

Master's programme in Computer, Communication and Information Sciences

Employee well-being as part of IT-project success metrics

lira Hannula

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Author Iira Hannula

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Supervisor Prof. Marjo Kauppinen

Advisor Prof. Marjo Kauppinen

Collaborative partner Fellowmind Finland

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Abstract

Fast-paced and result driven project work can cause stress among employees. Organizations working in the field of IT are recognizing that employees are vital contributors to project outcomes. By understanding how employee well-being influences project success, organizations can foster a work environment that promotes employee well-being, thus ultimately leading to improved project performance.

The goal of this thesis was to understand how can IT-project success be measured in a manner that incorporates and acknowledges the well-being of employees. This was done through a systematic literature review and an empirical study utilizing action design research. The approaches to both IT-project success and employee well-being in academic literature were examined. A measuring system for IT-project success that includes employee well-being metrics was created in the empirical study.

Existing literature provides metrics for IT-project success such as cost, time, effectiveness, sustainability, green efficacy, communication, and project satisfaction. These metrics allow organizations to evaluate the performance of IT projects, enabling them to identify areas for improvement and achieve successful project outcomes. Similarly, existing literature offers various metrics categorized under psychological well-being, health, time use, education, and living standard to measure employee well-being. These metrics provide insights into different dimensions of well-being and allow organizations to develop targeted strategies for enhancing employee well-being. However, implementing these metrics in fast-paced and result driven project environments requires careful customization and efficient data collection and analysis to strike a balance between obtaining valuable insights and managing practical constraints. This research highlights the importance of considering various metrics to measure IT-project success, including cost, time, customer satisfaction, work-life balance, alignment of competences and interests, and communication.

Based on the result, it can be concluded that including employee well-being aspects in the definition of IT-project success offers a possibility for a holistic approach to measuring IT-project success. Additionally, incorporating employee well-being in the definition of IT-project success could help guide actions that prioritize employee well-being, thus also resulting in better project success.

Keywords project success, employee well-being, IT projects, metrics, measurement

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Tuloshakuinen projektityö voi aiheuttaa stressiä työntekijöille. Ymmärtämällä, miten työntekijöiden hyvinvointi vaikuttaa projektin onnistumiseen, organisaatiot voivat luoda työympäristön, joka edistää työntekijöiden hyvinvointia ja siten vaikuttaa projektien onnistumiseen.

Tämän opinnäytetyön tavoitteena oli selvittää, miten IT-projektien onnistumista voidaan mitata siten, että työntekijöiden hyvinvointi otetaan huomioon. Tutkimus toteutettiin kirjallisuuskatsauksen ja toimintatutkimusta hyödyntävän empiirisen tutkimuksen avulla. Tutkimuksessa tarkasteltiin sekä IT-projektien menestyksen että työntekijöiden hyvinvoinnin lähestymistapoja kirjallisuudessa. Empiirisessä tutkimuksessa luotiin IT-projektien menestyksen mittausjärjestelmä, joka sisältää työntekijöiden hyvinvoinnin mittareita.

Kirjallisuus tarjoaa mittareita IT-projektien menestykselle, kuten kustannukset, aika, tehokkuus, kestävyys, ympäristövaikutukset, viestintä ja asiakastytyväisyys. Nämä mittarit mahdollistavat tunnistamaan kehittämistarpeita ja auttavat saavuttamaan onnistuneita projekteja. Kirjallisuus tarjoaa myös erilaisia mittareita työntekijöiden hyvinvoinnin mittaamiseen. Nämä on jaoteltu psykologiseen hyvinvointiin, terveyteen, ajan käyttöön, koulutukseen ja elintason. Mittarit kategorioissa tarjoavat tietoa eri hyvinvoinnin ulottuvuuksista ja mahdollistavat kohdennettujen strategioiden kehittämisen hyvinvoinnin edistämiseksi. Mittareiden käyttö nopearytmisissä projektiympäristöissä edellyttää huolellista räätälöintiä, sekä tehokasta tietojen keruuta ja analysointia. Näin voidaan saavuttaa tasapaino arvokkaan tiedon saamisen ja käytännön rajoitusten välillä. Tämä tutkimus korostaa erityisesti mittareiden kustannukset, aika, asiakastytyväisyys, työn ja vapaa-ajan tasapaino, osaamisen ja kiinnostusten yhteensovittaminen sekä viestintä, tärkeyttä IT-projektien menestyksen mittaamisessa.

Tulosten perusteella voidaan todeta, että työntekijöiden hyvinvoinnin sisällyttäminen IT-projektien menestyksen määritelmään tarjoaa mahdollisuuden kokonaisvaltaisempaan lähestymistapaan IT-projektien mittaamisessa. Lisäksi työntekijöiden hyvinvoinnin sisällyttäminen IT-projektien menestyksen määritelmään voi ohjata toimia, jotka priorisoivat hyvinvointia ja siten parantavat myös projektien menestystä.

Avainsanat Projektien onnistuminen, työntekijöiden hyvinvointi, IT-projektit, mittarit, mittaaminen

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1 Introduction

This thesis explores the connection between IT-project success and employee well-being and extends on how to include employee well-being in the success metrics of IT-projects.

1.1 Motivation and background

As knowledge workers in general are in high demand, companies are competing for the best talents by putting efforts into ensuring employee happiness even in demanding jobs. There is an interesting area in between IT-project success and the well-being of employees: does employee well-being and happiness correlate with successful IT-project deliveries? Do happy employees deliver better results? Also to the other direction: does success with projects add employee happiness?

Combining research on employee well-being with IT-project success is of paramount importance as it offers valuable insights into the interplay between these two critical aspects of organizational functioning. Understanding the relationship between employee well-being and IT-project success can lead to enhanced project outcomes and the overall success of an organization.

There is plenty of research about IT-project success factors [[Alias et al., 2014](#); [Adywiratama et al., 2022](#)] and successful IT-projects and success frameworks [[Howsawi et al., 2011](#); [Todorović et al., 2015](#); [Abdallah et al., 2022](#)]. The challenge of measuring IT-project success is tackled by [Kerzner \[2015\]](#) who provides some insights on IT-project success metrics while [Badewi \[2022\]](#) aims to recognize a defined framework of IT-project success. [Nevstad et al. \[2021\]](#) link IT-project success to project performance and [Sulistiyan and Tyas \[2022\]](#) share more specific metrics for IT-project success measuring.

In the existing literature there is also research about employee happiness and well-being [[Johnson et al., 2017](#)] and measuring it [[Pradhan and Hati, 2022](#)]. Literature also covers partly how employee well-being could be linked to organizational benefit [[Chiocchio et al., 2010](#)]. In literature these links can be found in leadership and how that can turn into IT-project success [[Khan et al., 2020](#)] and the influence of management of IT-projects with employee well-being [[Mubarak et al., 2022](#); [Rezvani et al., 2016](#)].

Research shows how employee well-being positively influences various work-related outcomes, including job performance and creativity [Sonntag and Fritz \[2015\]](#). When employees experience higher levels of well-being, they are more likely to be engaged, motivated, and committed to their work, resulting in improved project performance. Furthermore, studies have shown that employee well-being is closely linked to productivity and job satisfaction [Crawford et al. \[2010\]](#). When employees are well-supported, experience low levels of stress, and have a positive work environment, they are more likely to perform at their best and contribute to IT-project success.

By conducting research on the combination of employee well-being and IT-project success, organizations can identify strategies and interventions that promote employee well-being, leading to positive project outcomes. Implementing practices such as work-life balance initiatives, employee development programs, and supportive leadership styles can contribute to both employee well-being and IT-project success [Bakker et al. \[2014\]](#); [Bencsik \[2022\]](#).

1.2 Research problem and questions

In addition to the aforementioned themes, this thesis aims to address the challenge of exploring the current measurement of IT-project success in existing literature and proposing the integration of employee well-being metrics as part of the IT-project success measuring system. The objective is to first understand how employee well-being can be effectively measured and then determine how these metrics can be integrated into the IT-project success measuring system.

The empirical part of the study is focused on investigating how employee happiness and well-being are perceived and assessed within various roles in IT-projects. The aim is to examine whether employee well-being is considered as a contributing factor to IT-project success. To accomplish these objectives, a mixed-methods research approach was applied, combining action design research and qualitative interviews.

The study intends to contribute to the existing literature by bridging the gap between the measurement of IT-project success and the integration of employee well-being as a crucial component. By identifying the metrics and indicators that capture employee well-being and assessing their relevance to IT-project success, organizations can enhance their understanding of the holistic factors that influence project outcomes.

The research problem is defined as: How can IT-project success be measured in a manner that incorporates and acknowledges the well-being of employees?

The research questions are formed as follows:

1. What metrics are used to measure the success of IT-projects in existing literature?
2. What metrics are used to measure employee well-being in existing literature?
3. How could employee well-being metrics be integrated as part of IT-project success measuring system?

1.3 Scope of the thesis

The focus of this thesis is implementing a project success measuring system for IT-projects, that takes into account the well-being of employees. IT-project for this thesis is limited to projects where there is a project team consisting of a project manager and at least two other employees. While the topic of employee well-being is discussed and defined in the thesis, it is beyond the scope of this thesis to examine in detail how the holistic well-being of employees could be measured. Additionally, while actions are proposed, the detailed explanations and theories are beyond the scope of this thesis.

The first research question, which explores the metrics used to measure the success of IT projects in existing literature, is addressed through a comprehensive literature review that focuses on top journals in the field and papers discussing IT-project success metrics. Similarly, the second research question, which examines the metrics used to measure employee well-being in existing literature, is also addressed through a literature review that considers relevant sources. To answer the third research question regarding the integration of employee well-being metrics into a IT-project success measuring system, an empirical study is conducted. This study takes the form of interviews with six participants representing different project stakeholders in a supplier organization. Table 1 provides an overview of how the three research questions are addressed within this thesis, highlighting the different approaches taken to explore each question.

Table 1: Scope of the thesis

Research question	Literature review	Empirical study
What metrics are used to measure the success of IT-projects in existing literature?	X	
What metrics are used to measure employee well-being in existing literature?	X	
How could employee well-being metrics be integrated as part of IT-project success measuring system?		X

2 Methodology

This thesis consists of two parts: a literature review and an empirical study. The empirical study is a complementary part that builds on the knowledge conducted from the literature review. Qualitative methods are used for the literature review and the empirical study is conducted as action research. As the objective of this thesis is to provide a practical item for organizational use, action research is suitable as it aims to both define a problem and to provide a solution for it in the form of an IT artifact [Easterbrook et al., 2008]. The literature review aims to provide a strong theoretical background for the created artifact.

2.1 Literature review

The literature review was conducted to explore how IT-project success metrics are approached in literature. Additionally, literature research was conducted to understand how employee well-being is defined and measured in the literature. Finally, the links between IT-project success and employee well-being are explored in the literature review. As the aim of the literature review is to provide an analyzed review of the existing metrics, the theoretical review was conducted with a concept-centric approach. This approach means the findings of the review are presented as concepts [Webster and Watson, 2002], in this research meaning that the literature review is built and analyzed through the concepts instead of separate article summaries.

The process for the literature review consisted of four steps. The first step was creating the literature review plan. The plan was created to understand how to gather and review data for the literature review by choosing a suitable systemic approach. The second step of the process was searching for literature. This step consisted of deciding the search terms, databases and journals to be used as well as conducting the actual search. The third step of the process was selecting the papers to be used. The papers were assessed in steps, first assessing the relevancy through title, abstract and keywords and then evaluating the full papers after passing the initial evaluation. Finally, the data extracted from the selected papers was analyzed and coded. This approach followed the six-step framework proposed by [Nowell et al., 2017], which included familiarizing with the data, generating initial codes, searching for themes, evaluating themes, defining themes, and producing the results. The defined themes are the key concepts of this study: IT-Project Success, Employee Well-being, Metrics, Measurement. The systematic exploration of the data was facilitated by employing open coding techniques and adhering to the prescribed analysis guide. Four specific examples of codes, sub-themes, and themes that

emerged from the analysis are presented in Table 2. Steps 2, 3 and 4 were also done iteratively through the literature review.

Table 2: Analysis examples of literature review data

Passage	Code	Sub-theme	Theme
"With regard to the three criteria commonly used it proved insufficient to measure the IT project success [4]. The three criteria, known as the iron triangle, were proven to have no significant relationship to project success [4]. This is consistent with the following illustrations." [Sulistiyani and Tyas, 2022]	Comparing new and old definitions and criteria of IT-project success	Defining IT-project success	IT-Project Success
"This paper proposes that employee well-being includes four dimensions: job satisfaction, life satisfaction, positive affect, and negative affect. Each dimension is interdependent and correlated." [Dong and Yan, 2022]	Giving one definition of employee well-being based on literature findings	Defining employee well-being	Employee Well-being
" Although both types of projects are means for change and may have a wide range of internal and external effects, the success of private projects is normally evaluated by using a narrow set of metrics, usually related to financial profitability, and the most important stakeholders are the owners/shareholders and employees of companies." [Volden and Welde, 2022]	Examination of different metrics found in literature for IT-project success	Defining IT-project success metrics	Metrics
"These results justified the need to find an appropriate measurement method for empirical research into multiple stakeholder groups' perceptions of project success." [Davis, 2016]	Creation and definition of a measuring method for specific metrics of project success	Measuring IT-project success	Measurement

The themes presented in Table 2 are the key concepts of the study and the base of the concept-centric approach. The concept of IT-project success refers to the achievement of desired outcomes and objectives within an IT project. It encompasses factors such as meeting project goals, staying within budget and schedule, delivering quality results, and satisfying stakeholder expectations [Ika and Pinto, 2022; Sulistiyani and Tyas, 2022]. Project success is typically measured by specific metrics and indicators. The concept of employee well-being pertains to the overall physical, mental, and emotional health, satisfaction, and happiness of employees within the context of their work environment. It encompasses aspects such as job satisfaction, work-life balance, stress levels, motivation, engagement, and overall quality of

work experiences [Johnson et al., 2017; Bencsik, 2022; Dong and Yan, 2022]. In the context of this study, the metrics concept refers to quantifiable measures or indicators used to assess and evaluate project success and employee well-being. These metrics can be specific performance indicators, surveys, questionnaires, or other instruments that provide data for analysis and comparison [Lacerda et al., 2009; Kerzner, 2015]. Finally, the measurement concept refers to the process of collecting, analyzing, and interpreting data to assess the levels or values of specific variables or concepts [Lacerda et al., 2009; Bencsik, 2022]. In this study, measurement is used to evaluate project success and employee well-being by applying relevant metrics and assessing their impact or correlation.

Given the interdisciplinary nature of this thesis, which encompasses agile IT-project development, metrics analysis, and employee well-being, a diverse range of journals from these respective fields were consulted. By incorporating insights from various journals, this thesis benefits from a comprehensive understanding of the intersection between agile IT-project development, metrics analysis, and employee well-being. This multi-disciplinary approach ensures a holistic examination of the topic, leading to a more nuanced and informed analysis of the research questions at hand. As Webster and Watson [2002] suggest, major publications are in the leading journals, these were used as the primary sources for the research. However, additional sources were also used for complementary perspectives and inspiration.

The primary publications selected for this study were from the following journals: "Journal of Workplace Behavioral Health," "International Journal of Project Management," "International Journal of Workplace Health Management," "Journal of Management," "Procedia Computer Science," and "Journal of applied psychology." These journals were chosen based on their relevance and significance in the respective fields of workplace behavioral health, project management, workplace health management, management, and computer science. Additional sources were utilized as complementary and thought provoking.

The search was conducted in academic databases, including Scopus and Web of Science database. The search terms "IT Project Success", "Project success metrics" and "Measuring project success" were utilized for understanding project success in existing literature and "Employee well-being" and "Measuring employee well-being" for understanding the well-being part. For the linking of the two, search term "Employee well-being and project success" was used.

The search was performed in December 2022, and the papers retrieved were evaluated based on their titles, abstracts, and keywords to determine their relevance to the study's inclusion criteria. Specifically, papers that substantially discussed project success or employee well-being metrics and were not editorials, commentaries, or book reviews were selected for further analysis. Additionally, some base knowledge was searched from books and older publications that have been used in multiple later publications. The papers found with the search terms are summarized in Table 3 and Table 5.

Table 3: Summary of the selected papers for IT-project success

Search term	Related papers
"IT Project Success"	<ul style="list-style-type: none">• Sulistiyan and Tyas [2022] What is the measurement of the IT project success? <i>Procedia computer science</i>• Ika and Pinto [2022] The "re-meaning" of project success: Updating and recalibrating for a modern project management. <i>International journal of project management</i>• Mubarak et al. [2022] Psychological distress and project success: The moderating role of employees resilience and mindfulness. <i>International journal of project management</i>
"Project success metrics"	<ul style="list-style-type: none">• Kerzner [2015] Project management 2.0: leveraging tools, distributed collaboration, and metrics for project success <i>Hoboken, New Jersey: John Wiley and Sons Inc.</i>• Lacerda et al. [2009] A Study Case about a Software Project Management Success Metrics 2009 33rd Annual IEEE Software Engineering Workshop
"Measuring project success"	<ul style="list-style-type: none">• Volden and Welde [2022] Public project success? Measuring the nuances of success through ex post evaluation <i>International journal of project management</i>• Gil and Fu [2021] Megaproject Performance, Value Creation, and Value Distribution: An Organizational Governance Perspective <i>Academy of Management Discoveries</i>• Davis [2016] A method to measure success dimensions relating to individual stakeholder groups <i>International journal of project management</i>

In the Table 3 are summarized the different publications related to project success search terms. Additionally, With the search term "Project success", the [Baccarini \[1999\]](#) article was found. The article was published in *Project Management Journal* and has been cited in various articles and conference papers since its publication. This article offers a baseline for defining project success throughout history. More source material was found through searching the publications that have cited this article, a summary of these publications are listed in Table 4. These publications were analyzed through relevance and timeliness.

Table 4: Summary of publications found through [Baccarini \[1999\]](#)

Author(s) and year	Publication
Sastoque-Pinilla et al. [2022]	Project Success Criteria Evaluation for a Project-Based Organization and It's Stakeholders-A Q-Methodology Approach <i>Applied Sciences (Switzerland)</i>
Scheepers et al. [2022]	Aligning stakeholders' perceptions of project performance: The contribution of Business Realisation Management <i>International journal of project management</i>
Albert et al. [2017]	Evaluation of project success: a structured literature review <i>International Journal of Managing Projects in Business</i>
Iriarte and Bayona [2020]	IT project's success factors: a literature review <i>International Journal of Information Systems and Project Management</i>
Volden and Welde [2022]	Public project success? Measuring the nuances of success through ex post evaluation <i>International Journal of Project Management</i>
Khan et al. [2020]	The Impact of Psychological Empowerment of Project-Oriented Employees on Project Success: A Moderated Mediation Model <i>Economic Research-Ekonomska Istraživanja</i>

Table 5 summarizes publications found by using search terms related to employee well-being. In addition to the relevant papers found for employee well-being a book "Well-Being" by [Johnson et al. \[2017\]](#) was used as a base for employee well-being knowledge, as it provides a comprehensive explanation of well-being. Additionally, as the research is focused on organizational setting, a paper by [Ryff \[2019\]](#) from *Journal of business venturing* was chosen, as it provides supportive information about employee well-being from the organizational viewpoint.

Table 5: Summary of the selected papers for employee well-being

Search term	Related papers
"Employee well-being"	<ul style="list-style-type: none"> • den Broeck et al. [2016] A Review of Self-Determination Theory’s Basic Psychological Needs at Work <i>Journal of Management</i> • Crawford et al. [2010] Linking job demands and resources to employee engagement and burnout: a theoretical extension and meta-analytic test. <i>Journal of applied psychology</i>
"Measuring employee well-being"	<ul style="list-style-type: none"> • Dong and Yan [2022] A Multicriteria Approach for Measuring Employee Well-Being <i>Frontiers in Psychology</i> • Holmgren Caicedo et al. [2010] Managing and measuring employee health and wellbeing: a review and critique <i>Journal of Accounting and Organizational Change</i> • Juniper et al. [2009] Assessing employee wellbeing: is there another way? <i>International Journal of Workplace Health Management</i> • Bencsik [2022] Measuring organizational well-being and happiness based on GNH logic <i>Economics and Sociology</i>

2.2 Empirical study

The objective of this thesis is to provide IT-project success metrics for organizational use. This means the analysis of the existing metrics provided in literature and locating possible limitations of existing literature. Additionally, employee well-being metrics are analyzed in order to find a practical combination for the two.

2.2.1 Case description

As the result of this thesis is set to be a tangible artifact, action research is a suitable method for conducting the empirical study. [Davison et al. \[2004\]](#) define the aim of action research to be solving a real-world problem while simultaneously studying the experience of solving the problem. Action research requires collaboration from the problem owner [[Easterbrook et al., 2008](#)]. As stated, both defining and solving a problem are part of action research and the problem owner’s input is required for both [[Easterbrook et al., 2008](#)].

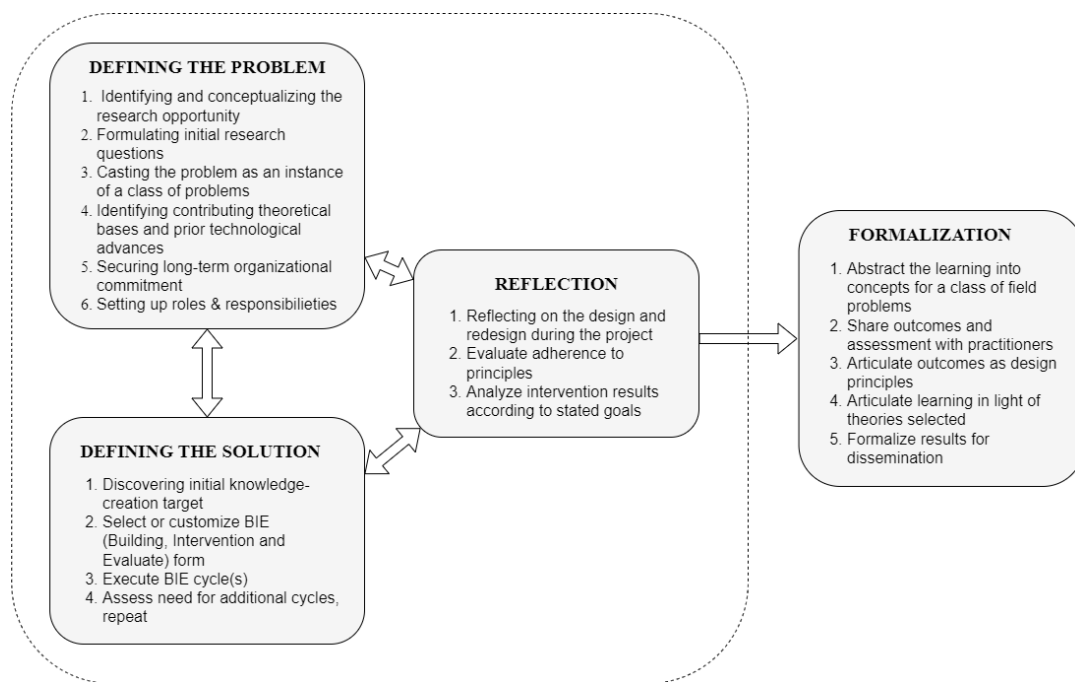
The solution of the problem in the scope of this thesis is set to be an IT artifact, meaning that the part of action research used for this thesis is design research, more specifically action design research (ADR). In this study, the IT artifact created was a measuring system for IT-project success, that takes into account employee well-being. Action design research aims to generate prescriptive design knowledge through building and evaluating IT artifacts in an organizational setting [[Sein et al., 2011](#)]. The aim is to define a problem situation and to construct an IT artifact that addresses the defined problem.

The empirical study was conducted in an organizational setting within a collaborative IT-consulting company. The IT-consulting company specializes in providing comprehensive IT solutions and services. They offer expertise in customer engagement, business intelligence, data science, cloud and security, and modern workplace solutions. From the organization, in total of six people took part in the research from roles in leadership, project management and consulting.

2.2.2 Research process

Action design research is conducted in four steps. These steps are portrayed in Figure 1. Firstly, the problem is formulated. This is done by intervening and evaluating a specific organizational setting [Sein et al., 2011]. Secondly, the solution is formulated, in the case of action design research the solution is an IT-artifact. The formulation of the solution includes also evaluating the proposed artifact in it's context [Sein et al., 2011]. Thirdly, the researcher reflects on the process and the created artifact and can propose a revised version of it. Finally, the formalization of these learnings is released in the actual use context [Sein et al., 2011].

Figure 1: Action design research process by [Sein et al., 2011]



The first step of action design research is defining the problem. This includes six tasks, starting with the initial trigger for research. As the opportunity for research is discovered, the problem formulation conceptualizes the opportunity, initial scope is set, roles are set and the initial research questions are formulated. A critical part of the first step is securing organizational commitment to the proposed change. Additionally, another critical part of the problem definition is defining the initial research opportunity through a class of problems. These steps secure a foundation for the research and therefore solution creation. [Sein et al., 2011]

The second stage of action design research is defining the solution. This is done through a cycle called Building, Intervention and Evaluation (BIE) and the stage consists of four distinct tasks. The outcome of this stage is the realized design of the artifact. The first task is identifying the need for knowledge-creation and setting the targets for it. The second task is the selection of the BIE form. [Sein et al. \[2011\]](#) identify two different approaches: IT dominant BIE and Organization-Dominant BIE. The main difference between these two approaches is the inclusion of end-users in the design process. [\[Sein et al., 2011\]](#)

In the organization-dominant building, intervention and evaluation approach, the end-users are more heavily involved during the entire process. The goal of the artifact creation is true organizational intervention and therefore the end-users are heavily involved through the creation process. In the IT-dominant approach the emphasis is more on the innovation and novel artifact itself. There is end-user involvement, but the initial iterations can also be conducted within the action design research team. So as the target has been set for the knowledge-creation, the second task is selecting the most suitable approach for the actual creation of the artifact. [\[Sein et al., 2011\]](#)

The third step of the process is the actual execution of the building, intervention and evaluation cycles. This means building the first iteration of the artifact, introducing it to the organization (intervention) and evaluating the results. These steps are conducted iteratively, which is why the final task of this stage is the assessment of the need for additional cycles. With this iterative stage the final product is the actual IT-artifact. [\[Sein et al., 2011\]](#)

The third stage of the action design research process is the reflection and learning. It consists of three distinct tasks and is conducted also simultaneously with the first two stages. This is shown in the first task, that requires reflection also during the project. The second task of the stage is evaluating adherence to principles. Finally, the results should also be analyzed through the set goals. As stated, this stage is conducted simultaneously with the first two stages to ensure the best possible results, as the learnings from the analysis can still be implemented during the project. [\[Sein et al., 2011\]](#)

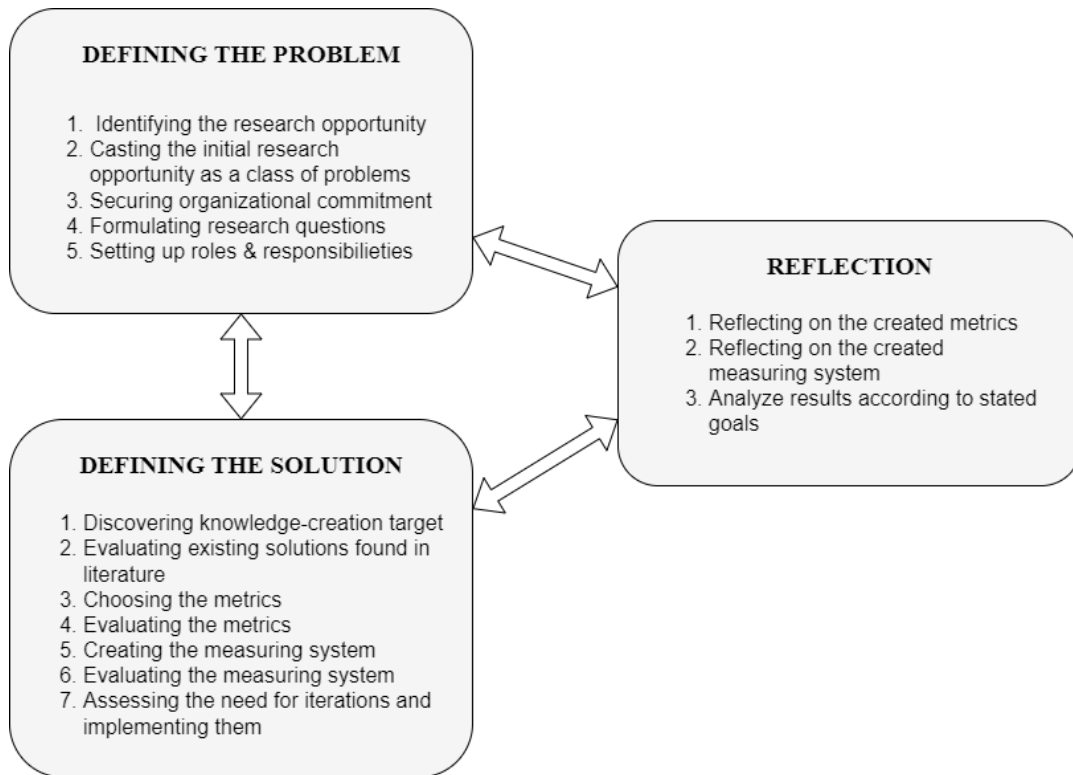
Finally, the last stage of action design research (ADR) is the formalization of learning. Drawing from the principle of creating generalized outcomes, this stage is the part that drives for the true organizational change. The stage is split into five distinct tasks, the first reflecting back into the first stage where the learnings from the project can be abstracted into concepts for a class of problems. As ADR aims for the creation of novel artifacts and knowledge, the tasks 2-4 are focused on the sharing of the outcomes. The theories, design and learnings should be shared with practitioners. Finally, the results are formalized for dissemination. [\[Sein et al., 2011\]](#)

For the scope of this thesis, the full action design research (ADR) process presented in [Figure 1](#) would be too heavy. In this thesis the principles of ADR are utilized in a moderated way. The modified stages and tasks are depicted in [Figure 2](#).

For this thesis, the first step was formulating the problem. The initial interest for the research was sparked by the statistical fact that project natured work is causing stress among IT-workers [\[Gällstedt, 2003\]](#). This problem was then analyzed through an organizational lens. The stress of project natured IT-workers was observed in an empirical way as well as it was found in well-being questionnaires conducted in an organizational setting.

The observations made in the organization were formatted into questions: are IT-project workers overworked? Does project natured work cause stress? Does stress have negative impact on well-being? Does poor employee well-being cause costs for the employer? These questions were guiding the second step of the problem definition, which was the process of

Figure 2: Moderated action design research process for this thesis



casting the initial research opportunity into a class of problems. Observations were made about the different factors with the problem, some initial literature search was conducted, and the opportunity was formed into a few defined problems within an organizational setting. As the first inspiration for this research was too broad to consider in the scope for this thesis, the defined problem was formulated to be more specific. As the aim is to encourage commitment for change across organizations in the industry, the problem needs to be specific, yet common. With these motivations, the problem was defined together with the organization as follows: The pressure for project success can drive for a decreased employee well-being.

There are several factors that could affect employee well-being. These factors include long-time stress, negative relationships in the workplace, overworking as well as several factors outside of the working environment. As this study aims to focus on the effects of IT-project work, the overall health of employees, as well as long-term employee well-being on an organizational level are left out of the problem definition. Employee well-being is a multifaceted issue and this research focuses solely on how to scope out single project's influence on employee well-being and therefore the long-term studies are not included in the problem definition of this study.

The third step of the problem defining is to secure commitment from the organization. To achieve this, a problem owner from the organization was introduced to the topic early on by the researcher. With the problem owner the initial research opportunity was discussed to define a problem that would be meaningful to both, the researcher, and the organization. As the problem was defined with the help from the problem owner, a commitment was formed between the researcher and the organization.

After some literature research about the topic, this problem was further revised, and the fourth step of the process was initiated. This entails formulating the defined problem into a research question: How can IT-project success be measured in a manner that incorporates and acknowledges the well-being of employees? The motivations behind this research question are in combining employee well-being as part of success with the idea, that combining employee well-being as part of IT-project success, it would guide organizations to consider projects successful only in situations where they do not have a negative effect on their employees' well-being. As the focus of the study is on IT-projects, the main focus of the solution is on the psychological well-being of the employees, as the decrease in it was also the original inspiration.

Finally, as the problem was defined and the organizational commitment was secured, the roles and responsibilities of the different participants were set up. In this thesis, the problem owner is responsible for offering guidance for the thesis and giving the organizational perspective, as well as guiding the implementation process within the organization. The definition of the problem, creation of the solution and testing the results is the responsibility of the author of the thesis.

The moderated action design research (ADR) process used includes also defining the solution part and reflection part. The steps taken in these parts have been moderated from the original ADR -process described by [Sein et al., 2011] and the more detailed descriptions of these steps are explained in the following section.

2.2.3 Data collection and analysis

As the problem has been defined and formulated into research questions, the second part of the action design research (ADR) is the defining the solution. The defining of the solution in the complete ADR process by [Sein et al., 2011] includes four steps and possible iterations. The moderated ADR process used in this thesis included seven distinct steps: discovering knowledge-creation target, evaluating existing solutions found in literature, choosing the metrics, evaluating the metrics, creating the measuring system, evaluating the measuring system and finally assessing the need for iterations and implementing them as needed. This approach was created using the ADR process by [Sein et al., 2011] as a base and the steps were moderated and defined to match the creation of a measuring system.

The first two steps were discovering and evaluating the literature and the initial task with the solution discovery was the literature research. At first, the targets for the research were set. As the objective of the thesis is to create a measuring system, the initial knowledge-creation target was set to search literature for existing solutions. In order to do so, it was needed to define both project success in IT-projects as well as employee well-being.

After having definitions for both IT-project success and employee well-being, added literature research was conducted to understand the existing metrics in literature. For IT-project success, research was conducted on the existing variables presented in literature and the variables already in use in the organization and the different ways to measure these variables. Literature was found on existing complete palettes for measuring IT-project success and on

single variables. For this thesis the emphasis is on the single variables and therefore also the complete solutions presented in literature were analyzed through the single measuring variables.

Literature research was also conducted on the measuring of employee well-being. The literature found consists of mostly periodical questionnaires that cover different parts of well-being. These metrics were analyzed through occurrence and relevancy. Finally, the results were drawn together: what does IT-project success mean and how it can be measured in existing literature and what does employee well-being mean and how the measurements are exhibited in existing literature.

As sufficient knowledge of the topic was discovered, the second task was evaluating the findings through an organizational view. The metrics were analyzed through a practical point of view and thus an interview study was conducted to gather a better understanding of the current ways of measuring IT-project success and the possible difficulties with the theoretical metrics.

For the interviews an unstructured interview method was used. [Zhang and Wildemuth \[2009\]](#) describe the method as more of a conversation than an interview. This method was chosen as the interviews were chosen as a support method for analyzing the literature results and for this it was important that the interviews were used as an incubator for ideas so that proper analysis would be possible. The target group of the interviews consists of IT-project managers, IT-consultants and unit leads of the supplier organization. The interviewees are summarized in Table 6.

Table 6: Summary of interviews

Interviewee	Role	Date
Interviewee 1	Unit lead	8.5.2023
Interviewee 2	Project manager	8.5.2023
Interviewee 3	Project manager	9.5.2023
Interviewee 4	Project manager	9.5.2023
Interviewee 5	Consultant	9.5.2023
Interviewee 6	Consultant	10.5.2023

Project managers are in an important role for this study, as it is important to understand what current metrics are in use, how they work and if there are no metrics, what are the reasons for it. Project managers also have good understanding of the possible workload of different measuring methods and are thus able to offer insights on the practicalities of measuring IT-project success. Additionally, in customer projects in a supplier organization, IT-consultants would be the ones participating in the measuring of well-being. Thus, it is crucial to get insights into how the measuring could be done without adding to the workload and stress of the employees. Finally, unit leads provide insights into what could be interesting on an organizational level. This is important to know, as the metrics is created to be used widely in the organization.

Additionally, to the practical analysis, the literature findings were analyzed through the reliability of the source material, the novelty of the ideas and the feasibility of the solution. The initial suggestion for the measuring system was thus created based on presenting and discussing the literature findings in six unstructured interviews, conducted in May 2023. Content analysis was conducted for the interview results to emerge codes from the data [[Hsieh and Shannon, 2005](#)]. The decoding of the data was done by recognizing the reoccurring

themes and suggestions of the interviews. These were then mirrored to the literature results to determine the most important metrics for different target groups and to gather suggestions for the possible measuring systems.

The third step of the action design research process was then choosing the metrics. The metrics were then chosen by analyzing the literature findings and combining them to the organizational analysis conducted in the interviews. After choosing the metrics, the fourth step is evaluating the chosen metrics. They were evaluated through a practical viewpoint and feedback was gathered from the interviewees.

The fifth step of the process is the creation of the holistic measuring system. This entails choosing the methods of measuring and reporting the chosen metrics. The methods for measuring were chosen by combining existing methods with the reoccurring suggestions from the interviews. Finally, a way of reporting the results was drawn together by utilizing methods of data analytics. The report was designed in a way that it could be used as a guide to take actions to fix the possible problems during the project. Thus, a suggestion of a full measuring system was created including the metrics, measuring methods, reporting and possible action points.

After creating the suggestion for the measuring system, it was sent to the same target group that participated in the initial interview study. Feedback was gathered from the target group and additional four interviews were conducted. The same unstructured interview method was used again as it was familiar to the participants and the open conversation allows for exploring a wide variety of topics and perspectives. The method was chosen to ensure that the impact of the interviewer on results would be minimized, as pre-set questions can be seen as guiding the interview extensively and for the purpose of this study it was important to allow for all ideas and feedback to be freely expressed. The final step of the solution creation is the assessment of the need for iterations. For this thesis, the measuring system went through two iterations of the steps from 3 to 6.

After the solution was created and evaluated and possibly modified according to the evaluation, the final solution is introduced in practice in the organizational setting. As shown in Figure 1, part of action design research is the formalization of the solution. However, for the scope of this thesis this step is left out and therefore the final step of the process was the reflection.

The reflection part of the moderated action design research process involves three essential steps. Firstly, it reflection on the metrics that have been created was done. This step involved evaluating the relevance and effectiveness of the metrics in measuring IT-project success while considering the well-being of employees. Secondly, reflecting on the created measuring system was done. The full measuring system created encompasses the metrics, measuring methods, reporting system, and guides for taking action. This step focused on assessing the suitability and comprehensiveness of the measuring system in capturing the desired outcomes and incorporating employee well-being metrics. Lastly, the reflection process involved analyzing the results obtained from the research in relation to the stated goal of measuring IT-project success that acknowledges employee well-being. The analysis was conducted to determine the extent to which the metrics and measuring system align with the goal and provide insights for further improvements or adjustments.

While the evaluation of the solution was focused on the organizational view of with the collaborative partner, the reflection part aimed to generalize the most important learnings to be shared. The learnings were formatted by revising the steps taken and analyzing the possible shortcomings of the process itself. Furthermore, the possible strengths and weaknesses of

the created measuring system were analyzed by reflecting on the steps that were taken to create it. Finally, the result of the study, the created metrics system, was analyzed with the research problem in mind to reflect if it could be seen as an answer to the initial problem. With these steps, the reflection part of the moderated action design research process was used to give precise conclusions of the most important learnings, that could be shared also outside of the collaborative organization to all interested organizations. Finally, to notice, while the formalization aspect of the process fell outside the scope of this thesis, it is essential to note that the measuring system is intended to be formalized within the organization.

3 Results of the literature review

The objective of the literature review is to answer the first two research questions. Specifically, the aim is to present the existing metrics for both IT-project success as well as employee well-being. Furthermore, the literature review explores how and why employee well-being is linked to project success.

3.1 Defining IT-project

First, it is necessary to understand the definition of an IT-project in terms of this research to understand the success in it. [Zwikael and Smyrk \[2012\]](#) define project as a process that requires input and produces an output. The input is the resources needed and the process is the defined way to produce the result, an output. The definition of a project therefore entails both the process and the end result [[Zwikael and Smyrk, 2012](#)]. When defining IT-project success, it is notable that both should be taken into account in the evaluation [[Iriarte and Bayona, 2020](#)]. For information technology (IT) projects, either the input, output or both can require information technology. The definition of a IT-project can be about change management, as an example implementing a change in the organization's enterprise systems architecture. Alternatively, an IT-project can be the creation of a new IT-product, as an example a web app [[Iriarte and Bayona, 2020](#)].

In this research, the definition of an IT-project covers medium and large IT-projects that are provided by a supplier organization to a customer. The project should have at least a project manager and minimum of two other employees from the supplier organization. The project can have either input or output or both as the IT-element.

3.2 Defining project success

In order to understand how to measure success in IT-projects, it is necessary to have a definition for success. In literature, project success is traditionally defined through "The Iron Triangle": cost, time and quality [[Atkinson, 1999](#); [Albert et al., 2017](#)]. The success in terms of cost simply refers to meeting the budget goal [[Baccarini, 1999](#)]. Success with time can be defined in terms of meeting the schedule [[Baccarini, 1999](#)].

Defining quality of the project provides more of a challenge. [Atkinson \[1999\]](#) suggests that the measurement of quality is influenced by the human-factors such as peoples' attitudes and beliefs and can, and often is, changed throughout the life-cycle of the project. [Baccarini \[1999\]](#) offers to divide between defining product success and the project management success. This divide helps with seeing project quality from a more objective point of view. It can be difficult to measure the quality of a project as the end product can be successful while project management can fail, and vice versa [[Baccarini, 1999](#)].

As time and cost can be defined unambiguously, these components of project success have stayed similar in literature through time. However, more recent literature gives more depth into the concept of project quality success. [Ika and Pinto \[2022\]](#) offer a perspective of how project success can be separated from project performance. The latter referring to the early defined metrics of time and cost, and the prior to the quality definitions of project success.

[Zwikael and Smyrk \[2012\]](#) shift the term from project success towards project benefits, offering that the success of a project could be measured through the value it produces. In literature, value refers to the added benefits, both economic and social, of the project after deducting the costs [[Ika and Pinto, 2022](#); [Gil and Fu, 2021](#); [Laursen and Svejvig, 2016](#)]. As

there are many stakeholders in a project, the value of the project is also measured through the different beneficiaries. In recent literature, the definitions of project success are close to this kind of multifaceted approach. The different project benefits found in literature are depicted in Table 7.

Table 7: The benefits of successful projects in literature

Source	Benefits	Benefitter
Atkinson [1999]	Improved efficiency and effectiveness, increased profits, strategic goals, organisational learning, reduced waste	Organization
Atkinson [1999]	Satisfied users, social and environmental impact, personal development, professional learning	Stakeholders
Zwikael and Smyrk [2012]	Effective return on the investment in the project	Project funder
Gil and Fu [2021]	Cost savings	Supplier
Gil and Fu [2021]	Improvements in economic welfare	Wide range of beneficiaries
Gil and Fu [2021]	Positive environmental impact	Wide range of beneficiaries
Ika and Pinto [2022]	Positive societal impact	Wide range of beneficiaries

The benefits of project success help in analyzing the factors behind project success. As an example, according to Ika and Pinto [2022], project success criteria should include metrics for relevance, efficiency, effectiveness, impact and sustainability. Relevance referring to how well the project matches the given problem or set goal, efficiency depicts if the project performs in the best possible way with the least resources, effectiveness showcases how well the project output has been adopted to use in practice among different project stakeholders, the impact of the project simply refers to the effects the completion of the project has and finally, sustainability in this study refers to how long these effects are shown, meaning how long until a new iteration has to be made [Ika and Pinto, 2022]. Marnewick et al. [2017] supports these views offering that both relevance and efficiency of an IT-project benefit the organization itself as well as the customer, by giving competitive advantage.

Sulistiyan and Tyas [2022] support the thought of a more in-depth definition of project success as projects can be successful on technical aspects but should be considered failures if the project is not in use. Sulistiyan and Tyas [2022]'s views support the meaning of both relevance and effectiveness as the project should not only offer a solution to a real problem but also be easily implemented and accessed in the environment it was created for.

The environment of the project is also considered as part of the success of a project in literature [Marnewick et al., 2017; Kivijarvi, 2020]. Kivijarvi [2020] offers that the definition and metrics of IT-project success should be considered through a hierarchical, multilevel framework. The success of an IT-project is therefore defined not only through the product and process but within their environment as well.

Kivijarvi [2020] starts the definition of an IT-project success from a different point of view. If in general project success could be defined through the process and product Kivijarvi [2020] offers that IT-project can be defined through a system point of view. In this approach the system is the IT-project and the subsystems are the possible subprojects. The top level entities according to Kivijarvi [2020] are for example the scope of the project, time, cost and quality, supporting the common view in literature of project definition.

So, in literature the constants of project success definition seem to be about staying within the scope of the project: meeting deadlines and budget and delivering what was agreed upon. This definition is divided into three parts: time, cost and quality, where quality is further divided into parts. This definition of project success is depicted in Figure 3.

Figure 3: Project success definition

Cost	Quality
Meeting the project budget	<ul style="list-style-type: none"> ➤ Success in processes ➤ Project relevance ➤ Sustainability ➤ Effectiveness ➤ Efficiency
Time	
Meeting the set deadlines	

3.3 Measuring IT-project success

As the success of an IT-project can be defined through the achieved benefits of different stakeholders, these benefits should also be measured. In literature, there are several different metrics found to measure the success of projects. Table 8 summarizes some metrics found in literature.

Table 8: Project success metrics in literature

Source	Metrics	Definition
Iriarte and Bayona [2020]; Marnewick et al. [2017]; Lech [2013]; Baccarini [1999]	Cost	Project meeting the set budget
Baccarini [1999]; Kivijarvi [2020]	Time	Project meeting the set deadlines
Volden and Welde [2022]; Ika and Pinto [2022]; Sulistiyani and Tyas [2022]	Effectiveness	Project's contribution to meeting user needs
Volden and Welde [2022]	Sustainability	Benefits persistent through life-time
Ika and Pinto [2022]; Gil and Fu [2021]	Green efficacy	The environmental impact of the project
Sastoque-Pinilla et al. [2022]; Davis [2016]	Communication	Communication between and within stakeholders
Sastoque-Pinilla et al. [2022]; Scheepers et al. [2022]; Iriarte and Bayona [2020]; Davis [2016]	Project satisfaction	Different stakeholders' view of meeting the project objectives

These metrics found in literature are measured in various ways. Cost of the project can be measured in a quantitative way by summing up the cost of resources needed for completing the project [Baccarini, 1999]. However, it should be noted that the budget of a project is usually set before or in the beginning of the project [Alexander, 2020]. This means that the scope of the project is a critical factor when measuring the success of the project through cost. It is the responsibility of the project manager to make sure the scope is well defined and not changed during the project [Alias et al., 2014].

Similar quantitative methods can be used when measuring the IT-project success through time. The same principals apply to both time and cost: both need to be realistically set with the project scope well defined [Alias et al., 2014]. In many IT-projects time is the critical metric, as the deadlines might be set for a specific reason. Therefore many of the other resources are defined with the time constraints in mind [Iriarte and Bayona, 2020].

Project quality can be more difficult to measure with quantitative means. As presented in Table 8, the quality of a project is spread through different metrics in literature. As quality is defined through several factors, there are no clear quantitative metrics for the project quality as a whole. However, the quality of an IT-project can still be measured through these different factors. It is noticeable that quality is also often measured with more qualitative means, as quality has different meanings to different stakeholders in the project [Scheepers et al., 2022; Davis, 2016].

The quality standards of an IT-project help to guide the quality definition and assessment through the project [Kandengwa and Khoza, 2021]. The quality standards of an IT-project refer to the project meeting the requirements of it's users. As an example in software projects, it means that the project output should offer a solution to a problem and the software should be functionable [Bergmann and Karwowski, 2018].

One aspect of quality is the effectiveness of the project, which can be defined as the alignment of the end result with the actual needs of the end user [Volden and Welde, 2022]. Cronin [1981] defines user needs as the specific requirements, expectations, and preferences of individuals or groups who will be using a product, system, or service. It encompasses the functional, emotional, and usability aspects that are essential for fulfilling the users' goals and delivering a satisfactory experience. User needs are determined through a comprehensive understanding of the target users, their context, and the problem or opportunity that the product or system aims to address [Cronin, 1981].

In recent literature effectiveness is also considered the starting point of the project. Understanding the end users need is what drives the project to be started. Design research is a methodology that combines creative problem-solving with rigorous research principles to address complex challenges and generate innovative solutions [Buur and Matthews, 2008]. It emphasizes an iterative and user-centric approach, integrating design thinking, experimentation, and systematic inquiry. The iterative nature of design research allows for continuous refinement and improvement of ideas, while the focus on user needs ensures that solutions are tailored to meet the requirements of the intended users [Buur and Matthews, 2008]. By integrating creative exploration with empirical investigation, design research offers a holistic approach to problem-solving that goes beyond traditional research methods [Cross, 2006].

When the primary objective of a project is to achieve effectiveness, it is essential to define the intended purpose or desired utilization of the project output. When the need and the possible use cases are well defined in the beginning of the project, effectiveness could also be measured with quantitative methods [Alexander, 2020]. As an example, if it is known how and when users could benefit the project output the most, it can be measured to which extent the project outcome is truly being used in the originally intended way [Baccarini, 1999].

End users' input is also required when measuring the sustainability of the project. Sustainability offers a challenge, as in the context of an IT-project it is defined as the longevity of the project output [Volden and Welde, 2022]. The true benefits of the project output through life-time cannot be measured immediately after the project. Therefore the end users' contribution is needed to form an estimate of how the project could meet the needs of the users in the future [Volden and Welde, 2022].

The end users are also needed to give an evaluation of project satisfaction. Project satisfaction can be measured both with a qualitative or quantitative methods. As project satisfaction means how the different stakeholders see the project meeting the pre-set objectives [Baccarini, 1999], it should also be measured with the input of all stakeholders in the project [Sastoque-Pinilla et al., 2022; Davis, 2016].

The process in between the input and output of the project should also be evaluated throughout the project. One metric used for this is measuring the communication both between and within the stakeholders of the project [Sastoque-Pinilla et al., 2022]. Evaluating communication can also bring forward problems with project definition and scope. As mentioned, the scope of the project should be well-defined already before the project implementation begins. If the communication between the different project stakeholders is not effective, the scope can be left ambiguous [Alexander, 2020].

Communication is also part of project satisfaction. As the time and cost of a project can change also during the process, the effectiveness of communication can play a huge role in achieving project satisfaction despite changing circumstances. However, communication is a distinguished part of project satisfaction and can be measured on its own [Davis, 2016]. Communication should also be measured not only between the different stakeholders but also

within the stakeholders [Sastoque-Pinilla et al., 2022; Scheepers et al., 2022]. As an example, the communication of the project manager and the technical team as well as just how effective the communication has been within the technical team.

Finally, part of the IT-project success metrics is the green efficacy, measuring the environmental impact of a project. Green efficacy in IT-projects refers to the ability of these projects to achieve environmental sustainability goals while delivering their intended outcomes [Ika and Pinto, 2022]. In literature green efficacy is often integrated as part of sustainability. However, in more recent literature [Ika and Pinto, 2022; Gil and Fu, 2021] this is separated as it's own metrics, as green values continue to grow in importance. There has been a growing recognition of the urgent need to address environmental issues and mitigate the impact of human activities on the planet. The escalating concerns about climate change, resource depletion, and pollution have led to a heightened focus on sustainability and environmentally friendly practices [Chen et al., 2014]. Additionally, stricter regulations and policies have been implemented globally, pushing organizations to adopt greener and more sustainable approaches. Moreover, consumers are becoming more conscious of their environmental footprint and are increasingly demanding products and services that align with their values. To remain competitive and meet customer expectations, businesses are compelled to prioritize green efficacy, emphasizing efficient resource utilization, reduced emissions, and eco-friendly practices [Chen et al., 2014]. As a result, the emphasis on green efficacy has grown significantly in recent years, driving organizations across various industries to incorporate sustainability as a core principle of their operations.

As organizations increasingly prioritize sustainable practices, integrating green efficacy into IT-projects has gained significance. Green efficacy encompasses strategies such as reducing energy consumption, minimizing electronic waste, adopting eco-friendly technologies, and promoting sustainable practices throughout the project lifecycle [Gil and Fu, 2021]. Reducing energy consumption is crucial in IT projects as data centers and computing infrastructure consume significant amounts of energy. By optimizing energy usage, implementing energy-efficient hardware and software solutions, and employing virtualization techniques, IT projects can contribute to minimizing carbon footprints and operating more sustainably [Introna et al., 2014].

Secondly, minimizing electronic waste is essential in IT projects due to the rapid pace of technology advancement and obsolescence. Adopting strategies such as responsible recycling, refurbishment, and proper disposal of electronic equipment helps prevent electronic waste from ending up in landfills, conserves resources, and reduces the environmental burden [Agarwal and Nath, 2011]. Thirdly, adopting eco-friendly technologies is a key aspect of green efficacy in IT projects. This includes utilizing renewable energy sources to power IT infrastructure, incorporating energy-efficient devices and components, and employing virtualization and cloud computing to optimize resource utilization [Lakshmi et al., 2012]. By leveraging these eco-friendly technologies, IT projects can contribute to a greener and more sustainable future.

Lastly, promoting sustainable practices throughout the project lifecycle involves integrating environmentally conscious principles into project planning, execution, and maintenance. This includes considering the life cycle impact of IT systems, selecting suppliers and vendors with strong sustainability practices, and incorporating environmental criteria into procurement processes. By embracing sustainable practices, IT projects can minimize their environmental footprint and contribute to a more environmentally responsible industry [Gil and Fu, 2021]. By incorporating green efficacy principles, IT-projects can contribute to environmental stewardship and align with organizational sustainability objectives.

In practice, measuring the different parts of IT-project success requires different methods. In literature, time and cost are measured with a pre-existing targets [Baccarini, 1999; Ika and Pinto, 2022]. In the beginning of a project, deadlines and budget are set and it can be measured if the project stayed within the agreed scope. This means time is simply measured on whether or not the project meets the set deadlines and cost is measured on whether or not the project exceeds the set budget [Iriarte and Bayona, 2020; Kivijarvi, 2020].

The quality of a project is more difficult to measure, as the definition is not unambiguous. The quality requirements are also distinct for each group of stakeholders and therefore should be measured in a way that takes into account the satisfaction within the different stakeholder groups. Thus, the quality of a project is not measured as one but instead, several methods have been developed to assess and evaluate the quality of IT-projects. One commonly used method is the ISO 9126 standard, which provides a framework for evaluating software quality based on six dimensions: functionality, reliability, usability, efficiency, maintainability, and portability [ISO9126, 2001]. This comprehensive approach allows for a systematic assessment of different aspects of software quality. Another widely employed method is the Capability Maturity Model Integration (CMMI), which provides a set of best practices for assessing and improving the maturity level of software development processes [McMahon, 2010]. By implementing these methods, organizations can effectively evaluate the quality of their IT-projects and implement corrective actions to enhance overall project performance.

For measuring the customer or end user satisfaction, an existing method found in literature is net promoter score (NPS). It can be measured simply with one question "On a scale of 0 to 10, how likely are you to recommend [our product or company]?". Based on their responses, customers are classified into three categories: Promoters (score 9-10), Passives (score 7-8), and Detractors (score 0-6) [Reichheld, 2003]. NPS is calculated by subtracting the percentage of Detractors from the percentage of Promoters, resulting in a score that can range from -100 to +100.

Organizations utilize net promoter score (NPS) as a key performance indicator to assess customer satisfaction and loyalty [Keiningham et al., 2007]. The simplicity and ease of use of NPS make it a popular tool for tracking customer sentiment over time and benchmarking against industry standards. NPS can provide valuable insights into customer perceptions, identifying areas for improvement and highlighting opportunities for enhancing the customer experience [Reichheld, 2003]. Additionally, NPS allows organizations to segment their customer base and focus their efforts on converting Detractors into Promoters, thus driving customer advocacy and organic growth [Reichheld, 2003].

Effectiveness on the other hand can be measured by measuring how well the end product has been taken into use. Several methods have been developed to assess effectiveness in IT-projects. One commonly used approach is the Balanced Scorecard (BSC), which provides a holistic framework for measuring project performance across multiple dimensions, including financial, customer, internal process, and learning and growth perspectives [Kaplan et al., 1996]. The BSC enables organizations to align project goals with strategic objectives and track performance indicators in a balanced and comprehensive manner.

Additionally, the Critical Success Factor (CSF) approach is employed to identify and measure key factors that are critical to IT-project success [Alias et al., 2014]. By identifying and measuring the most significant factors related to project objectives, the CSF method provides valuable insights into project effectiveness. These methods offer organizations diverse approaches for assessing effectiveness in IT-projects, allowing them to track project performance, ensure alignment with strategic goals, and make informed decisions for project improvement and success.

For more quality measuring, literature suggests mostly questionnaires. Questionnaires offer several advantages for measuring quality in IT-projects. They allow for standardized data collection, ensuring consistency and comparability across responses [Newell, 1993]. They also provide a structured approach to gather feedback from a large sample of stakeholders, allowing for a broader representation of perspectives. Questionnaires can be administered at different stages of the project, including during development, implementation, and post-implementation, to capture different perspectives and assess quality throughout the project lifecycle [Gable et al., 2008].

Furthermore, questionnaires can be used to measure both perceived quality and satisfaction levels, helping identify areas for improvement and potential gaps between expectations and actual experiences [Sulistiyan and Tyas, 2022; Gable et al., 2008]). By analyzing the responses obtained through questionnaires, researchers can gain valuable insights into the strengths and weaknesses of IT-projects, supporting decision-making and continuous improvement efforts.

3.4 Defining employee well-being

For understanding how employee well-being (EWB) can be measured during a project, there is first need to have a definition for it. Johnson et al. [2017] define well-being through three key components: psychological well-being, physical well-being and social well-being. Psychological well-being (PWB) refers to a persons ability to handle daily life stress while maintaining a positive attitude and a sense of purpose [Johnson et al., 2017]. Physical well-being refers to the physical aspects of well-being, e.g. sleep, exercise and nutrition, while social well-being covers the individual's network and social contacts [Johnson et al., 2017]. For this thesis the focus is mostly on the psychological well-being.

In literature, psychological well-being is divided into two aspects: eudaimonic well-being and hedonic well-being [Johnson et al., 2017; Martela and Sheldon, 2019-12; Ryff, 2019]. Hedonic well-being refers to the general idea of happiness: the perceived happiness of an individual, their subjective well-being and ability to experience positive emotions [Johnson et al., 2017]. Eudaimonic well-being captures the functional aspects of well-being [Martela and Sheldon, 2019-12] and can be seen as a formulation of the three innate motivational needs: autonomy, competence and relatedness [Ryff, 2019]. According to Johnson et al. [2017] these aspects can be identified and divided into the following terms: environmental mastery, positive relationships, autonomy, personal growth, self-acceptance, and purpose in life. Additionally, Johnson et al. [2017] emphasizes that the general concept of happiness is essential to psychological well-being. This definition of psychological well-being is depicted in Figure 4.

Figure 4: The elements of psychological well-being according to [Johnson et al., 2017]



The autonomy dimension of eudaimonic well-being refers to the human need to be self-determining and independent [Ryff, 2019]. While part of psychological well-being is the ability to handle changes in the environment that you can not control [Johnson et al., 2017], the environmental mastery dimension of eudaimonic well-being refers to the individuals' sense of being able to manage the surrounding environment [Ryff, 2019]. This means being able to see and seize the available opportunities but also being able to create an environment suitable for the individual [Ryff, 2019].

Ryff [2019] explains personal growth as the individuals ability to reach personal potential. As social well-being refers to the healthy connections in the individuals network [Johnson et al., 2017], the positive relations with others can be seen as the ability to form and maintain these connections. Furthermore, the individuals capability for empathy and capacity for affection are part of the eudaimonic aspect of relations with others [Ryff, 2019].

The feeling of having a purpose in life is seen as the core of eudaimonic well-being [Ryff, 2019]. This refers to the individuals ability to see meaning in their life, being able to set goals and have a direction in life [Ryff, 2019]. Finally, self-acceptance encompasses having positive attitude toward oneself, even while acknowledging one's bad qualities [Ryff, 2019].

These eudaimonic dimensions paired with the general concept of happiness are what form a sense of psychological well-being, as depicted in Figure 4. Psychological well-being (PWB) has been shown to have a link to success [Johnson et al., 2017]. It should be however mentioned, that while there is a link between the two, causality is difficult to show, as the challenge remains which comes first: good PWB or success [Johnson et al., 2017]. While there are several factors contributing to the overall PWB, the scope of this thesis entails employee

well-being, meaning the focus is on the workplace factors that influence employees overall PWB.

Johnson et al. [2017] expands the general concept of psychological well-being to also cover workplace psychological well-being. It is noticeable, that employee well-being is often not studied as much in details as employee engagement. The reason organizations are more interested in the concept of employee engagement is the correlation between strong employee engagement and organizational success, while there are little explicit reference between employee engagement and psychological well-being Johnson et al. [2017]. However, studies have shown better employee engagement from employees with a high psychological well-being Harter et al. [2003] and there are definitely benefits from happy and committed employees.

Johnson et al. [2017] establishes a theoretical connection between workplace psychological well-being and employee engagement by introducing employee satisfaction as an integral component. This proposition underscores the interrelation between these constructs and highlights the significance of employee satisfaction as a contributing factor to both psychological well-being and engagement in the workplace. Employee satisfaction refers to the extent to which employees experience contentment, fulfillment, and positive emotions in their work environment. It is an important aspect of employee well-being and organizational success. Johnson et al. [2017] emphasizes the importance of creating a supportive and fulfilling work environment that promotes employee satisfaction through factors such as meaningful work, fair compensation, opportunities for growth and development, and positive interpersonal relationships. As shown in Figure 4, personal growth and purpose in life are aspects of psychological well-being. Job satisfaction is therefore linked to the ability to achieve one's goals.

Considering these concepts further, a factor in employee well-being is also the workload placed on an individual. Since achieving one's goals is part of good psychological well-being, it should also guide the amount of work: employees should be able to achieve their deadlines without significant overload of work [den Broeck et al., 2016]. The balance of this is not straightforward as too much work can make these goals seem unreachable, but not having enough to do might make employees feel static as they are not really getting the feeling of achievement at their job [Johnson et al., 2017].

Furthermore, it is shown in Figure 4 that autonomy is an aspect of good psychological well-being. Autonomy refers to the level of independence and control individuals have over their work tasks, decision-making, and scheduling. Same concept applies to the workplace: often experts working in IT need to be able to make autonomous decisions on where and when to work. However, there is a balance with the autonomy dimension too, as too much autonomy might also make the individual feel not supported enough. Not getting support might lead to stress and decreased psychological well-being [Johnson et al., 2017]. When employees are granted autonomy, they experience a sense of empowerment and ownership over their work, leading to increased job satisfaction and engagement [Juniper et al., 2009]. Moreover, autonomy allows employees to utilize their skills and expertise, promoting a sense of competence and personal growth. [Holmgren Caicedo et al., 2010] further support this perspective by highlighting that autonomy contributes to a positive work environment and reduces stress levels. By providing employees with autonomy, organizations foster a sense of trust, respect, and empowerment, ultimately enhancing employee well-being and overall organizational performance.

Additionally, as positive relationships with others are a driving factor for good psychological well-being, it is also important to put value into the relationships at the workplace. Positive relationships are characterized by mutual respect, support, and effective communication among colleagues and supervisors. These relationships create a positive social climate, fostering a sense of belonging, trust, and camaraderie among employees. Research has shown that positive workplace relationships contribute to employee well-being by reducing stress levels and enhancing job satisfaction [Juniper et al., 2009]). Holmgren Caicedo et al. [2010] highlight that positive relationships at work promote a supportive and collaborative environment, leading to improved employee engagement and motivation. Additionally, Johnson et al. [2017] emphasizes the role of positive relationships in promoting employee satisfaction and overall well-being. Positive relationships also enhance teamwork and collaboration, facilitating knowledge sharing, innovation, and problem-solving [Holmgren Caicedo et al., 2010]. When employees feel connected and valued by their colleagues and supervisors, they are more likely to experience higher levels of job satisfaction, commitment, and productivity.

In literature it seems that the definition of employee well-being is constructed from six key factors, summarized in Table 9. These key factors are linked to both basic psychological needs, such as security and autonomy [den Broeck et al., 2016] as well as the elements of psychological well-being depicted in Figure 4. The identified key factors for employee well-being are resources and communication, control, work-life balance, job security and change, work relationships, and job conditions. These factors were chosen based on their prominence in academic literature on employee well-being. Research conducted by den Broeck et al. [2016] supports the Self-determination theory of psychological needs of autonomy, competence, and relatedness are regarded as vital for continuous psychological growth and well-being, supporting the view of Johnson et al. [2017] stating the importance of control, job security and change and job conditions. Additionally, the key factors represent important aspects that impact employees' psychological and physical well-being, job satisfaction, and overall quality of work life. Studies such as Chiochio et al. [2010]; Crawford et al. [2010]; Ryff [2019] show a link in between well-being and work-life balance and Rezvani et al. [2016] brings forward the relationships and building safety and security in the workplace. It is worth noting that there may be other factors that could also contribute to employee well-being. For example, factors such as recognition and rewards [Langove and Isha, 2017], career development opportunities [Rezvani et al., 2016; Johnson et al., 2017], organizational culture [Khan et al., 2020], and leadership style [Khan et al., 2020; Fareed et al., 2021] are also introduced in literature. The chosen factors were considered the most important ones due to their consistent and significant associations with employee well-being across various studies and theoretical frameworks such as [den Broeck et al., 2016; Johnson et al., 2017; Ryff, 2019].

Table 9: Employee well-being key factors

Factor	Definition	Psychological well-being dimension(s)	Source
Resources and communication	Granting employees the resources and support needed to implement a given task	Environmental mastery and personal growth	Johnson et al. [2017]
Control	Allowing control over when and how to work	Autonomy	Holmgren Caicedo et al. [2010]; Johnson et al. [2017]; Ryff [2019]
Work-life balance	Enabling a level of freedom for employees to focus on self outside of work	Happiness	den Broeck et al. [2016]; Johnson et al. [2017]
Job security and change	Giving employees a sense of security and space for innovation	Basic need for security and personal growth	den Broeck et al. [2016]; Johnson et al. [2017]
Work relationships	Having a supportive workplace network and management	Positive relationships	Juniper et al. [2009]; Johnson et al. [2017]
Job conditions	Aligning work goals with personal growth and providing an environment where achieving these objectives are realistic to achieve	Personal growth	den Broeck et al. [2016]; Johnson et al. [2017]

As stated, many of these key factors of employee well-being are related to personal growth. Additionally, factors such as work-life balance are more complex and can not directly be pointed to any one psychological well-being dimension as this balance affects many aspects of the employees general well-being and happiness. Overall it is shown in literature, that also general happiness of employees affect their results [Johnson et al., 2017]. However, there are several factors that influence one's overall well-being and happiness and therefore the focus is on the factors that can be affected by organizations.

The factor of resources and communication refer to the organization providing the necessary technological tools for the given tasks to be completed. Additionally, the employee should be made aware of the expectations from the organization. Together these factors create an environment where the employee can feel like they are in control of their own environment and are given the space and ability to achieve the given tasks [Johnson et al., 2017], therefore moving towards personal growth.

Control of work is part of the human need for autonomy [den Broeck et al., 2016]. In expert jobs, such as working in IT-projects, employees should feel free to choose their own style of working. This refers to being able to decide where to work from, when, with what tools, and having flexibility in work arrangements Juniper et al. [2009]; Holmgren Caicedo et al. [2010]. Providing employees with control over their work environment and processes not only enhances their sense of autonomy but also promotes creativity, productivity, and job satisfaction [den Broeck et al., 2016].

As mentioned earlier, within the framework of psychological well-being, a crucial aspect is general happiness, which has been found to be positively correlated with productivity [Johnson et al., 2017]. In light of this, organizations should aim to foster an environment that supports work-life balance. Work-life balance entails enabling employees to maintain fulfilling personal lives and engage in hobbies and activities outside of work. By facilitating work-life balance, organizations provide employees with the opportunity to pursue personal goals, establish meaningful relationships, and cultivate enriching experiences, thereby contributing to overall happiness and well-being.

One of the basic needs of humans is the feeling of security [den Broeck et al., 2016]. In the workplace there are several factors that could affect the feeling of safety. For example, the environment should feel safe enough for employees to express their opinions and ideas. Safety can also refer to feeling monetarily secured. Changes are inevitable, but should be conducted in a way that supports innovation and the feeling of safety and security [den Broeck et al., 2016].

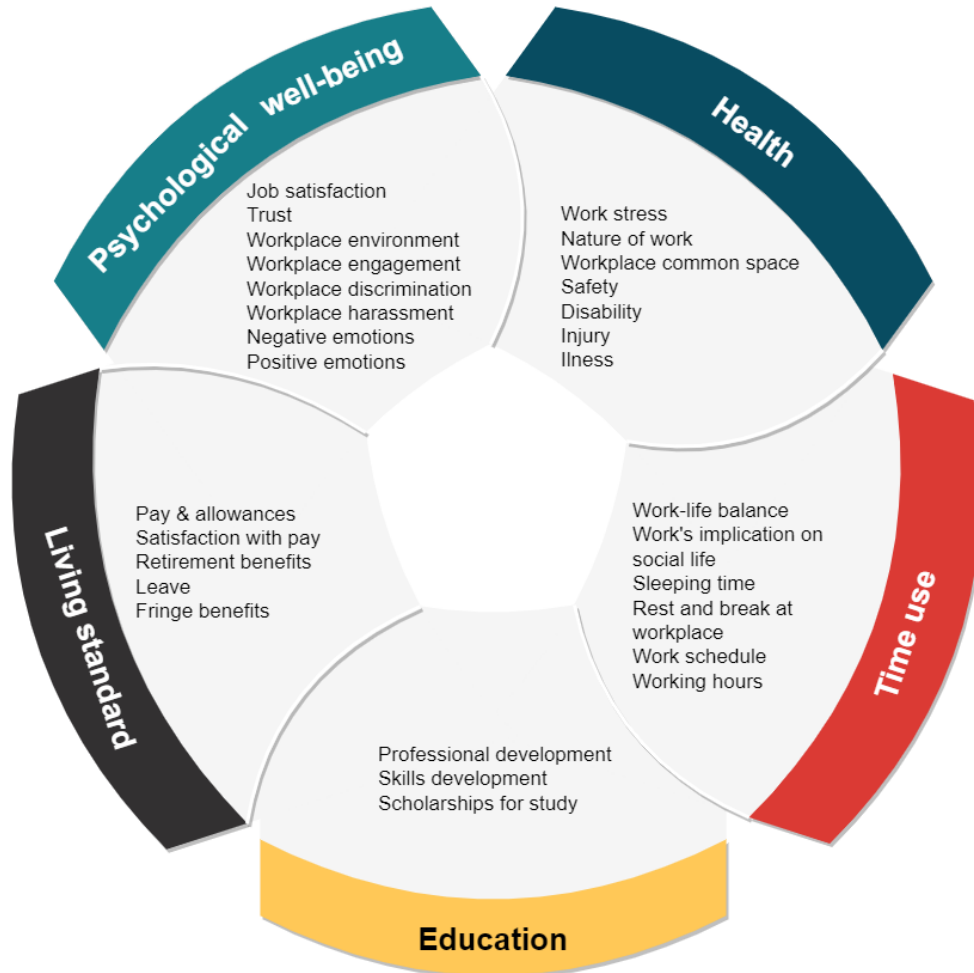
Positive relationships play a big role in psychological well-being and therefore also in the workplace [Johnson et al., 2017]. As stated, employees should get the support they need from managers but also have a generally supportive and positive network at work. Organizations should aim to create an environment where employees are able to create meaningful relationships with each other in order to build a network that supports the well-being of the entire organization [Johnson et al., 2017].

Finally, ensuring that job conditions support the general well-being of employees is crucial, encompassing not only the physical aspects and ergonomic considerations but also the intangible factors that influence their overall well-being [Johnson et al., 2017]. In the context of IT-workers, this entails creating an environment that allows for the alignment of personal goals with work objectives, and fostering a culture where these objectives are not only realistic but also safe to pursue. This includes providing adequate resources, support, and a psychologically safe workplace that encourages innovation, growth, and the exploration of new ideas [Dong and Yan, 2022].

3.5 Measuring employee well-being in IT-projects

Many companies are already putting efforts into measuring their employee well-being and satisfaction. The challenge remains how to incorporate these measurements into the project natured world of IT. It is in no ones interest to send out full questionnaires after every project, however the employee satisfaction during projects should be measured on some level. In general employee well-being surveys can be divided into categories that give answers to the different parts of employee well-being, as shown in Figure 5.

Figure 5: Elements of employee well-being by [Bencsik \[2022\]](#)



The first category is the psychological well-being. In terms of employee well-being, psychological well-being covers topics such as job satisfaction, trust, workplace environment, workplace engagement, workplace discrimination, workplace harassment and negative and positive emotions [Bencsik \[2022\]](#). These can be further divided as part of the general psychological well-being.

Job satisfaction is highly related to personal growth and feeling like having a purpose in life. An employee with high job satisfaction is given the opportunities to have personal growth at work as well as feeling like the job they do has meaning that is also important for them personally [Johnson et al. \[2017\]](#). Job satisfaction can be achieved by empowering employees to achieve goals that align with their personal goals, therefore creating a feeling of achievement and importance [den Broeck et al. \[2016\]](#); [Johnson et al. \[2017\]](#).

Trust relates to many parts of psychological well-being, most importantly in having positive relationships and the feeling of autonomy [[Johnson et al., 2017](#); [Bencsik, 2022](#)]. Trust can be built with open communication and transparency in the workplace [[Dong and Yan, 2022](#)]. In

doing so, employees can have the opportunity to build relationships in the workplace that are already based on trust and open communication, therefore having a good base for positive relationships to be born [Johnson et al. \[2017\]](#). Autonomy is also highly based on trust at the workplace, as employees have a need to feel like they can influence the work they do, having a feeling of autonomy. However, this requires trust both ways, from the employer to be able to trust the employee to do the tasks in time, and for the employee to trust the employer to allow autonomy [Ryff \[2019\]](#).

Workplace environment can be defined both in a physical and mental ways. Physically it is important to provide the employees a space and equipment that enables working [\[Johnson et al., 2017\]](#). In terms of psychological well-being, the environment refers to feeling of safety, so that employees feel they are allowed to grow, learn and innovate without the fear of punishment. At the same time, this is part of the environmental mastery of psychological well-being, as employees should feel like they are in control of the environment they work in, as well as having access to all the equipment needed [\[Johnson et al., 2017\]](#).

Workplace engagement is also part of various areas of psychological well-being. Most importantly, it can be seen that employee engagement supports individual's autonomy, as the individual should feel free to make the choice to be committed to their job [\[Holmgren Caicedo et al., 2010\]](#). This can be achieved in many ways on an organizational level. As an example, the organization can work on establishing a positive work culture. A positive work culture, characterized by trust, respect, and open communication, is instrumental in enhancing employee engagement. According to research by [Crawford et al. \[2010\]](#), a positive work environment contributes to increased engagement levels. Organizations should emphasize fostering social connections, promoting collaboration, and recognizing employee contributions to cultivate a positive culture that fuels engagement.

Furthermore, opportunities for growth and development are vital factors in driving employee engagement. [Stuss and Herdan \[2018\]](#) emphasize the importance of developmental experiences in fostering engagement. Organizations should invest in training programs, mentorship initiatives, and challenging assignments that facilitate continuous learning, skill development, and career progression, ultimately enhancing employee engagement.

Finally, employee voice and participation are crucial for engagement, as they foster a sense of ownership and empowerment. Research by [Shin and Hur \[2021\]](#) highlights the positive impact of participatory decision-making on employee engagement. Organizations should encourage and value employee input by providing channels for feedback, involving employees in decision-making processes, and recognizing their contributions, thereby enhancing engagement levels.

An important part of psychological well-being is also safety and acceptance and workplace discrimination and harassment are greatly connected to these, as well as environmental mastery and positive relationships. Having an inclusive and safe workplace supports the building of positive relationships and the individuals experience of being in control of their environment [\[Bencsik, 2022\]](#).

Finally, allowing both positive and negative emotions at the workplace can have a huge effect on the individuals self acceptance. Positive emotions, such as happiness, joy, and enthusiasm, contribute to enhanced job satisfaction, engagement, and productivity [\[Diener et al., 2017\]](#). On the other hand, negative emotions, including stress, frustration, and anger, can lead to reduced job satisfaction, lower performance, and increased turnover intentions [\[Schaufeli et al., 2017\]](#). Organizations should strive to create a supportive work culture that acknowledges the significance of emotions. By fostering positive emotions through

recognition and appreciation, promoting work-life balance, and providing opportunities for personal growth, organizations can enhance employees' emotional well-being, job satisfaction, and overall performance [Bencsik, 2022; Dong and Yan, 2022].

The second category is health and it covers topics such as stress, nature of work, workplace common space, safety, disability, injury and illness [Bencsik, 2022]. The physical aspects can be taken into account by the employer for example through health insurance or other measures that also create a feeling of safety. Employees should be allowed to fall ill and get better in their own time without being scared of punishment. Additionally, even in high demand jobs, there should be the possibility to have breaks during the day and the employer should also provide a space for employees to have a break [den Broeck et al., 2016; Bencsik, 2022]. Work stress is often very personal, but can be influenced by the employer by providing resources and support for stress management and resilience training can significantly benefit employees. These programs equip individuals with coping mechanisms, such as mindfulness techniques and stress reduction strategies, to navigate stressful situations effectively [Johnson et al., 2020].

The third category is time use at work. This category covers topics such as work-life balance, work's implications on social life, sleeping time, rest, work schedule and working hours [Bencsik, 2022]. Time usage is also easily measured, as employers have multiple ways to measure for example working hours, the time used for breaks and work schedule [Dong and Yan, 2022]. However, topics such as work-life balance, work's effects on social life and sleeping time are dependent on the employee's own communication. From the employers side, it is important that the time used for work allows for the employees to still have enough time for sleep and social life [Johnson et al., 2017].

The fourth category, education, encompasses various aspects such as professional and skills development opportunities and scholarships for further studies [Bencsik, 2022]. As emphasized previously, personal growth plays a significant role in overall psychological well-being. It is essential to foster an environment that encourages employees to continuously grow and learn, even during work hours [Holmgren Caicedo et al., 2010; Dong and Yan, 2022]. Organizations should proactively support and provide resources for employees to enhance their skills, acquire new knowledge, and pursue professional development opportunities. By promoting ongoing learning and personal growth within the workplace, organizations can contribute to the overall psychological well-being of their employees and create a culture of continuous improvement and advancement [den Broeck et al., 2016].

The last category of employee well-being encompasses the living standard of employees, which includes factors such as compensation, allowances, satisfaction with pay, retirement benefits, leave, and fringe benefits [Bencsik, 2022]. These elements are directly linked to the employees' sense of autonomy and their ability to effectively navigate and master their work environment. A fair and competitive compensation package, along with comprehensive benefits, contributes to employees' overall satisfaction, financial security, and their perception of being valued by the organization [Holmgren Caicedo et al., 2010]. Furthermore, retirement benefits and leave policies provide employees with a sense of stability and work-life balance, enabling them to plan for the future and meet personal obligations [Bencsik, 2022]. By addressing the living standard of employees, organizations not only enhance their overall well-being but also foster a positive work environment that promotes job satisfaction and commitment.

Within these categories, specific questions are employed to assess the conditions prevailing in the workplace. While originally designed for traditional work settings, many of these questions can also be adapted and applied to project-based environments. When evaluating

employee well-being, it is important to comprehensively cover each category, as they offer valuable insights into the different facets of psychological well-being. By addressing aspects such as work-life balance, job conditions, social support, education, and living standards, organizations can gain a holistic understanding of the overall well-being of their employees. This comprehensive approach enables organizations to identify areas for improvement and implement targeted interventions to enhance employee well-being and promote a healthier and more productive work environment.

Literature suggests options to measure overall employee well-being in the workplace. These measurements can be conducted over time, or using bigger employee engagement questionnaires. The benefit of measuring overall employee well-being is having a good understanding of the current situation in the workplace and identifying any pain points in the overall well-being of employees. These questionnaires often cover all areas of well-being that are summarized in Figure 5.

3.6 Linking employee well-being with IT-project success

Literature shows there is a link between increased stress and project based work. [Mubarak et al. \[2022\]](#) list some common types of psychological distress such as stress, anxiety, depression, attention deficit, hyperactivity and bipolar disorder. Project based work is often considered stressful as employees suffer from work overload and time pressure. A study conducted by [Chiocchio et al. \[2010\]](#) shows a clear link between the time pressure of a project and psychological stress. Stress can cause significant changes in an employees cognitive resources and behavior [[Bacchi and Licinio, 2017](#)], which can lead into a reduced performance at work.

A study by [Bakker et al. \[2014\]](#) revealed that employees who experience higher levels of well-being are more likely to exhibit higher job performance and work engagement. In the context of IT projects, this translates into employees being more focused, motivated, and committed to achieving project goals [[Bakker et al., 2014](#)]. Engaged employees are also more likely to exhibit proactive behavior, such as seeking innovative solutions and taking ownership of their work, ultimately leading to IT-project success [[Bacchi and Licinio \[2017\]](#)].

Employee well-being plays a critical role in reducing absenteeism and turnover rates, both of which can have detrimental effects on IT projects. High levels of stress, burnout, and dissatisfaction can lead to increased absenteeism, where employees take more unplanned leaves [[Bacchi and Licinio, 2017](#)]. Moreover, a high turnover rate disrupts project continuity, hampers knowledge transfer, and negatively impacts team dynamics. According to [Wright and Bonett \[2007\]](#) well-being is negatively related to absenteeism and turnover intentions, highlighting the importance of supporting employee well-being for IT-project success.

IT projects often involve cross-functional teams and collaboration among various stakeholders. Employee well-being significantly influences effective collaboration and communication within these teams. A positive work environment and supportive culture fostered by employee well-being enable open communication, knowledge sharing, and teamwork [[Rezvani et al., 2016](#)]. Conversely, poor well-being can result in strained relationships, miscommunication, and conflicts, undermining the project's progress [[Bakker et al., 2014](#)]. Higher levels of well-being are associated with better teamwork and knowledge sharing behaviors, leading to improved project outcomes [[Wright and Bonett, 2007](#)]. Thus, literature shows a link between a good employee well-being and successful projects [[Mubarak et al., 2022](#); [Chiocchio et al., 2010](#)].

Mubarak et al. [2022] suggest there are two ways to aim for reducing stress among project employees: either changing the processes and conditions of work and second being helping employees to build their psychological resources. Mubarak et al. [2022] and Berg and Karlsen [2013] offer tools for managing stress and building stronger resilience among employees. However, there are also tools and processes that can be utilized in an organizational level to help with the increased employee distress.

As project time and budget can be difficult to influence by the providing organization [Mubarak et al., 2022], it is important to have the project processes designed to support employee well-being. Rezvani et al. [2016] bring forward the importance of emotional intelligence at workplace and with that, the effective communication between the project team. Openness of communication and trust between the project team can help to bring forward the feelings of stress or work overload in time [Rezvani et al., 2016], where there can still be modifications made to the individuals workday. Additionally, this allows for a safe working culture to be nurtured, increasing the psychological well-being among the employees [Johnson et al., 2017].

Furthermore, as organizations might find a challenge in choosing the projects, there should be active processes to ensure that the alignment of skills are matched with the project needs. Ryff [2019] highlights the importance of autonomy in the workplace, and this suggests for a process where the employees could be made aware of the project requirements and the correct employees could be matched to ensure commitment from the project team.

Employee well-being is intrinsically linked to the success of IT projects. By fostering enhanced performance and productivity, reducing absenteeism and turnover, enabling effective collaboration and communication, and nurturing innovation and creativity, organizations can create an environment that supports employee well-being and maximizes IT-project success [Khan et al., 2020]. Recognizing the importance of employee well-being in IT projects can lead to the implementation of targeted interventions and policies that improve employees' overall well-being, ultimately benefiting both individuals and organizations in the long run [Bakker et al., 2014; Bacchi and Licinio, 2017; Mubarak et al., 2022].

3.7 Summary

The existing literature puts forth various metrics for measuring IT-project success and well-being. A comprehensive summary of these metrics can be found in Table 10. These metrics encompass a range of indicators that capture different dimensions of IT-project success and employee well-being. By utilizing these metrics, organizations can assess the effectiveness and impact of their projects while also gauging the well-being of their employees. This integrated approach allows for a more holistic evaluation of project outcomes, taking into account not only the tangible project deliverables but also the well-being and satisfaction of the individuals involved. Such a comprehensive measurement framework enables organizations to align IT-project success with employee well-being, fostering a positive and sustainable work environment.

Table 10: Summary of metrics suggested in literature

	Metrics	Definition	Source
IT-Project success	Cost	Project meeting the set budget	Baccarini [1999]; Marnewick et al. [2017]; Lech [2013]
	Time	Project meeting the set deadlines	Baccarini [1999]; Kivijarvi [2020]
	Effectiveness	Projects contribution to meeting user needs	Volden and Welde [2022]; Ika and Pinto [2022]; Sulistiyani and Tyas [2022]
	Sustainability	Benefits persistent through lifetime	Volden and Welde [2022]
	Green efficacy	The environmental impact of the project	Ika and Pinto [2022]; Gil and Fu [2021]
	Project satisfaction	Different stakeholders' view of meeting the project objectives	Davis [2016]
Employee well-being	Psychological well-being	Overall mental state and emotional health in relation to work, including feelings of satisfaction, engagement, and positive functioning	Johnson et al. [2017]; Ryff [2019]; Bencsik [2022]
	Health	Physical well-being, encompassing aspects such as their physical fitness, absence of illness or injury, and overall vitality	Johnson et al. [2017]; Bencsik [2022]
	Time use	How individuals allocate and manage their time to engage in work-related activities, personal pursuits, and other responsibilities or leisure activities	den Broeck et al. [2016]; Johnson et al. [2017]; Bencsik [2022]
	Education	The acquisition of knowledge, skills, and competencies through formal or informal learning processes to enhance their professional growth and development	den Broeck et al. [2016]; Johnson et al. [2017]; Bencsik [2022]
	Living standard	Overall quality of life and well-being, including factors such as income, housing, access to basic necessities, and the ability to meet personal and family needs	den Broeck et al. [2016]; Johnson et al. [2017]; Bencsik [2022]

4 Results of the empirical study

This section presents the findings and results obtained from the empirical study conducted as part of this research. The study aimed to explore the perceptions of employee happiness and well-being within various roles in IT projects and investigate their potential contribution to IT-project success. A mixed-methods approach, including the creation of a measuring system and additional qualitative interviews and surveys, was employed to gather comprehensive and diverse data.

4.1 Analysis of existing metrics for project success

In literature, the found metrics for IT-project success include cost, time, effectiveness, sustainability, green efficacy, communication and project satisfaction. Cost and time are reoccurring throughout literature starting from 1960's and have remained relatively similar to this day. However, effectiveness, sustainability, green efficacy, communication and project satisfaction have different approaches throughout literature. The reoccurring theme amongst the metrics is, that they measure the quality of the project, both measuring the end product and the process.

The methods for measuring time and cost are simple and straightforward. However, measuring project quality requires more effort from all stakeholders. In practice, when measuring the success of small or medium sized projects, the measuring should not cause extra efforts from any of the project stakeholders.

From the point of view of the supplier organization and the project manager, it is crucial to know the basics of how projects are going in the company. This means understanding the amount of resources used, for IT-consulting this often means that the measuring of time is critical to IT-project success metrics. Measuring time also requires little extra effort from any of the stakeholders as it can be simply put in the frame of whether the project stays within the set deadlines. The measuring of project time is relatively the same both in literature and in an organizational setting and it can be measured by the project manager.

Measuring cost or budget is crucial to the customer paying for the project to be implemented. Budget for projects is often set before the project starts and it is defined by the needs of the customer. The budget is refined often throughout the project as well, as the needs or priorities might change. From the point of view of the project executor, the project team from the supplier organization, the budget defines the amount of resources allocated to the project and therefore it is critical to have a well defined budget to estimate the costs of a project. The cost of the project can be measured after the project by comparing the budget given to the actual resources used and this measuring can be done by the project manager or in practice this is often measured by an automated system.

The quality measurements require often more input from different project stakeholders. In literature, there are both quantitative and qualitative methods presented for measuring the project effectiveness. In practice, for small and medium sized IT-projects, it can often be unnecessary to set a specific number of users with a specific use case as projects can be done iteratively and these can often change throughout the lifetime of a project. Thus, the measuring of effectiveness in practice often means qualitative methods.

In practice, measuring effectiveness can often be more important in the projects that start with an ambiguous scope or without proper research on customer needs. As an example, in IT-projects where the customer is not familiar with the technologies used, the project scope and definitions are more important than in projects where the customer has a clear project goal

for a very specific use. When there is an established relationship between the project team of the supplier organization and the end-user or customer, the projects can be defined and delivered in small iteratives, meanwhile maintaining a common understanding of the current need and how the project will be answering the existing problems.

In this way, effectiveness might not be measured in a specific qualitative methods. With an established business relationship such as described, a way of measuring effectiveness can be simply asking if the end result of a project is in use and how it is being used and then comparing this to the original scope of the project. This way of measuring effectiveness requires minimum effort from the stakeholders and still provides critical information about the quality of the projects implemented for the customer.

The measuring of IT-project success is critical for keeping up with customer satisfaction to ensure continuity. Customer satisfaction often means new projects and a stable flow of business. In literature, one presented way of measuring customer satisfaction was using Net Promoter Score (NPS). This is often in use also in practice as it requires minimum effort from all stakeholders, while still providing information of how well the project has been received and if there is a possibility for more projects in the future. This can be combined with the measuring of effectiveness, and both can be implemented by the project manager when there is an established relationship with the project customer.

Measuring the sustainability of the projects requires more effort from the customer. In literature, it was presented that sustainability can either be measured over time, so following the lifespan of a project, or the customer can give an estimate of the longevity of the effects of a project. The measuring of sustainability can therefore be quite imprecise and requires both time and effort. In practice this is rarely done on small and medium sized IT-projects. Sustainability is more critical in bigger projects that require more resources but is often left out in smaller projects out of simplicity and efficiency.

Green efficacy is presented in more recent literature more often than in the past. For companies implementing projects, it can be difficult to scope out projects that only have a positive environmental impact. For the companies requesting projects, the green efficacy usually either is or is not part of the company values and therefore it either exists or does not exist in the success metrics. For companies implementing IT-projects, this measurement is often left out, since it is usually taken into account before accepting the project, and therefore the actual impact is usually left for the customer to measure.

Finally, the measuring of communication is presented in literature [Davis, 2016]. While communication between the different stakeholders is often very critical for successful projects, in practice it can often also be seen in customer satisfaction. Successful communication often results in a well defined project scope and an end result that fulfills the customer needs and stays within budget. Therefore in practice, the measuring of success in project communication between stakeholders is often measured through project satisfaction.

The initial suggestion for the IT-project success metrics are time, cost, effectiveness and satisfaction, summarized in Table 11. Cost was chosen as it is already measured in the organizational setting and there is an existing method for measuring cost. Cost in supplier IT-projects is measured through comparing the resources allocated and spent on the project. By monitoring and comparing actual costs against the planned budget, organizations can identify cost overruns and take necessary corrective actions. This measurement not only helps in financial management but also enhances project accountability and transparency. It is followed with an automated system and therefore it is easy to include in the new IT-project success metrics as it requires no additional work compared to the existing system.

Table 11: Suggested existing success metrics

Metrics	Definition	Measuring method
Cost	Project meeting the set budget	Existing target
Time	Project meeting the set deadlines	Existing target
Effectiveness	Projects contribution to meeting user needs	Qualitative method for asking the customer
Satisfaction	Different stakeholders view of meeting the project objectives	Net promoter score

Similarly, time measurement is crucial in IT projects as it allows organizations to assess project progress, meet deadlines, and manage project schedules effectively. By monitoring the project timeline and comparing it with the planned schedule, organizations can identify potential delays, implement timely adjustments, and ensure project completion within the agreed-upon time frame [Iriarte and Bayona, 2020]. Time measurement helps in maintaining project momentum, managing stakeholder expectations, and meeting project deliverables in a timely manner. It also provides a basis for resource planning and allocation, enabling organizations to optimize their workforce and allocate resources efficiently.

Overall, measuring cost and time in IT projects serves as a fundamental mechanism for project control, decision-making, and performance evaluation. These measurements enable organizations to track project progress, identify deviations, and take appropriate actions to ensure IT-project success. By effectively managing costs and adhering to project timelines, organizations can enhance project efficiency, mitigate financial risks, and increase customer satisfaction. Therefore, incorporating cost and time metrics in IT-project success measuring system is crucial for effective project management in the IT industry.

Additionally to the existing metrics, literature suggests effectiveness as a crucial metric for measuring IT-project success due to its direct alignment with meeting the needs and expectations of end-users or customers. The effectiveness of a project refers to the degree to which the project output or solution fulfills its intended purpose and delivers the desired outcomes [Volden and Welde, 2022]. Understanding the end-users' needs and ensuring that the project output addresses those needs is essential for achieving effectiveness. By focusing on effectiveness, organizations can gauge the relevance and impact of their projects, ultimately leading to higher customer satisfaction and competitive advantage [Marnewick et al., 2017].

To utilize effectiveness as a metric for IT-project success, it is important to define and clarify the intended purpose and utilization of the project output from the outset [Alexander, 2020]. This involves understanding the specific use cases and expected benefits for end-users or customers. Quantitative methods can be employed to measure the extent to which the project outcome is being used in the originally intended manner, providing valuable insights into the project's effectiveness [Baccarini, 1999]. Additionally, qualitative methods can be used to gather feedback and assess how well the project output has been taken into use and whether it is addressing the intended needs of the stakeholders.

By focusing on measuring effectiveness, organizations can continuously assess the relevance and impact of their projects, enabling them to make informed decisions, improve project outcomes, and enhance customer satisfaction. It allows organizations to identify any gaps or discrepancies between the project output and the desired outcomes, enabling them to take corrective actions and ensure alignment with stakeholder needs throughout the project lifecycle.

Finally, I suggest adding customer satisfaction to the success metrics as a permanent component. Incorporating satisfaction as a metric for IT-project success is crucial for assessing the project's ability to meet the pre-defined objectives and fulfill the expectations of customers. Measuring project satisfaction can be done using both qualitative and quantitative methods, involving input from all project stakeholders [Baccarini, 1999; Sastoque-Pinilla et al., 2022; Davis, 2016]. By gathering feedback and evaluations from customers, organizations can gain insights into how well the project has been received and whether it has met the desired outcomes.

To incorporate satisfaction as a metric for IT-project success, organizations should establish a systematic process for collecting feedback from customers throughout the project lifecycle. This can mean simply quantitative methods, such as net promoter score surveys, that can be used to measure overall satisfaction levels and track changes over time. The feedback and data collected can be analyzed to identify areas of improvement, address any gaps between customer expectations and project outcomes, and guide future project initiatives. By incorporating customer satisfaction as a metric for IT-project success, organizations can ensure that customer needs and expectations are met, leading to increased customer loyalty, repeat business, and a positive reputation.

4.2 Analysis of existing metrics for employee well-being

Additionally to the listed metrics for IT-project success, I suggest the addition of employee well-being metrics as part of the IT-project success measuring system. In literature, employee well-being is divided into categories based on the different part of psychological well-being they are part of. These categories are psychological well-being, health, time use, education and living standard. These categories are further divided into topics that are linked to the psychological well-being of employees as explained in chapter 3.5.

Literature provides questionnaires as a means to measure employee well-being in the workplace. These questionnaires can be either heavy once or twice a year -questionnaires or throughout time measured smaller questionnaires. However, the common factor is that they often have an aim to get an overall picture of employee well-being in the workplace. The results are often analyzed on an organizational level and any changes are also applied on the same level. However, method of measuring employee well-being requires resources and time. Thus, when it comes to IT-projects, the traditional method of using questionnaires to measure employee well-being may not be as effective. IT-projects often involve dynamic and rapidly changing work environments, where employees may have different needs and experiences throughout the project lifecycle. Implementing heavy or infrequent questionnaires may not capture the nuances and fluctuations in well-being specific to IT-projects. Additionally, analyzing and applying the results on an organizational level may overlook project-specific factors and hinder the ability to address well-being issues in a timely manner.

As stated, in a quick project natured environment, the measuring should not require extra efforts. Therefore the way of measuring employee well-being during the project should be easy and effortless for the employees and the analysis should be quick to produce. The object of measuring employee well-being during projects is finding possible pain points in the processes of the project. With specific findings the organization can easily make changes on those processes and build stronger bonds to their employees. In the case of too heavy measuring, it can add stress for the project managers and therefore the measuring should be quick to both fill and analyze, but should still provide meaningful insights.

Also it should be noted, that the well-being should be considered during the project and the effects of the project at hand are the ones being evaluated instead of the overall state of employee well-being (EWB) in the workplace. This is because in many organizations, EWB is already being evaluated and as stated earlier, the changes are implemented on an organizational level. With targeted measuring of EWB during on-going projects, the project and processes can be changed to match the specific needs better and quicker.

Therefore, the measurements do not cover the entire palette of psychological well-being, but rather aim to provide insights on how the project at hand is influencing employee well-being, summarized in Figure 5. Knowledge work and especially work in IT always requires the necessary tool and technologies and these are offered by the employer by default. Also the physical working environment is often changing as many people can choose where they want to work from. This means that the physical requirements as well as working hardware and software are left out on the project specific metrics, as these are considered to be part of overall employee well-being.

When measuring work-life balance, the emphasis is put on the single project. There are ways to measure if a person is working over their own limits, but for measuring a single IT-project, the emphasis is placed on the effects of the single project, creating questions such as: "Can you fit the project within your working days or is it affecting your personal life?" Work-life balance is an important part of employee well-being and should be measured, but in this specific case, it is applied to match only one project instead of overall work-life balance.

Job conditions, security and change are all aiming for trust in the workplace as well as supporting employees' personal growth. For IT-projects this means there should be effort put into aligning the projects to match the employee's personal goals. In this way the employee gets to learn and improve, which also adds to employee engagement. Additionally, having transparency and trust within the workplace requires strong culture of communication. This can also be measured within a single IT-project, as it can be approached with tangible questions.

As the goal is to drive practical improvements and facilitate real change, measuring employee well-being in IT-projects should not only provide a holistic understanding of overall well-being but also offer insights into specific processes that may be causing issues. By identifying and addressing these specific process-related challenges promptly, organizations can make targeted interventions to enhance employee well-being and optimize project outcomes. This requires an agile and iterative approach to well-being measurement that enables real-time feedback and continuous monitoring of project-specific processes.

Table 10 summarizes the categories of employee well-being that literature suggests to be measured. However, given the specific focus of this research on psychological well-being and its relationship with project-oriented work, the categories of health and living standard are not included in the suggested metrics for well-being in IT-projects. While health and living standard are important aspects of overall well-being, this study aims to explore the psychological dimensions that are particularly relevant in the context of IT-projects and their

impact on employee well-being. By narrowing down the focus to these specific dimensions, a more targeted and in-depth understanding of the psychological well-being implications in IT-projects can be obtained.

As the remaining categories are too massive to be measured as they are, the metrics are selected from the categories of psychological well-being that align with the research focus. By selecting specific metrics within each category, such as job satisfaction, trust, workplace engagement, workplace environment and positive and negative emotions, the study can capture the essential psychological aspects that influence employee well-being in the context of IT-projects. These selected metrics will provide valuable insights into the specific factors that affect psychological well-being and enable organizations to identify areas for improvement and implement targeted interventions to enhance employee well-being in IT-project environments.

For this, the selected method is a questionnaire with questions from four distinct areas of employee well-being: engagement, work-life balance, alignment and communication. The questions within each category are set to provide answers to multiple of the selected areas in employee well-being. These can be measured during and after the project, to have insights into the areas that could need improvements and to see if the actions taken have lead to real improvements during the project. The initial suggestion of the well-being metrics that could be added to the IT-project success measuring system are summarized in Table 12.

Table 12: Suggested metrics for employee well-being

Metrics	Definition	Connected to part of employee well-being	Source
Employee engagement	The level of enthusiasm, dedication, and commitment employees have towards their work, organization, and its goals	Psychological well-being	Johnson et al. [2017] ; Bencsik [2022]
Work-life balance	The equilibrium individuals strive to achieve between their professional responsibilities and personal well-being	Time use	den Broeck et al. [2016] ; Johnson et al. [2017] ; Bencsik [2022]
Alignment of competences and interests with project	The degree to which an employee's skills, capabilities, and personal passions are effectively utilized and matched with the requirements and nature of the project	Psychological well-being and Education	Holmgren Caicedo et al. [2010] ; den Broeck et al. [2016] ; Johnson et al. [2017] ; Bencsik [2022]
Communication	The effective exchange of information, ideas, and feedback among project stakeholders, facilitating clear understanding, collaboration, and coordination to achieve project goals	Psychological well-being	Juniper et al. [2009] ; den Broeck et al. [2016] ; Johnson et al. [2017] ; Bencsik [2022]

4.3 Creation of the new measuring system

The analysis of the literature research and the existing systems was discussed with the problem owner to gain understanding of what is important in an organizational perspective.

4.3.1 Choosing the metrics

The first metrics suggested for the measuring system is cost. The cost of a project is particularly important in the sense of used resources compared to the compensation. For the supplier organization, this usually means the used working hours and comparing that to the agreed workload and resource allocation. It is crucial to know that the work that employees do for the customer is also compensated by the customer.

Measuring cost in terms of used resources can also help with understanding other key factors of the project as well. As an example, cost could be used to give indication on the success in terms of project scope. Literature presents project scope as one of the factors for success in project quality [Ika and Pinto, 2022]. Having success in defining the project scope allows for accuracy in the estimation of workload, which then helps in planning the distribution of workload so that there is no over working for the employees. Success in the definition of project scope also provides understanding of the needed skills, allowing for strong alignment of the project needs with the correct people from the supplier organization.

Project scope can be measured either in qualitative methods by conducting small interviews or questionnaires. Alternatively, project scope could be measured quantitatively in the number of change requests. In a fast-paced organizational setting where work is mostly project based, qualitative measuring methods are often left out. For the project scope measuring, the qualitative methods are rejected as an option for now. Measuring success in project scope qualitatively requires extra work from the project manager, as the scope needs to first be put in very clear definitions in the beginning and in the end. Furthermore, there is need to conduct a survey of the employees' perspective of the original scope and the changes in it and these then need to be analyzed before final statement of success can be given regarding the scope. As the measuring system for IT-project success is meant to be used as a tool to guide actions, additional efforts should not be required from any of the project stakeholders. Thus, qualitative methods for measuring success in project scope are not used in the measuring system.

Success in project scope could also be measured with quantitative methods, by following the amount of change requests. There are however multiple obstacles in utilizing these methods too. Firstly, only in very rare occasions all the change requests from the users or customers are presented in a formal way. So, in order to log and follow all requests of change in the original scope, again extra efforts from the project manager is needed as all requests that come up in conversations and meetings should also be turned into formal change requests. Second, the amount of change requests alone does not provide much vital information. There should first be a set scale of the amount of change requests per project that should be given grades to help with the analysis. However, as projects can be vastly varied, setting a permanent scale for the amount of change requests is impossible. Furthermore, setting a scale for every project adds extra work for the project manager. Thus, measuring success in project scope as it is, is rejected from the measuring system.

As success in the definition of the project scope is difficult to measure quantitatively as it is, the cost of the project can be used to also indicate success in the initial scope definition. Additionally to measuring success with the project scope as it is, success in scope could be measured by measuring success in matching the right competencies with the skills needed in

the project. Success in the project scope allows for strong estimates of the skills needed in the project as the project is defined on a detailed level.

However, measuring success in finding the correct competences to implement the project also provides a challenge. It is possible to define the needed competences for the project and matching the people with these competences to find a team that matches the needs of the project to be successfully implemented. However, setting a scale for success in this process provides a challenge, as simply measuring fulfilling skills one-to-one might not be possible. The level of the definition of the skills needed provides a challenge: is it enough to have knowledge of the technologies used, are there specific skill requirements within the technologies, are there needs for soft skills? Defining the skills needed requires extra efforts from the project manager or the employees and still does not guarantee success in matching the right people with the project. The people with the matching competences might not be available, or there might be people interested in learning the needed competences, therefore being left out of the radar while being very competent candidates for implementing the project. For this ambiguity also the measuring of success in connecting the correct competences with the project needs is left out of the measuring system.

Thus, the cost of the project is chosen as the first metrics for the measuring system. The cost of the project can provide much more information to the supplier organization than only the used resources. The cost of the project is used to also give indication of success in defining the project, both in defining the scope and the skills needed. In a supplier organization, the cost is measured through the resources, so in the working hours used for the project that is compared to the estimation of workload and the accuracy of the allocated resources. Additionally, time works as a supporting metrics for the success in these areas.

As the estimation of working hours provides meaningful information of how much resources a project takes, the set deadlines give a time pressure for the project implementation. If the resources are calculated correctly, the project deadline should stay the same throughout the project. However, in the case of issues arising in the workloads, often also the time metrics will go over the set deadline. In some cases, the time goes over the set target for external reasons. Therefore, the analysis of the time metrics should always be conducted in qualitative methods in addition to comparing the time given and used in the supplier organization. This ensures that if there are issues with the deadlines in a project, the reasons behind can be analyzed and proper actions can be taken to correct the issues.

In addition to the metrics of cost and time, in the literature suggestions in Table 11, effectiveness is presented as a success metrics. Effectiveness gives indication to how well the project matches the customer needs by showing how well the outcome of the project is taken into use. This metrics provides meaningful insights into how well the project was defined and how well the supplier company knows either the customer or the end users of the project output.

However, as stated in Chapter 4.1, measuring effectiveness provides a challenge. As the metrics system is designed to guide actions that can be implemented while the project is ongoing, also measuring effectiveness should be conducted throughout the project. Furthermore, effectiveness measuring is suggested to be measured qualitatively, meaning more work for project manager as first the customer needs to be contacted about getting this measurement and results then need to be analyzed. Effectiveness can provide good insights after the project is completed, but for ongoing measuring to guide actions to take during the project, effectiveness provides little useful information. Thus, for now effectiveness is rejected from the original suggestion of the full measuring system.

Finally, customer satisfaction is suggested in Table 11 as part of the measuring system. Satisfaction from the customer is crucial information for the supplier company, as it can also indicate future projects and sustainability in the co-operations between the supplier and customer organizations. Furthermore, it provides a good indication of the overall success of the project from different perspectives: supplier and customer organizations, end users, management level and possibly executive level.

As suggested in Table 11, measuring the customer satisfaction can be conducted by using net promoter score (NPS). Though NPS does not provide full analyzed information of how the project is received by customers, it does provide an indication of how the project and therefore the supplier organization is seen by the customers. Therefore it is included in the measuring system, as it does not require much efforts from any of the project stakeholders, but still provides an overall understanding of the IT-project success.

From Table 11 the chosen metrics are therefore cost, time and customer satisfaction. Combining employee well-being with these metrics should be conducted in a way that gives meaningful insights on the parts of the process that can still be influenced by taking action but the actual gathering and analyzing data should not require extra efforts from the project team. The initial suggestion for the employee well-being metrics are summarized in Table 12. As presented in chapter 3.5, the way of measuring well-being is often conducted by questionnaires. In this way, the metrics chosen for the measuring system mean a series of questions for each of the categories. The initial suggestions for these questions for the different metrics are presented in Table 13.

The engagement metrics is included to see how connected employees feel to the project. Overall employee engagement is said to provide estimates of employee performance [Mubarak et al., 2022], so it was included in the initial suggestion for the success metrics for projects as well. However, as the target is to have guidance for taking action during the project, the engagement metrics is left out of the final metrics system. While employee engagement provides insights into how things are, it was noticed that it does not offer guidance into what could be changed. Furthermore, employee engagement is measured often on an organizational level and as it can be challenging to influence the projects done, it is seen as a better solution to leave the metrics out of the project measuring system.

The work-life balance -category operates as a support for the cost -metrics presented. As the workload can be seen and measured exactly how it is, the work-life balance -metrics is included for the employee perspective. Measuring the workload through cost provides insight into how well the project scope was defined, while the work-life balance -metrics provides insights into how burdensome employees' feel the project to be.

The employee perspective is important as the project can be felt as burdensome and challenging mentally even if the workload would not directly be more than originally estimated. The work-life balance -metrics can therefore also operate as a support for providing insights into how well the needed competences were matched to the project as if the employee feels the project too challenging, it can cause stress also outside of working time. Thus, work-life balance can be compromised without the workload exceeding.

As depicted in Table 12, the alignment of competences and interests with project -metric is part of education and psychological well-being in the context of employee well-being. Measuring alignment can operate as support for also in the defining of the scope. As stated, part of the project definition is understanding the skills needed in the project. Matching the skills needed with the right competencies allows for a strong success prognosis for the IT-project success. Furthermore, aligning the skills and competences allows for the employees

Table 13: Suggested questions for measuring employee well-being

Metrics	Questions
Employee engagement	<ul style="list-style-type: none"> • How much would you agree with this statement: The project is aligned with the company’s mission and values. • How much would you agree with this statement: The project’s outcome and end goal are important to me. • How much would you agree with this statement: I feel connected to the project team.
Work-life balance	<ul style="list-style-type: none"> • How much would you agree with this statement: it is easy for me to work productively during the project. • How much would you agree with this statement: I am content with my overall sense of mental well-being at work. • How much would you agree with this statement: I feel like I have a good sense of work-life balance, I can finish the work day without feeling compelled to keep working at home.
Alignment of competences and interests with the project	<ul style="list-style-type: none"> • Do you feel that your work during the project aligns with your career goals? • How much do you agree with this statement: The project supports my learning and personal growth as an IT-professional.
Communication	<ul style="list-style-type: none"> • Do you feel comfortable asking for feedback from your manager? • Do you feel comfortable giving feedback to your manager? • Do you feel like you are listened to during meetings, conversations or online discussions? • How much would you agree with this statement; I receive appropriate recognition when I do good work.

to have growth in areas significant to them and allowing employees to participate in the matching process allows for more autonomy in the workplace, supporting the basic needs of psychological well-being. Measuring project based alignment supports many areas of employee well-being as well as offers support for IT-project success predictions. Thus, alignment is seen as a vital metrics for the measuring system.

Communication is seen in both traditional IT-project success metrics as well as employee well-being metrics. The suggestion is to have a strong employee well-being perspective for the metric, as in this way it allows for checkup for also trust and allowing both positive and

negative emotions within the project team. Thus, it is chosen for the final metrics and the questions are refined to show success in all areas: communication, trust and emotions.

To conclude the suggestion for the metrics in the measuring system would entail cost, time, customer satisfaction, work-life balance, alignment of competences and communication. These are summarized in Table 14.

Table 14: The chosen metrics for the measuring system

Metrics	Definition
Cost	Used resources compared to the estimated workload
Time	Project meeting the set deadlines
Customer satisfaction	Customer's view of meeting the project objectives
Work-life balance	Project supporting employees work-life balance
Alignment of competences	Project supports employees personal growth
Communication	Trust and transparency in communication

4.3.2 Choosing the measuring methods

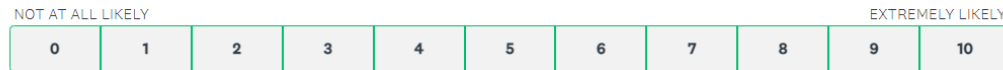
There are several possibilities for measuring the cost of the project. The suggested method for a supplier organization is to use an existing project management tools, such as Jira/Trello/Monday/etc. The benefits of using existing management tools allows for automatic following of used resources compared to the existing target, thus decreasing the amount of manual work needed from the project team. In addition, this allows for the project resources to be followed throughout the project, to show early indications of the cost going over the initial target.

The same softwares often also offer tools for measuring the time of the project. A way to measure success in time, is to use the management tool to divide the project into tasks or subprojects and setting deadlines for each increment. This allows for the project team to quickly see how each part of the project is doing in comparison to their original timetable, thus allowing to concentrate resources to the tasks that are possibly holding back the development of the rest of the project. Measuring time does often require manual work in terms of reporting the readiness of a task, but the amount of time this takes is very little compared to the benefits of this measuring.

Though time and cost are automatically being measured and followed throughout the lifetime of a project, the customer satisfaction is not suggested to be measured too often. The suggested method is sending a quick questionnaire of one question, an example in Figure 6, incrementally after different project phases. The question can be then prefaced with the phase in question. For example, after defining the project and designing the project phases and possible solution, the preface could be "After meeting the project team and having the project definitions done, how likely..." Another example could be after the first draft of the project outcome is provided for the customer approval, the preface could be "After testing the product, how likely..." and so on. The project phases after which the net promoter score is measured should be chosen in a way where the customers have had the opportunity to work with the project team of the supplier company and there is significant progress been made compared to the previous net promoter score. In this way the net promoter score provides actual indication of customer satisfaction throughout the project and can be used to guide future processes in similar projects as it can be seen which phases have the best and worst reception.

Figure 6: Measuring the net promoter score

* 1. How likely is it that you would recommend this company to a friend or colleague?



As stated, measuring employee well-being is often conducted through questionnaires. This is the recommended system also for the IT-project success measuring. However, as organizational level employee well-being is often done already using bigger questionnaires about employees' overall well-being, for the project based well-being it is not crucial to conduct full surveys of employees overall health. Furthermore, as sparing time is essential in project natured environment, the measuring of employee well-being during a project is suggested to be conducted as a "well-being pulse".

Measuring the well-being pulse could be done weekly with categorized questions. The categories are presented in Table 12 as the metrics used, while the questions could change every week. This approach allows for gathering comparable insights of how the project is going in the different phases. Furthermore, as the metrics are used to guide actions, the categorization allows for specific actions to be made as the categories are created based on knowledge of employee well-being presented in Figure 5. The questions for each category are summarized in Table 15.

Table 15: Questions for measuring employee well-being during projects

Metrics	Questions
Work-life balance	<ul style="list-style-type: none"> • How much would you agree with this statement: it is easy for me to work productively during the project. • I feel like the project is supportive for work-life balance: I can finish the work day without feeling compelled to keep working at home • My free time is not affected by the project or thoughts or doubts about the project • I feel like I can manage the work for this project well and my efforts have meaningful outcomes
Alignment of competences and interests with project	<ul style="list-style-type: none"> • Do you feel that your work during the project aligns with your career goals? • How much do you agree with this statement: The project supports my learning and personal growth as an IT-professional. • I have the possibility to influence my own work in this project so that it supports my career goals • This project aligns with my competences
Communication	<ul style="list-style-type: none"> • Do you feel comfortable giving feedback to your manager? • Do you feel like your opinions are valued during meetings, conversations or online discussions? • How much would you agree with this statement; I receive appropriate recognition when I do good work in the project • I feel like I am free to express my feelings and thoughts within the project team • I feel like if I express my opinions, it can make a real impact on the project outcome

The work-life balance category has four distinct questions and for the weekly well-being pulse one is chosen randomly. The questions are based on literature and are derived from the categories of employee well-being presented in Figure 5. The first question in the work-life balance -section "How much would you agree with this statement: it is easy for me to work productively during the project." is measuring the workload and stress of the employee. As stress is shown to decrease cognitive skills and lower productivity, the question provides insights into how the employee feels their current mental state in terms of working ability [Mubarak et al., 2022]. The third question "My free time is not affected by the project or

thoughts or doubts about the project" measures similar factors, but rather than measuring the ability, it measures the early signs of stress: restlessness and continuous thoughts of work [Bacchi and Licinio, 2017].

The third question "I feel like the project is supportive for work-life balance: I can finish the work day without feeling compelled to keep working at home" is directly a supporting question for the workload measuring. It gives the employee's perspective into how well the workload has been adjusted for the project deadlines and if the employee feels like they can handle the tasks at hand within the estimated workload. The final question in the category: "I feel like I can manage the work for this project well and my efforts have meaningful outcomes" also provides insights into how well the employee feels they can handle the tasks at hand. This can also provide insights into how well the competences have been matched to the project needs.

In the alignment of competences and interests with project -category there are four questions. The first two questions "Do you feel that your work during the project aligns with your career goals?" and "How much do you agree with this statement: The project supports my learning and personal growth as an IT-professional." are more passive, and targeted towards measuring the success in the alignment of project needs with the employees' personal growth goals. The third question "I have the possibility to influence my own work in this project so that it supports my career goals" guides the employee to reflect and possibly take action. This allows for a more active part for the employee to set career goals and find aligning work. The final statement "This project aligns with my competences" is a question that measures how well the project was aligned with the existing skills of the employee.

As stated, the communication metric is chosen to measure also trust and emotions. The questions supporting success in both communication and trust are "Do you feel comfortable giving feedback to your manager?", "Do you feel like your opinions are valued during meetings, conversations or online discussions?", "I feel like if I express my opinions, it can make a real impact on the project outcome". Finally, the question "I feel like I am free to express my feelings and thoughts within the project team" allows for analysis for how well communication and emotions are succeeding within the project team.

The well-being pulse for the employee is sent out weekly and only ever has one randomly chosen question from each category. For each question, the employee can evaluate their well-being on a scale from one to four. An even number is chosen to avoid middle ground answers. These are avoided to have meaningful insights that could be used as guidance for actions. Thus, the answers always need to have either a negative or a positive indication. Additionally, the employee can leave a comment if there is a need for further explanation. An example of the weekly pulse is presented in Figure 7.

Figure 7: Well-being pulse

Well-being pulse

* 1. My free time is not affected by the project or thoughts or doubts about the project

1 - Do not agree 4 - Fully agree

2. Free comment:

* 3. I have the possibility to influence my own work in this project so that it supports my career goals

1 - Do not agree 4 - Fully agree

4. Free comment:

* 5. Do you feel like your opinions are valued during meetings, conversations or online discussions?

1 - Do not agree 4 - Fully agree

6. Free comment:

To conclude, the first two metrics, cost and time, could be measured using existing project management tools. Measuring satisfaction could be conducted using net promoter score, sent out after each project increment. Finally, the employee well-being metrics could be included in the IT-project success measuring system using a weekly well-being pulse. These are summarized in Table 16. To really have use for this measuring system, the results of the measurements should be available for the project team to see in a centralized way.

Table 16: The measuring methods for the system

Metrics	Measuring method
Cost	Automatic comparison in existing project management tool
Time	Comparing to existing targets in project management tool
Customer satisfaction	Net promoter score
Work-life balance	Well-being pulse
Alignment of competences and interests with project	Well-being pulse
Communication	Well-being pulse

4.3.3 Reporting the results

The results of the measurements need to be reported and published for the project team to be useful. Even though measuring success can be meaningful for the supplier organization for example in marketing and customer acquires, the value of having continuous measuring of success in the suggested areas is in the possibility to make changes during the project to have influence in the overall success of the project.

To achieve this, each of the metrics should be reported in a centralized way to allow easy access and quick analysis. The reporting is suggested to be embedded either in the project management tool that is used for measuring the cost and time, or if there is a tool in use for knowledge transfer in the project, that could also be a suitable platform for the IT-project success reporting.

As measuring cost in the supplier organization can be done by measuring the used resources in comparison to the estimated target, also the reporting of the cost should entail both the used resources and the original target. Most of the project management tools have an automation for this and if possible, that could be used directly in the centralized reporting. If the report is published on another platform, the information could be retrieved from the project management tool and reported as a simple Key Performance Indicator (KPI).

As the measuring of time is also suggested to be done by utilizing existing project management tools, the reporting of time could also utilize the existing system. However, many large projects include several subprojects and tasks, and the existing systems often provide a platform to see all of the tasks included in a project. For having quick analysis of how the project is doing in terms of time, it could be more useful to have the different project phases or subprojects presented on a timeline. The suggested timeline could have the initial targets as points and the actual duration of the phase could be presented as a continuous line. This way of reporting time could then provide meaningful insights into the project time with only a quick glance and the timeline could be embedded on the project report page with the other metrics.

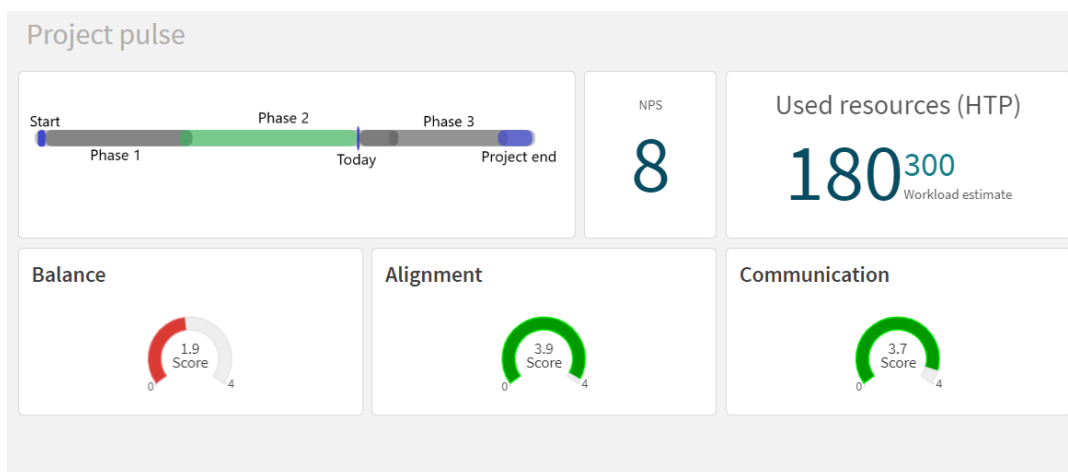
For the measuring of satisfaction, the Net promoter score (NPS) is quite straightforward. The end result is a number between one and ten, ten being the best. As the suggestion is to send the NPS to the project stakeholders after each project increment, the results of this could be automatically retrieved and the data on the project report could be automatically updated as new answers come in. Like cost, the results of the NPS could be reported as a simple key performance indicator on the project report.

The results of the well-being pulse are also numerical, as employee well-being in this system is measured with a scale from one to four. The suggested way of reporting the results of

the well-being pulse is using gauges. The reason for using gauges instead of simply presenting the numerical values is because the gauges can be color-coded to indicate success in the different categories. It is shown that the human eye focuses on color [Huang, 2014] and using colored reporting can quickly give an indication of the IT-project success in one glance. The suggested colors are green for values between 3 and 4, yellow for values between 2 and 3 and red for values below 2. The colors allow for making quick analysis of the categories doing the best and worse, as humans are used to associating these colors with similar values [Huang, 2014]. In addition to color, the gauge also offers the numerical value of the well-being pulse results as well as the actual scale used, providing a lot of easy to read and analyze information quickly.

An example of the IT-project success measuring report is provided in Figure 8. The chosen reporting is also influenced by the technologies and project management tools already in use, but the main point remains the same: the report should provide easy to read information about the state of the project with only one glance. In this way, the report could be used as the initial source of information about the project, and in the case there are issues in some of the metrics, they could all be analyzed further.

Figure 8: Reporting example



4.3.4 Using the measuring system as a guide for making changes

The measuring system is created to be used as a guide during the project to take actions to have influence on the final success of the project. Each of the metrics chosen for the system has potential value beyond the obvious. The system is meant to give indication on what the current state of the project is, and which areas could be improved. The report allows for this analysis to be done quickly as the visualizations have been chosen to be simple and familiar for most. In the best case, the report highlights the painpoints of the project development and the project team can do further analysis when necessary and try to fix the root problem. These developments in the processes or within the team could then be seen in the overall development of IT-project success over time.

In reality, finding solutions and taking appropriate actions to promote employee well-being during an IT project can be a complex task. However, a well-designed measuring system serves

as a valuable guide, enabling project teams to prioritize employee well-being and improve relevant metrics throughout the project lifecycle. Even before the project development begins, it is crucial to establish a solid foundation for fostering a healthy work environment. For example, building a project team consisting of members who find the project interesting and whose competences align with the project needs is essential.

Throughout the course of an IT project, the measuring system plays a vital role in guiding actions through real-time feedback and visibility into employee well-being metrics. When metrics indicate high levels of stress or burnout, actions can be taken to address the underlying causes. These actions may include workload redistribution, implementing stress management programs, providing resources for personal development, or cultivating a culture that supports work-life balance.

If the metrics highlight excessive work-related time usage, teams can prioritize actions such as workload redistribution, delegation, or implementing flexible working arrangements to promote a healthier balance between work and personal life. Metrics related to project timeline adherence, task completion rate, and milestone achievements can guide actions regarding resource allocation, task prioritization, and workload management. This ensures that excessive work hours and schedule conflicts, which may negatively impact employee well-being, are prevented. Addressing stress levels can involve providing stress management programs, fostering a supportive work environment, encouraging breaks and downtime, or offering resources for effective stress management. Metrics related to project budget, cost control, and resource utilization can guide actions to ensure efficient resource allocation, avoiding unnecessary financial stress and pressure on employees.

If metrics indicate a mismatch between employees' competences and assigned tasks, actions such as skill assessment, training programs, or task reallocation can be taken to ensure employees are working on projects that align with their expertise and strengths. In cases where metrics reveal a lack of alignment between employees' personal interests and assigned work, teams can explore actions like job rotation, project customization, or providing opportunities for employees to pursue projects aligned with their passions. These actions enhance motivation, job satisfaction, and overall well-being.

When metrics indicate communication gaps within the team, teams can focus on actions such as improving communication channels, promoting transparency, conducting regular team meetings, or facilitating knowledge sharing. These actions enhance collaboration, reduce misunderstandings, and address communication gaps. In cases where metrics reveal issues with stakeholder communication, actions can be taken to ensure effective communication with stakeholders. This may involve clarifying expectations, providing regular updates, soliciting feedback, or conducting stakeholder satisfaction surveys. By addressing communication gaps, teams can improve stakeholder relationships, project success, and ultimately contribute to a positive work environment and employee well-being.

By leveraging these metrics and taking appropriate actions, project teams can proactively address employee well-being concerns, promote a healthier work-life balance, foster alignment with competences and personal interests, and improve communication. This, in turn, leads to enhanced employee satisfaction, engagement, and overall project success.

4.4 Summary of the proposed measuring system

The measuring system that was created, is proposed to be used as a tool during IT-projects. The proposed measuring system consists of six metrics: time, cost, customer satisfaction,

employees' work-life balance, alignment of competences and interests with project, and communication, and in addition the proposed measuring system offers measuring methods for the metrics and a way of reporting the results of the measuring. These components of the measuring system are summarized in Table 17. Additionally, when the system is taken into use, the proposed actions could be listed as guidance.

Table 17: Proposed IT-project success measuring system

Metrics	Definition	Measuring method	Reporting method
Cost	Used resources compared to the estimated workload	Automatic comparison (project management tools)	Key Performance Indicator
Time	Project meeting the set deadlines	Comparing to existing targets (project management tools)	Timeline
Customer satisfaction	Customer's view of meeting the project objectives	Net promoter score	Key Performance Indicator
Work-life balance	Project supporting employees work-life balance	Well-being pulse	Gauge
Alignment of competences and interests with project	Project supports employees personal growth	Well-being pulse	Gauge
Communication	Trust and transparency in communication	Well-being pulse	Gauge

4.5 Analysis of the proposed measuring system

The measuring system consists of six metrics, namely time, cost, customer satisfaction, employees' work-life balance, alignment of competences and interests with project, and communication, and in addition to the metrics, the measuring system includes the measuring methods for the metrics and the reporting of the results. The created measuring system offers both advantages and limitations in assessing the performance and well-being of employees during and after an IT project. This section offers analysis of the system through an organizational point of view.

One of the shortcomings of the proposed measuring system is that the measuring is not done on a precise level. The metrics chosen are broad and may not provide detailed insights into multifaceted issues. For example, work-life balance is a complex concept that encompasses various factors such as time use, stress levels, and engagement. By measuring it as a single metric, the system may fail to capture the nuances and specific areas for improvement. Similarly, alignment of competences and interests with project and communication are multidimensional aspects that require a more in-depth analysis to identify precise areas of concern. The system could benefit from breaking down these metrics into more granular components to gain a better understanding of the underlying issues. However, the practicality of having more detailed metrics is too time consuming for a project-natured environment, and therefore the detailed well-being measurements are seen best to do on an organizational level.

Another possible shortcoming of the proposed measuring system is the system's narrow focus on short-term project performance that overlooks the long-term impact and user satisfaction. The system focuses primarily on measuring project performance during and immediately after its completion. While this provides valuable insights into the project's execution, it fails to capture the longer-term impact of the project and how it is perceived by the actual users. Gathering feedback from end-users and assessing their satisfaction with the implemented solution could provide valuable insights for future projects and continuous improvement. However, the measuring system was created to be a tool during the project to help in taking proactive measures to ensure successful project and good employee well-being. Therefore, the measuring of long-term impact could be part of a future research.

A risk for when using the proposed measuring system is not having an assigned person responsible for data analysis. Without a designated individual or team with the necessary expertise and authority to collect and interpret the data, the system's effectiveness may be compromised. This person should have the autonomy to take actions based on their analysis, ensuring that the insights derived from the metrics are utilized to drive meaningful change. Their role would be to identify patterns, trends, and potential areas for improvement and make informed decisions on the actions to be taken. In the context of this thesis, the project manager is set to be the responsible person for both analyzing the data collected and taking the necessary actions to ensure a successful project.

On the positive side, the proposed measuring system could offer clear reporting and is created with the intention to require minimal time investment. Thus, making it a practical tool for project teams. The concise and well-defined metrics provide a structured framework for measuring key aspects of the project and employee well-being. The information presented in the reports serves as a valuable guidance for making data-driven decisions about the necessary actions to be taken. By having a clear overview of metrics such as time, cost, customer satisfaction, work-life balance, alignment of competences and interests with project, and communication, project teams can identify areas of concern and prioritize actions to address them effectively.

In conclusion, the proposed measuring system with its six chosen metrics presents both advantages and limitations. While the system provides a practical tool with clear reporting and guidance for decision-making, its lack of specificity and focus on short-term project performance are notable shortcomings. However, the practicality and dynamism of the system make it possible for it to be a practical tool for different IT-projects in different environments. Additionally, the simplicity of both the data gathering and reporting makes the system easy to adapt in many different organizations and project teams.

5 Discussion

The research problem was defined as: How can IT-project success be measured in a manner that incorporates and acknowledges the well-being of employees? Throughout the analysis, there has been an exploration of various aspects related to this topic, including the challenges associated with traditional IT-project success metrics and the significance of employee well-being in achieving long-term project outcomes. This section aims to critically analyze the findings and discuss the implications for measuring IT-project success in a way that integrates and recognizes the well-being of employees.

The research questions were:

1. What metrics are used to measure the success of IT-projects in existing literature?
2. What metrics are used to measure employee well-being in existing literature?
3. How could employee well-being metrics be integrated as part of IT-project success measuring system?

This section offers answers to these questions by combining findings from the literature review and empirical study.

5.1 Metrics of IT-project success in existing literature

In existing literature, several metrics are used to measure the success of IT-projects. These metrics encompass various aspects and provide a comprehensive understanding of project performance. Cost, time, effectiveness, sustainability, green efficacy, communication and project satisfaction are among the metrics frequently employed to evaluate IT-project success.

Cost and time are quantitative metrics that focus on whether a project stays within the set budget and meets the established deadlines, respectively [Baccarini, 1999; Iriarte and Bayona, 2020]. They require realistic estimates and alignment with the project scope to accurately gauge success [Baccarini, 1999; Kivijarvi, 2020].

Effectiveness measures the project's contribution to meeting user needs. It emphasizes the alignment of project outcomes with the requirements and expectations of end-users [Volden and Welde, 2022]. Understanding user needs is crucial for delivering a satisfactory experience, encompassing functional, emotional, and usability aspects [Cronin, 1981]. Defining the purpose and desired utilization of the project output is essential for measuring effectiveness, and quantitative methods can be used to assess to what extent the project outcome is being utilized as originally intended [Ika and Pinto, 2022; Sulistiyani and Tyas, 2022].

Sustainability assesses the longevity of project benefits over its lifetime and involves considering the perspectives of end-users and their anticipated future needs [Volden and Welde, 2022]. In recent literature, environmental sustainability is detached from the umbrella term of sustainability and is often handled as its own metrics as green efficacy [Gil and Fu, 2021; Ika and Pinto, 2022].

Green efficacy evaluates the environmental impact of IT-projects. It incorporates strategies such as reducing energy consumption [Introna et al., 2014], minimizing electronic waste [Agarwal and Nath, 2011], adopting eco-friendly technologies [Lakshmi et al., 2012], and promoting sustainable practices throughout the project lifecycle [Gil and Fu, 2021]. The growing recognition of environmental issues, stricter regulations, and customer demands for sustainable products and services have elevated the importance of green efficacy. By integrating

environmentally conscious principles into project planning, execution, and maintenance, IT projects can minimize their environmental footprint and contribute to a more sustainable future [Gil and Fu, 2021].

Communication is a critical metric that measures the effectiveness of communication both between and within project stakeholders [Davis, 2016]. It plays a crucial role in defining project scope, managing changing circumstances, and ensuring effective collaboration among team members [Sastoque-Pinilla et al., 2022]. It is a distinct aspect of project satisfaction that can be measured independently. Communication should be assessed not only between the project team and the customer but also within the project team [Davis, 2016].

Project satisfaction captures stakeholders' views regarding the extent to which the project meets its predetermined objectives [Sastoque-Pinilla et al., 2022]. It considers the perceptions and evaluations of different stakeholders, emphasizing their satisfaction with the project outcomes and the alignment with the initial goals [Davis, 2016; Iriarte and Bayona, 2020].

These metrics provide a literature based framework for measuring the success of IT-projects. They offer a combination of quantitative and qualitative measures, allowing for a nuanced evaluation of project performance. This set of metrics allows for a holistic evaluation of project performance, considering financial, temporal, environmental, and stakeholder-related aspects. However, implementing all of these metrics in practice can be resource-intensive and time-consuming, requiring careful consideration and customization to align with the specific needs and constraints of each project.

On the positive side, the inclusion of these metrics enables organizations to gain a holistic understanding of project success, considering not only the traditional measures of cost and time but also factors related to effectiveness, sustainability, and green efficacy. For example, measuring sustainability and green efficacy allows organizations to assess the environmental impact of IT projects and promote eco-friendly practices throughout the project lifecycle. Additionally, incorporating communication and project satisfaction metrics provides insights into the effectiveness of communication channels and stakeholder engagement, contributing to the overall project success.

However, the challenge lies in the practical implementation of these metrics within the dynamic and fast-paced project environments. Fast-paced project environments emphasize the need for speed and efficiency in project execution. There is a strong focus on meeting tight deadlines, delivering results quickly, and staying ahead of the competition. Time is a critical factor, and project teams often face pressures to accelerate timelines, reduce project durations, and ensure timely completion without compromising quality. Organizations need to carefully select and adapt the metrics to their specific context, considering the available resources, project goals, and stakeholder expectations. Streamlining the metrics to focus on the most critical aspects while ensuring data collection and analysis efficiency is crucial. This way, organizations can strike a balance between obtaining valuable insights and managing the practical constraints of measurement.

5.2 Metrics of employee well-being in existing literature

In existing literature, various metrics are used to measure employee well-being. These metrics cover different aspects of well-being and provide valuable insights into the overall health and satisfaction of employees. The metrics found in literature are categorized under five categories: psychological well-being, health, time use, education and living standard [Bencsik, 2022].

Psychological well-being is a crucial category that reflects employees' contentment and fulfillment with their work as well as their overall mental well-being [Johnson et al., 2017]. It involves metrics such as job satisfaction, trust, workplace environment, employee engagement, workplace inclusivity and emotional well-being [Bencsik, 2022]. High job satisfaction indicates a positive work environment and can be achieved through empowering employees and providing opportunities for growth and meaningful work [Johnson et al., 2017]. Trust at the workplace plays a significant role in employee well-being and is associated with positive relationships, autonomy, and open communication [Dong and Yan, 2022]. The workplace environment encompasses both physical and psychological aspects. The physical aspects includes factors such as access to necessary resources and equipment and environmental mastery, which refers to the individuals' sense of being able to manage the surrounding environment [Johnson et al., 2017]. The psychological aspects includes factors as safety and the feeling of control. A positive workplace environment promotes well-being by providing a sense of safety, support for personal growth, and access to necessary tools and resources [Johnson et al., 2017]. Employee engagement refers to the level of commitment, involvement, and enthusiasm an employee has towards their work. It is closely linked to autonomy and can be fostered through a positive work culture, social connections, recognition of contributions, and opportunities for growth and development [Bencsik, 2022]. Creating an inclusive and safe workplace is essential for employee well-being. Addressing workplace discrimination and harassment promotes a sense of safety, positive relationships, and environmental mastery [Johnson et al., 2017]. Emotional well-being encompasses both positive and negative emotions experienced at work. Positive emotions, such as happiness and enthusiasm, contribute to job satisfaction and productivity [Crawford et al., 2010]. Conversely, negative emotions, like stress and frustration, can have detrimental effects on well-being [Crawford et al., 2010].

The health related metrics consider factors such as stress, work-related injuries and illnesses, and the availability of support and resources for managing health and well-being. The time use category includes the metrics work-life balance, work's impact on social life, rest, and working hours. [Bencsik, 2022]

The education category encompass metrics as professional and skills development opportunities, further studies, and continuous learning [Bencsik, 2022]. Providing opportunities for employees to enhance their skills, acquire new knowledge, and pursue personal and professional growth contributes to their overall well-being [Johnson et al., 2017].

Living standard category includes the metrics: compensation, benefits, retirement plans, leave policies, and fringe benefits. Fair and competitive compensation packages, along with comprehensive benefits, contribute to employee satisfaction, financial security, and their sense of value within the organization. [Bencsik, 2022]

The use of the various metrics provided by literature to measure employee well-being allows organizations to assess different dimensions of employee health and satisfaction, providing a holistic view of their well-being. By categorizing the metrics organizations can identify specific areas of strength and areas that require attention. This approach enables organizations to develop targeted strategies and initiatives to enhance employee well-being and create a positive work culture. One advantage of using these metrics is that they provide organizations with quantitative and qualitative data that can be used to track changes in employee well-being over time. By regularly collecting and analyzing data, organizations identify potential issues, and implement interventions to support employee well-being. For example, if data shows a decline in work-life balance scores, the organization can explore flexible work arrangements or wellness programs to address the issue.

However, a potential limitation of using these metrics is the subjective nature of some indicators, such as job satisfaction and psychological well-being. These metrics rely on self-reporting and individual perceptions, which can be influenced by various factors and may not always provide a completely accurate picture of employee well-being. Additionally, organizations need to ensure that the data collected is kept confidential and used in a responsible manner to protect employee privacy and maintain trust.

Additionally, while a the holistic set of metrics provided by literature may provide a deeper understanding of employee well-being, organizations in fast-paced project environments often need to strike a balance between collecting detailed data and maintaining project efficiency. By carefully selecting a subset of metrics that align with the project nature and time constraints, organizations can still gain valuable insights into employee well-being while keeping the focus on project execution and meeting project goals. In such cases, organizations may need to prioritize a subset of key metrics that align with their project goals and time constraints. For example, in a fast-paced IT project where time and cost are critical factors, organizations may choose to focus on metrics such as project effectiveness, communication, and satisfaction to ensure successful project delivery. These metrics can provide immediate feedback and help identify areas of improvement during the project lifecycle.

5.3 Integrating employee well-being as part of IT-project success measuring system

The starting point of creating a IT-project success measuring system is considering various factors of IT-project success and their measuring methods. One important aspect is measuring the cost of the project, which involves comparing used resources to the agreed workload and resource allocation. Project management tools like Jira, Trello, or Monday can automate the tracking and analysis of costs. Additionally, monitoring time is crucial, ensuring that deadlines are met and tracking the time spent on tasks using project management tools. Breaking the project into tasks or subprojects with set deadlines allows for progress monitoring. The metrics of cost and time were included to assess the project's financial efficiency and timeliness. By tracking these metrics, the project team can identify areas of cost overrun or schedule delays, enabling them to take corrective actions and ensure project success.

Another vital component is customer satisfaction as it reflects the level of satisfaction and fulfillment experienced by customers throughout the project lifecycle. By measuring customer satisfaction, the supplying organization of the IT-project can gain insights into the effectiveness of project execution and identify areas where customer expectations are not being met. This metric enables the team to proactively address concerns and foster stronger relationships with customers, ultimately enhancing project success. The customer satisfaction can be assessed using the Net Promoter Score (NPS). The Net Promoter Score is a widely used method for measuring customer satisfaction and loyalty. It involves asking customers a simple question about their likelihood to recommend a product or company. NPS provides valuable insights into customer perceptions and helps organizations assess satisfaction levels, identify areas for improvement, and drive customer advocacy and organic growth.

Employee well-being can be incorporated into an IT-project success measuring system by including specific metrics that assess the various dimensions of well-being throughout the project lifecycle. In the process of creating a new measuring system that includes these metrics, the following steps were being implemented. First, identified relevant well-being indicators by determining the key aspects of employee well-being presented in literature that

are relevant to the IT-project context. Second, defining measurable metrics by developing specific metrics that align with the identified well-being indicators. Third, the metrics and their measuring methods were evaluated within the organization by utilizing interviews. Through an analysis of the interviews, additional iteration of the first two steps was executed. Finally, the chosen well-being metrics were incorporated alongside other project success metrics, such as cost, time, and customer satisfaction into the created IT-project measuring system.

The chosen metrics from the process were work-life balance, the alignment of competences and interests with project and communication. The work-life balance metrics incorporates questions about workload, stress levels, and the impact of the project on employees' free time. By measuring these aspects, insights can be gained into the employees' mental state and their ability to work productively. The alignment of competences and interests with project -metrics is targeted with two different types of questions: passive and active. The passive questions assess the degree of alignment of the project with the existing skills of the employee and measures how well the project manager was able to match the skills needed with the employees available. The active question prompts employees to reflect on their own work and take action to align it with their career goals. Communication can be measured through questions that assess employees' comfort in giving feedback, the value placed on their opinions, and their perception of the impact their opinions can have on the project outcome. Additionally, adding a question about expressing feelings and thoughts within the project team provides insights into the overall communication and emotional atmosphere.

To measure the well-being metrics, a weekly well-being pulse is sent to employees, including one randomly chosen question from each category. Employees rate their well-being on a scale from one to four, with an even number chosen to avoid middle ground answers. Employees also have the option to provide additional comments for further explanation if needed.

In summary, the proposed way of incorporating employee well-being within IT-project success measuring system, is the new created measuring system that involves six metrics: time, cost, customer satisfaction, employees' work-life balance, alignment of competences and interests with project, and communication, and additionally the proposed measuring system offers measuring methods for the metrics and a way of reporting the results of the measuring. Furthermore, the research offers guidance of actions that could be taken if one or more of the metrics is showing poor results in the reporting. The components of the proposed measuring system are summarized in Table 18.

Table 18: The components of the proposed IT-project success measuring system

Metrics	Measuring method	Reporting method
Cost	Automatic comparison (project management tools)	Key Performance Indicator
Time	Comparing to existing targets (project management tools)	Timeline
Customer satisfaction	Net promoter score	Key Performance Indicator
Work-life balance	Well-being pulse	Gauge
Alignment of competences and interests with project	Well-being pulse	Gauge
Communication	Well-being pulse	Gauge

The inclusion of the metrics work-life balance, alignment of competences and interests with the project, and communication highlights the significance of employee well-being and its impact on project outcomes. Work-life balance is essential to ensure employees have a healthy integration of work and personal life, which directly contributes to their overall well-being and productivity. Alignment of competences and interests with the project acknowledges the importance of matching employees' skills, expertise, and interests with project requirements, enabling them to work on tasks that are meaningful and engaging. Effective communication is critical for successful project collaboration, knowledge sharing, and problem-solving, ultimately leading to better project outcomes.

While other metrics mentioned in the literature review may have been valuable, their exclusion from the selected set of metrics was based on the focus of the study being IT-projects and the impact of a single project. For example, metrics related to health and safety was excluded since the study primarily focused on project-specific metrics rather than overall employee well-being. Similarly, metrics related to education and living standard were left out as the study's primary aim was to assess immediate project success rather than long-term employee development or organizational policies. The chosen metrics were deemed the most relevant and actionable within the given project context, allowing for a more focused and effective measurement of project success and employee well-being.

This approach could provide a more holistic assessment of IT-project success by considering the impact on employee well-being. Incorporating employee well-being as a staple in the measuring of IT-project success could demonstrate a commitment to the welfare of employees. Which in turn fosters a positive work environment, promotes employee morale, and can contribute to higher productivity and retention rates. Furthermore, assessing employee well-being metrics can help identify potential risks and areas of improvement that may affect project success. It allows organizations to proactively address issues that could impact employee performance and project outcomes.

5.4 Limitations

The literature review has certain limitations that should be considered. Firstly, the literature review followed a concept-centric approach, which involved analyzing and presenting the findings based on key concepts rather than providing separate article summaries. The concept-centric approach employed in the literature review offers several benefits and potential disadvantages worth considering. On the positive side, this approach allows for a thorough understanding of the underlying concepts by exploring their interrelationships and connections across various studies. By focusing on key concepts, the review can uncover shared themes, patterns, and gaps in the literature, resulting in a more extensive integration of knowledge. Additionally, the concept-centric approach enables the integration of diverse perspectives and theories, allowing for a nuanced analysis of the research questions at hand.

However, there are also potential drawbacks to consider. By presenting the findings through the lens of key concepts, there is a risk of oversimplification or reductionism, potentially overlooking important nuances and complexities within individual studies. The approach may also limit the exploration of context-specific factors and unique contributions of each study, as the emphasis is placed on overarching concepts rather than detailed article summaries. Moreover, the concept-centric approach may require subjective judgment in determining which concepts to focus on, potentially introducing bias or overlooking relevant ideas that fall outside the selected concepts. To mitigate these potential disadvantages, transparency was

maintained in the selection and interpretation of key concepts, ensuring that the synthesis accurately reflected the diversity and richness of the literature. The research was conducted while remaining aware of the limitations of the concept-centric approach and with openness to consider additional perspectives that emerged from individual studies. This is shown in the various publications used as supporting sources for knowledge and inspiration. A balanced approach was adopted, combining the benefits of a concept-centric analysis with careful attention to the specificities of each study. This approach resulted in a more robust understanding of the research area and facilitated meaningful insights for theory development and practical applications.

Secondly, the search process for literature was conducted iteratively, meaning that it did not capture all relevant publications in a single search. Although efforts were made to include diverse sources by consulting a range of journals from different fields, some relevant studies have been missed because of time and resource constraints for this study. Additionally, the literature review was based on papers that passed the initial relevancy assessment through title, abstract, and keywords. This selection process introduces the potential for bias, as certain papers may have been excluded based on their titles or abstracts, even if they could have provided valuable insights. Furthermore, the literature review focused primarily on major journals in the fields of workplace behavioral health, project management, workplace health management, management, and computer science. While these journals are considered significant in their respective areas, there may be relevant studies published in other journals that were not included in the review. These disadvantages were taken into account with the additional publications added from various other journals. However, these publications were not used as the primary source for knowledge and instead offer further information about specific areas.

Lastly, the search process was conducted using specific search terms and limited to a certain timeframe. This restricted the scope of the review and excluded relevant studies that used different terminology or were published outside of the specified timeframe. However, some recurring articles from new publications were also used as the base knowledge, as an example [Baccarini, 1999]. Despite these limitations, the literature review process aimed to provide a broad analysis of IT-project success metrics and employee well-being by incorporating insights from diverse sources. By considering a range of journals and utilizing a systematic search process, the review sought to gather relevant and significant research in the field.

Considering the empirical study, while the action design research (ADR) process described in the empirical study provides a systematic approach for addressing a real-world problem and developing an IT artifact, there are several limitations to consider.

Firstly, the involvement of a problem owner from the organization introduces a potential bias in problem formulation and solution design. The problem owner's perspective and interests may influence the research direction, potentially limiting the objectivity of the study. To mitigate the risks associated with the potential bias introduced by the problem owner's involvement, several strategies were employed. Firstly, it was ensured that a diverse representation of stakeholders was included in the solution design processes. By involving multiple perspectives, different viewpoints and interests were considered, reducing the impact of any individual bias. This was achieved through engaging a range of employees from the organization in different roles, such as team leads, consultants and project managers. It is noticeable, that all participants are from the same organization, which may limit the generalizability of the findings to a broader context or different organizational settings. However, for the scope of this thesis it was enough to get an organizational view from one organization and this can be expanded in future studies.

Furthermore, rigorous research methods and techniques were employed to mitigate bias. Established research methodologies, such as peer review and independent validation, were used to enhance the reliability and validity of the study. These practices provided checks and balances to ensure that the research findings were based on solid evidence rather than influenced solely by the problem owner's perspective. Lastly, a critical and reflective stance was maintained throughout the research process. Throughout the research, a continuous questioning of assumptions, biases, and interpretations was conducted and an active search for alternative viewpoints, and challenging own preconceptions was done to mitigate the biases. This self-reflection helped identify and mitigate potential biases, ensuring a more objective and rigorous research approach was followed.

Secondly, the modified action design research process used in this thesis may omit crucial steps, reducing the comprehensiveness of the study. By excluding the formalization stage, the research lacks a systematic approach for integrating the developed artifact into the organizational context. This omission could hinder the successful implementation and sustainability of the proposed solution. However, as this part was left out of the scope for time restraints, it is not a significant loss for this study itself and more so offers opportunities for further studies. Moreover, the reliance on literature research as the primary method for discovering existing solutions may introduce limitations that were presented in the discussion for the limitations of the literature research.

Thirdly, the use of unstructured interviews as the primary data collection method poses limitations. Unstructured interviews may lead to subjective interpretations and potentially overlook important aspects related to measuring IT-project success and employee well-being. The lack of standardized questions and predetermined response categories may hinder the comparability and reliability of the interview data. To enhance comparability and reliability, a set of broad themes and topics were identified in advance to guide the interviews. These themes acted as a loose framework, providing some structure to the discussions without constraining participants' responses. By having predefined areas of interest, the interview data was categorized and analyzed in a more systematic manner. Furthermore, the interpretations, assumptions, and decision-making processes were documented, which facilitated critical reflection and allowed for potential reevaluation of findings. This iterative approach was employed during the creation of the solution, enabling actively self-critique and consideration of alternative perspectives that emerged during the analysis phase.

Finally, a limitation of the study is the absence of testing the produced measuring system in an actual IT-project. Without real-world implementation and validation, the effectiveness and practicality of the measuring system remain uncertain. The study's findings and conclusions are solely based on theoretical development and hypothetical scenarios, which may not accurately reflect the complexities and challenges encountered in real IT-project environments. The absence of empirical data and feedback from project teams and stakeholders hinders the ability to assess the feasibility, reliability, and relevance of the proposed measuring system. Consequently, the generalizability and applicability of the study's findings to real-world IT-projects may be limited, emphasizing the need for further research and empirical validation in practical settings. However in this thesis, the formalization part of the action design research process was already left out of the original scope of the thesis for time constraints.

6 Conclusions

The objective of this thesis was to explore the measurement of IT-project success while incorporating and acknowledging employee well-being. Through a thorough examination of existing methods in literature and an action design research, the key learnings of the study are presented in this section.

Including employee well-being aspects in the definition of IT-project success offers a possibility for a holistic approach to measuring IT-project success. Integrating employee well-being aspects into the definition of IT-project success means considering not only the traditional metrics of cost, time, and customer satisfaction but also evaluating the impact of the project on employee mental well-being aspect. This includes work-life balance, alignment of competences and interests with project, and the success of communication. It involves recognizing that a successful project goes beyond achieving project objectives and extends to fostering a positive and supportive work environment that prioritizes employee well-being. By incorporating these well-being aspects, organizations can measure the overall success of an IT-project by considering its positive influence on both project outcomes and the well-being of the individuals involved.

Incorporating employee well-being in the definition of IT-project success could help guide actions that prioritize employee well-being, thus also resulting in better project success. Prioritizing employee well-being and taking proactive measures to address the needs of employees, fosters a positive and supportive workplace culture, resulting in higher levels of engagement, productivity, and better project outcomes. By creating an environment that values the health of employees, organizations demonstrate their commitment to their workforce. This leads to increased motivation, collaboration, and commitment among employees, enhancing communication, problem-solving, and decision-making. Ultimately, by prioritizing employee well-being, organizations create the conditions for improved IT-project performance and overall organizational success.

6.1 Suggestions for further research

Suggestions for further studies can enhance the understanding and application of IT-project success measurement systems that incorporate employee well-being. The following avenues can be explored:

A suggestion for further research could involve conducting a comprehensive study that includes the formalization stage in the action design research process to address the limitations of this study. This could involve systematically integrating the developed measuring system, into the organizational context. Furthermore, future studies could explore alternative research methodologies beyond literature research to validate and enhance the findings of this study. A suggestion would be to validate the effectiveness of the created measuring system by implementing it in real IT-project environments. This validation could involve selecting a sample of IT projects across different organizations and applying the measuring system to assess project success and employee well-being. Data could be collected using the defined metrics and measuring methods, and the results could be analyzed to evaluate the practicality and usefulness of the system. Additionally, qualitative feedback from project teams and stakeholders could be gathered to gain insights into the perceived value and impact of incorporating employee well-being in the measurement of IT-project success. This practical validation would provide valuable evidence on the applicability and effectiveness of the measuring system in real-world

scenarios, guiding organizations in implementing employee-centric approaches to project management and improving project outcomes.

Additionally, exploring the cultural context and its impact on project success and employee well-being measurement is essential. Different cultures may have varying perspectives on well-being, work-life balance, and project success. Investigating how cultural factors, such as cultural attitudes towards work, societal expectations, collective values, and cultural norms influence the implementation and effectiveness of employee well-being metrics can help tailor measurement systems to specific cultural contexts and identify any cultural barriers or facilitators.

Finally, further studies can delve into the organizational factors that influence the successful integration of employee well-being metrics in project success measurement. Factors such as leadership support, organizational culture, communication practices, and employee engagement can play a crucial role in the adoption and effectiveness of such systems. Understanding these organizational dynamics can provide valuable insights for organizations aiming to implement employee well-being measurement and enhance project success.

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