Stay up to date with recent technologies	y	5	"Je moet wel mee kunnen komen met wat er wat de hedendaagse verwacht wordt door de organisaties gewoon met het technologische opties die wil zijn"
	Compatibility of output (external)	Integration with 3th party	y	4	"Ja of dat er een koppeling ligt met een systeem wat dan dat specifieke kernproces ondersteunt dat kan natuurlijk"
				5	"hoe ervaren eigenlijk de teams van andere systemen het om met jouw systeem te interfacen (…) die informatie uit je ERP systeem wil je misschien toch nog met andere systemen of met je klanten gaan delen? En ja, dan moet dat wel mogelijk zijn.
				6	"externe Integratie (…)Zonder dat, Zonder zo'n koppeling Ja dan mis je de boot en dan. Dat is absoluut een criterion."
	Consistency of interface design	Consistency of the functional design	y	4	"Maar dat is in ieder geval in grote lijnen toch door iedereen te volgen moet zijn zeg maar ja dus eigenlijk consistentie en hoe het werkt ja."
		Limited customizability of user interface	y	3	"Nou ja wat we, één ding wat we weten is dat heel veel gebruikers de standaard GUI is al intuïtief vinden hè qua gebruik (…)
				4	"maar als jij een zoals Hyves zeg maar vroeger, dat ja nou ja dat draaide er om zeg maar het was ja dan is het natuurlijk wel succes criterion want als jij je eigen profielpagina moet kunnen inrichten je kan geen eigen kleuren niet ofzo dan ja. Maar bij een ERP implementatie, ik denk het niet."
				6	"Ik denk vooral dat je Gestructureerde eenvoudige manier Die rechttoe rechtaan is voor een gebruiker om het klaarzetten of moet kunnen begeleiden en Als je flexibiliteit toelaat, kan dat betekenen dat in gebruik al meer tijd bezig is, want dan moet ook in één keer nagedacht worden. (…)Als ik zelf zie dat niet als een succes criteria, in ieder geval geen zwaarwegende. "
	Accessibility of system	System should be easy accessible	y	5	"Ja bijvoorbeeld, hoe makkelijk het is om het systeem op te starten. Dus als jij op 10 plaatsen iedere keer een wachtwoord in moet vullen, zeg maar of dat je single sign on hebt dat dat soort dingen spelen wel mee."
	Format of the information	Methods for filtering/retrieving information	y	5	"Dus eigenlijk kunnen filteren op die data. Dat daar goede methodes voor zijn, Dat is echt als vrij essentieel voor een ERP systeem."

	Tracking and control	Tracking and control	y	5	"Is vrij lastig als het systeem dat eigenlijk niet goed nou ja logt aan de aan de voorkant al, dus je ja je wil in ieder geval bepaalde zaken terug kunnen herleiden"
				6	"Dus Het is absoluut heel Waardevol ja en zal ook vaak wordt gebruikt Omdat het een In feite is historie is wat online bewaard Blijft, kun je Alles nog terugkijken? Ja."
	Integrated help menu or user support	Integrated help function	y	6	"Ja absoluut, laat het even een beetje te maken met die interactieve instructie die ik net noemde Als je dat kunt doen en door een f een knop in te drukken op een veld, dan is Dat zeker een meerwaarde ja."
	System response time	System performance is connected to user experience	y	1	"Ja, dat gebruikers experience is, waar we toevallig nu tegenaan lopen is dat ook gewoon lekker, lekker soepel moet werken (…) het moet snel zijn maar het moet ook gewoon, je moet er makkelijk doorheen kunnen het moet snel reageren"
				5	"Als performance tegenvalt, ja, dan valt de user experience daarmee vaak ook tegen."
Internal business value	Improved business process/ Organisational learning	Reduce process cycle time	y	1	"Dat gaat ze ook behoorlijk helpen om, dat scheelt ze per week, ik noem maar even wat, zes keer dat dezelfde pallets weer terug naar klanten gaan (…) Process cycle time neemt af (…) Ja"
				3	"Ik denk dat uiteindelijk succesvol want, moment dat jij je bedrijfsprocessen dusdanig in het ERP hebt ondergebracht dat je, nou misschien staat de kortste weg zal zijn meer, meer kunnen doen met minder of gelijk aantal mensen."
		Improve processes, adapt to new processes.	y	3	"En krijg je misschien ideeën van hoe kan mijn werk beter? Of hoe kan ik hoe kan mijn bedrijf laten groeien in andere processen dus dat kan zeker een rol spelen ja."
				5	"Ja precies, en het kan zeker zo zijn dat als jij een goed systeem hebt dat gebruikers daardoor nu een manier bedenken om dat proces in te richten waar ze nooit aan hadden gedacht als ze dat systeem niet hadden gezien. Én dat ze zo eindelijk tot inzicht te komen om het ja uiteindelijk het proces nog te verbeteren. Dat dat speelt zeker mij, ja."
		Optimize existing processes	y	5	"als vervanging eigenlijk gewoon een nieuw ERP systeem neerzetten en niet perse een way of working veranderen, alleen optimaliseren… Ja ik denk dus negen van de tien keer dat het eigenlijk de bestaande situatie gewoon verbeteren is"
	Improved decision making/Keeping management informed **COMBI**	Management decisions are more data driven, improved decision making	y	1	"Dat zal het management wel ongetwijfeld willen zien of het een succes is. Nou ik vraag me af of dat het management daar ook heel vaak echt gebruik van maakt (…) zeker als ze dat meer zouden doen meer betrokken bij zouden zijn, ja dan zou dat wel, dan zal het wel bijdragen."
				3	"Ik denk als dat op de orde is nou dan zullen, dan is eigenlijk impliciet dat je dat je door het beter databeheer ook betere ook besluiten kunt nemen dus beter management taken kunt uitvoeren nou dat ben ik wel mee eens ja."
				4	"Ja dat is dan toeval maar ik denk dat het ook wel kan inderdaad je in je productie gegeven zodat je bijvoorbeeld fout gevoeligheid of, weet je wel, doorlooptijden van projecten dat soort zaken, daar kun je natuurlijk gewoon management technisch best wel veel mee"
				5	"Ja dan kom je weer heel erg uit op je rapportages, dus dan hoef je die informatie, ja, hoe zeg je dat gecombineerd aanbiedt in een duidelijk overzicht waar je precies de informatie hebt die je nodig hebt om te kunnen sturen. Dus ja, Dat is zeker een belangrijke factor binnen"
				6	"En sturing kan geven om een bedrijf en een gebruiker verder te helpen."
				6	"De juiste keuzes te maken en soms ook iemand de kans te geven om eens een andere Taak uit te voeren. Ja zeker In de

				"productie wereld is dat iets wat we steeds meer gaande is om de persoon op de juiste Plek te krijgen, En ook op basis van feiten te kunnen onderbouwen."
Labour requirements/Job effectiveness **COMBI**	Changing role of employment	y	1	"Dan wordt het wel belangrijker, daar kan het zeker een succes mee worden, omdat ze daardoor niet hoeven te besparen op de arbeidskosten maar die mensen wel ergens anders gaan voor in kunnen gaan zetten."
			2	"Veranderende rol van arbeid (…) omdat je dus de eenvoudige taken dus geautomatiseerd hebt kunnen mensen zich meer richten op de, ja enkel ja meer de analytische kant om iets toe te voegen, dus in plaats van ja ja het simpele werk is geautomatiseerd is."
			4	"Als dat je doel is wel ja (…) ja ik denk wel dat als op het moment dat ze dat jij zegt van als we deze berekeningen die nu door persoon gedaan wordt (…) ja dan kun je dat wel bepalen of gebruiken om te bepalen hoe succesvol bijvoorbeeld die calculatie module is."
			5	"Dus en wat we ook wel zien, is dat je vaak een verschuiving krijgt van mensen die eigenlijk alleen maar simpele taakjes hoeven te doen en dat je hoe meer je gaat uit met is er aan mensen nodig hebt die echt de processen snappen dat de achterliggend is"
			6	"Als je die kunt vervangen door een Automatisch robot die op basis van informatie uit het ERP ook diezelfde bevoorrading actie kan uitvoeren. Dan, is dat iets wat daarbij hoort ja."
Management efficiency	Real time information available and operational data control	y	1	"Ja dat hoort er zeker bij. Zeker ook als je de applicatie daarvoor hebt ontworpen, dat ze real time inzicht hebben wat er bijvoorbeeld voorraad is wat verkocht kan worden. Dat draagt zeker bij."
			2	"Jazeker essentieel zelfs, ja absoluut oké omdat je de dus niet alleen als gebruiker informatie uit je scherm haalt maar ook de middel van rapportages die uit de data trekt, ja meer duidelijke sturing aan kan geven, ja absoluut."
			6	"filteren hoe de klanten ervoor staan, leveranciers, Je eigen processen beter onder controle hebben, totdat je meer informatie Tot je beschikking hebt. Ja machine park beter kunnen monitoren, preventief ingrijpen op onderhoud."
Improved planning efficiency	Flexibility and improved planning and delivery and arrangement		5	"Dus ja, zorgen dat je aan de voorkant heel flexibel blijft maar aan de achterkant wel al je afspraken nakomt. Én dat dat lukt Alleen Als je geolied geheel hebt waarin ja de planning natuurlijk een belangrijke factor daarin"
Organizational morale	Organizational morale/happiness of employees	y	2	"Organizational morale (…) ERP systeem waarbij je eigenlijk voldaan hebt aan je taak maar dat je net even detail mist of nou of de omstandigheid of begrip bij de collega dat dat gaat dan soms wat verloren. (…)Ja ja dus ja, het lijkt echt op efficiëntie maar er zit ook een gevaar zit eraan vast."
			3	"(…)ik denk dat dat wel, het is het is, klein maar zeker niet te onderschatten ja. Ik denk als jij van tevoren weet, ik moet weer vandaag naar werken en ik vind mijn werk leuk maar ik ben met dat ding wat met toetsenbord voor ligt dat, was drie keer niks, dat dat dat je dan minder gemotiveerd bent ja. Denk niet dat, doorslaggevende succescriteria maar wel in die die iets bijdraagt aan de factor geluk."
			4	"dat ja dat kan heel veel ik denk dat het heel veel werk plezier kan opleveren als dingen gemakkelijker voor je worden gemaakt door het systeem ja."
			5	"zodat ze daar daar ook happy van worden? Omdat dat beter gaat dan voorheen, kan Natuurlijk ook andersom zijn. En dan? Kan je daaruit herleiden dat jij gefaald hebt, dus zeker uiteindelijk uit zich dat als moraal binnen het bedrijf, ja."

				6	"Het doet heel veel voor het moraal, want ook andere afdelingen of directieleden die komen en die zien dit die denken ook van nou Mooi leuk gewoon dat dat dat doet"
	Improved creativity	Improved creativity	y	5	"Creativiteit (…)Ja want het is altijd lastig om te vertellen wat je mist, zeg maar wat je nog niet weet dat mogelijk is dat met nieuwe technologieën (…) Maar dat vraag ik niet naar omdat je niet weet dat het dat het mogelijk is. En dat is met een ERP systeem natuurlijk precies hetzelfde. "
	Cross-functional collaboration and communication	Improved internal communication	y	4	"Vast wel, ja helemaal als je uit de situatie kwam Excel de norm is, als alles in hetzelfde systeem zit en iedereen kan er op dezelfde manier bij dat kan zeker bijdragen aan hoe succesvol het op de lange termijn is."
		Improved cooperation between departments	y	6	"de verbintenis tussen afdelingen vergroten? Denk jij dat dat ook een succes criteria voor een ERP zou kunnen zijn? (…) Ja dan denk ik absoluut, ja."
External business value	Improved reputation	Reputation increase	y	1	"Dat scheelt dus dat dat ze een slechte naam krijgen, en scheelt ze heel veel handelingskosten dus veel vrachtkosten, zeg het maar."
				6	"Als je in die zin kijkt Heeft dat zeker invloed. Dus ja absoluut dat dat reputatie is Daar zeker een onderdeel van."
	Increase profit/(income)revenues/sales **COMBI**	Creates opportunities for growth	y	1	"Als we dit nu goed gaan doen, betekent dat over een paar jaar misschien wel heel groot kunnen groeien , direct zeg je daar ook mee ook wel, meer omzet genereren en dus misschien wel meer winst maken."
		Increased production/revenues	y	6	"Denk je dat er vanuit dat perspectief nog meer dingen zijn die bij succes uit af kunt leiden? (…) Ja productieverhoging, en omzetverhoging, een inkoop"
	Adapt to outside influences **NEW**	Conform to legal requirements and changes	y	1	" (…) willen we beter inzichtelijk hebben wat er gebeurt of moeten we het wel doen om wetgeving, dat we toch wat anders moeten doen, dat zijn allemaal redenen die bijdragen daaraan."
		Prevent bankruptcy/downfall	y	2	"Ja, ja zowel als we succes is maar ook als er geen succes is er zijn genoeg voorbeelden vanuit de praktijk dat bedrijven daar nou bijna aan onderdoor gegaan zijn omdat er niet succesvolle implementatie van een ERP systeem plaatsgevonden heeft."
	Service and satisfaction of customers and suppliers	Improve customer support and satisfaction	y	2	"het is voor externe partijen niet even niet zo evident van hoe je dat intern organiseert alleen de mate waarin je dat goed kunt organiseren intern daarin speelt een goed ERP systeem ja dat is echt een absolute sleutelrol dat klopt."
				3	"Kijk als het bedrijf de klant goed kan ondersteunen dan indirect kan die zijn klant natuurlijk ook nog goed ondersteunen, dus dat is wel een, dat zou een successcriteria kunnen zijn(…)"
				4	"ik denk wel indirect (…) dus in die set kan het ERP zeker indirect wel de klanttevredenheid beïnvloeden."
				6	"Ja dan, is dat een factor in die klanttevredenheid. Niet alles, Maar het heeft zeker gewoon een rol."
		Improve external information supply	y	3	als je dat die informatie goed beschikbaar kunt stellen aan je bedrijfsvoering, dan helpt dat. En hoe gemakkelijk kunnen externen daarbij? Dat is dan meer vanuit de bedrijfskunde gedachten denk ik.
	Competative advantage/Market efficiency/increased market share **COMBI**	Discernment in the market	y	3	Omdat bedrijven zich uniek achten of onderscheidend willen zijn of willen worden in de markt (…) ik denk dat juist dat een successcriteria is.
				5	"Ja, maar het gaat soms nog wel verder dan dat om eigenlijk competetive advantage te krijgen, wil je dingen ook kunnen bieden die je concurrenten eigenlijk nog niet kunnen bieden. Dan dat soort vaak wel dicht tegen je ERP aan."
				6	"Ja tuurlijk 100% ja kijk als jij met de ERP Ervoor kan zorgen dat je een verschil maakt, waardoor je het beter kan doen als concurrenten of je kunnen het beter doen Als het jaar

				daarvoor en dat ook het aantonen, dan heeft dat zeker een voordeel, maar ook op technologisch vlak"
	Reduce production costs	y	4	"Denk je dat je echt concurrentievoordeel uit ERP kunt halen, denk je dat dat een succes criterion zou kunnen zijn? (…) Vast wel toch ja lijkt me wel op zich vrij logisch (…)dus dat je op die manier weer geld bespaart."
			6	"Dat we Minder tijd bezig zijn met plannen doordat dat systeem op basis van gegevens die zich in zich heeft automatisch in planning kan voorstellen. Dat ze omzet hebben vergroot, Dat ze hun productie hebben versneld."
Return on investment (ROI) **MIXED OPINIONS**	Return on investment NOT relevant for ERP succes	n	5	"Wat wat, wat verdien je nou met je ERP systeem? Dat is lastig te zeggen. Je kan het vooral vergelijken met de situatie daarvoor. Of de situatie daarna als Als je juist naar. Dat kan misschien zelfs ook gewoon voorkomen. Van verlies zijn natuurlijk."
	Return on investment relevant	y	6	"Past dat daar ook in? Dat je je investering eruit, haalt? (…) Tuurlijk, dat hoort er zeker bij. Ja. Dat is, Dat is niet altijd heel goed meetbaar op kleinere onderwerpen. Wellicht wel, maar als totaal niet, maar. Dat is zeker iets wat erbij hoort. Ja."

6.10. Appendix 10. Data collection approach

6.10.1. Meta-plan workshop

- **Step 1:** Online session to determine the abstraction level on which the success criteria should be validated and to familiarize the participants with each other's models that were found in their literature study. At the end of the first session, when the abstraction level is determined, the group will decide how to prepare the list of criteria for the next session, all criteria will be added to a spreadsheet by one of the participants. The discussion should be based on arguments on the advantages and disadvantages of all possible options.
- **Step 2:** Individual preparation, in which all participants will decide for every criterion from the bundled list whether they consider this as an actual criterion for ERP success. Next to that, a first deduplication will be done by all participants. All participants will work in the predefined spreadsheet. As a preparation for the second online session, one of the participants will bundle all results. In this way, the results can be discussed during the second session.
- **Step 3:** Second online session to discuss all individual criteria. This session will consist of two parts. If it turns out that a third session is required because of a time shortage, step 3 will be split up into two sessions.
  - The first part will be a discussion about whether a criterion should be on the final list. To make the discussion more efficient, the following rules will be applied:
    - When all participants agree on whether a criterion should be included in the final list, that criterion will not be discussed during the session but will be added to the final list directly.
    - When only one participant thinks a criterion should be included in the final list, the criterion will neither be discussed during the session and the criterion will not be added to the final list.
    - When two or three of the five participants have a different opinion about a criterion, a discussion will be held during the session. When the majority of the participants decide that the criterion should be on the final list, the criterion will be added.
  - During the second part of the discussion, the criteria from the final list will be bundled and a second round of deduplication will also be done.

6.10.2. Interview

- **Step 1:** Open coding. During the open coding phase, text fragments from the interviews will be labeled with an open code that describes the essence of the statement of the respondent.
- **Step 2:** Axial coding. During this phase, the code fragments will be bundled into axial code labels. These axial codes will derive from the existing model because the goal of this step is to validate whether the criteria from the model are relevant. It will, however, give room to add new axial codes if new success criteria come up during the interviews. The following additional tags will be used to add to the axial labels:
  - "MIXED OPINIONS" if respondents do not agree on a criterion during the interviews

- o "NEW" if the criterion is new, which means it is nonexistent in the model
- o "NOT" if a criterion is explicitly mentioned as irrelevant by one or more respondents
- o "COMBI" if several criteria from the model are combined
- **Step 3:** After all text fragments have a label and when they are categorized into axial code groups, the existing model will be analyzed and the criteria that were not mentioned will be marked to incorporate in the analysis of the data.
- **Step 4:** To make sure that no criteria that were mentioned in the literature were accidentally removed from the model during the meta-plan workshop, the results of the interviews will also be compared to the list of eliminated criteria. If any of these eliminated criteria were mentioned during the interview, they will be marked to incorporate in the analysis of the data. These codes will receive the extra tag "WAS ELIMINATED"
- **Step 5:** In the final step, the results will be analyzed and described in chapter 4.

6.11. Appendix 11. Final model

Term	Criterion	Sub-criterion	Description
Short	Project	Fit between business processes and ERP	The extent to which ERP and redesigned business processes match each other and the organisation goals.
		Conformance to functional and technical specifications	The extent to which the ERP meets the functional and technical specification that were defined beforehand.
		Product within intended purpose	Was the project delivered according to the intended purpose?
		Within budget – schedule - scope	Was the project delivered within budget? Was the project delivered within schedule? The extent to which the scope is complete; goals, tasks, costs, deadlines and requirements.
		Stakeholder satisfaction	Were stakeholders satisfied with the termination of the project? Was there a 'wow-factor'?
		Met organizational objectives	The extent to which the ERP contributes to the organizational objectives.
		Stakeholder involvement	The extent to which stakeholders are involved in the creation of the ERP.
Medium	User experience	Overall satisfaction	The extent of overall satisfaction about the ERP in general.
		Effectiveness for users	The extent to which the users experience the ERP effective for performing their job.
		Efficiency for users	The extent to which the users experience the ERP efficient for performing their job (they can perform their job in the most efficient and least time consuming way).
		Flexible system interaction and use	The possibility for ERP users to interact with the system and perform tasks through multiple pathways.
		Ease of use	The extent to which ERP functions can be easily used by end users.
		Enjoyment by users	The extent to which users enjoy using the ERP.
		Ease of learning	How difficult users find learning the functions of ERP.
		Adequacy for users	The extent to which the ERP supports the tasks and information needs of the user.
		Recall information	The extent to which the ERP user can reproduce the information.
		Intuitiveness of the system	The extent to which users know directly how to navigate the system and to which extent the system feels intuitive to use.
		Readability	The extent to which ERP users can understand the information/data, depending on content and presentation.
		Navigation of system	The extent to which the user can navigate efficiently through the ERP and find the information they need.
		System task orientation for user's work	The extent to which the ERP is task oriented for users.
		Interface (look and feel)	The extent for ERP users to understand the information/data, depending on content and presentation.
	Usage	Nature of use	Does the nature of use fit the role of the end user?
		User acceptance	Do the end users accept the system?
		User satisfaction	Are end users satisfied with the system?
		Personal value of the system	The extent to which the ERP is of added value for the user.
		Extent of use	The extent to which the ERP is used.
		Actual use	The extent to which the users actually use the ERP and do not fall back to workarounds.
		Recurring use	The extent to which the users reuse the ERP system.
		Intention to (re)use	The extent to which users are willing to (re)use the ERP, based on their experience with the ERP.

	Information	Data currency of system	The financial significance of the data to the organization (expressed in a monetary value).
		Overall output quality	ERP improves the standard and quality of the organisation's output.
		Comprehensibility of the data	The extent to which users are able to draw conclusions based on the information in the ERP.
		Conciseness of the information	The extent to which the information in the ERP is complete.
		Availability of the information	The extent to which the information in the ERP is available to the users.
		Reliability of the information	The extent to which the information in the ERP is reliable (correct).
		Usability of the information	The extent to which the information in the ERP is useful.
		Data consistency	The extent to which data in database is consistent between applications and across the whole firm.
		Data integrity	The extent to which data in database is integrated across the whole system.
		Scope of the information	The extent to which the information in the ERP covers all required areas.
		Accuracy of data	The extent to which data is correct and precise.
		Input data accuracy	The extent to which data is inputted correctly and precisely.
		Uniqueness of the information	The extent to which the information in the ERP is unique (and not redundant), and to which extent this is enforced by the ERP.
		Completeness of the data	The extent to which data is inputted completely without missing elements.
	Infrastructure	User authorisation	Users are granted appropriate data and system access rights.
		Data backup and recovery mechanism	Policies, plans and procedures adopted to back up and recover ERP data to avoid potential data loss.
		Configuration of user PCs (devices)	User PCs have adequate and even the latest configurations to support the running of ERP.
		Cross-platform support	Is the ERP usable on several platforms, like mobile phones, tablets and scanning terminals.
		External integration (compatibility) of ERP	The possibility for ERP to be integrated and exchange data with other IS applications.
		Internal integration of ERP	Different modules of the ERP system are seamlessly integrated together to share data.
		Infrastructure security	The capacity of IT infrastructure to prevent the firm from both internal and external security threats.
		Server and database capacity	The server and database are of sufficient size to support smooth running of ERP.
		Speed of network connection	The speed of network connection is good enough to avoid potential delay of ERP data processing.
		Scalability of the infrastructure	To what extent is the infrastructure scalable and able to support usage growth.
	Service	Availability of IT maintenance staff	The extent to which IT support is accessible when users need it.
		Reliability of service	The extent to which the service organization is reliable in their support, based on clear processes.
		Flexibility in service	The extent to which the service organization is flexible in their support.
		Individual support	Availability of personalised one on one support for users.
		Empathy in service	The extent to which the employees of the service organization perform their jobs in an emphatic way.
		Intrinsic quality of service	The extent to which the employees of the service organization feel responsible for the quality of the service.
		Knowledge and technical skills of IT staff	Support staff have sufficient knowledge and experience of the system to handle user queries.
		User support materials	Availability and helpfulness of system manuals.
		Responsiveness of IT maintenance staff	User requests for help are handled and responded promptly.
		Simplification of the IT inquiry process	Number of steps that users need to go through when seeking IT support.

	System	Consistency of interface design	ERP interface design is uniform and menu options are persistent across the whole system.
		Availability of reports	Users can always access relevant ERP reports and outputs when needed.
		Turnaround time of system	The extent to which the ERP contributes the lowest possible turnaround time.
		Efficiency of system	The extent to which the ERP operates in an efficient way (from a performance perspective).
		Flexibility of the system	The extent to which the system is capable to handle a variety of products.
		Integrated help menu or user support	The extent to which technical support and user manuals are embedded in ERP systems, including formal instructions for users.
		Information awareness	The extent to which the ERP system contributes to information awareness.
		Interactivity of system	The extent to which the system is considered to be interactive, both from a technical as functional perspective.
		Usefulness of system functions and characteristics	The extent to which the ERP system functions and characteristics are useful.
		Detection and prevention of data errors	The ability of ERP system to automatically detect and prevent the input of incorrect data.
		Tracking and control	The ability of ERP system to enable users to track and modify transactions and inputted data as they progress through a task.
		System response time	The time between sending a user request and receiving a system reply to that request.
		Regular system upgrade/enhancement	The ERP system is properly upgraded and enhanced to meet emergent business needs.
		System stability and availability	The frequency of system crashes and periods when users are unable to access the system due to technical failure.
		Technical ability of the system	The technical capabilities of the system to execute specific tasks.
		Timeliness of the data	Is the accessibility and availability of information timely to make the right decisions?
		Sophistication of system	The extent to which the ERP uses the latest and best technologies and is designed properly.
		Visibility of system (progress)	The ability of ERP system to display a user's progress when doing a multi-step task.
		Customization of system	The amount of customization options of the system.
		Format of the information	The extent to which the format of the information contributes to better interpretable information.
		Compatibility of output (external)	The ability of ERP systems to provide output that can be opened or imported by other software.
		Allows for data integrity	The ability of the ERP system to allow data integration.
		System reliability	The extent to which ERP is free of technical bugs and errors and so can consistently perform its intended functions.
		Technical security of the system	The inbuilt capacity of ERP to resist internal and external security threats.
Long	Internal business value	Cross-functional collaboration and communication	ERP aids information exchange and joint projects between employees and departments.
		Overall productivity	ERP helps the organisation create a greater quantity of its output.
		Labour requirements	The organisation needs a low number of workforce with support and automation enabled by ERP.
		Efficiency of organizational units	The extent in which the efficiency of organisational units is improved.
		Management efficiency	ERP improves the organisation's capacity in managing, monitoring and controlling.
		Keeping management informed	The extent to which the ERP supports the information provision for management to make the best possible business decisions.
		Individual productivity	The extent to which the ERP supports the productivity of individual employees.
		Cost reduction	Does the ERP reduce operating expenses?

		Organisational learning	ERP adds to the organisation's ability to adapt and learn in response to internal and external stimuli.
		Organisational morale	ERP positively adds to the organisational morale and optimism.
		Improved business process	Does the ERP improve business processes?
		Job effectiveness	The extent to which the ERP increases the effectiveness of jobs in the organization.
		Task performance	The extent to which the ERP increases the performance of individual tasks in the organization.
		Process cycle time	The time taken to complete each new business process is acceptable.
		Timeliness of decisions	The extent to which the ERP system ensures that decisions can be made on time.
		Improved decision making	Does the ERP contribute to better substantiated decision making?
		Improved planning efficiency	ERP improves the organisation's capacity in planning and scheduling.
		Improved creativity	ERP improves the creativity of the users.
		Reduce inventory	The extent to which the ERP reduces the amount of stock held by the organization.
		Workload	The extent to which the ERP reduces the amount of work for individual employees.
	External business value	Competitive advantage	ERP helps the organisation achieve a favourable position compared to rival organisations.
		Market efficiency	Does the ERP contribute to a better market position?
		Return on investment (ROI)	Does the ERP help to increase the ROI of the organization?
		Service and satisfaction of customers and suppliers	Does the ERP increase the customer and supplier satisfaction?
		Improved income revenues	Does the ERP contribute to a higher income generation?
		Improved revenue	Does the ERP contribute to a higher revenue?
		Improved product quality	Does the ERP improves the product quality?
		Improved reputation	Does the ERP increase the reputation of the organization?
		Improved profit	Does the ERP contribute to higher profit?
		Increased market share	Does the ERP increase the market share?
		Improved sales	Does the ERP increase sales revenues?

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