Master's Thesis

The people side of sustainability transition.
Navigation toward the change.

Anna Nevostrueva

07-02-2023

The people side of sustainability transition. Navigation toward the change.

"People and their behaviours are
what deliver results to your organisation."

© Mark Hortsman

by

Anna Nevostrueva

in partial fulfilment of the requirements for the degree of

Master of Science
in Construction Management and Engineering

at Delft University of Technology

Student number: 5386357

Graduation Committee

Chairman:	Dr. D. F. J. Schraven,	TU Delft
1st supervisor:	Dr. E. J. Houwing	TU Delft
2nd supervisor:	Dr. T. Wang	TU Delft
External supervisor 1:	M. Archila Lamus	RHDHV
External supervisor 2:	A. Profijt	RHDHV

Delft, February 2023

EXECUTIVE SUMMARY

Sustainability gradually embeds into businesses, becoming mainstream, and at this point, there is no way back; the ongoing changes are irrevocable. Due to increased concerns about global environmental problems, sustainable development takes on new forms. As a significant contributor to a sustainable future, the construction industry is experiencing substantial changes. Governments and other policymakers develop norms and requirements, and the final consumer demands a more sustainable product. Therefore, clients more often ask for sustainable construction projects.

To survive in the competitive environment, organisations introduce sustainable development into their business strategies, although integrating sustainability into the current way of working is a very complex task. The overarching specificity of the sustainability concept influences many aspects and stakeholders in the construction project. project management, along with its main functions on the project delivery, such as time, budget, and scope, should also track sustainability implementation. This means project management is placed into a transition process or a change which requires a deliberate approach.

People are the main asset of a consultancy firm, and a project manager is a key figure in the delivery of projects. Change Management theories suggest that the success of change efforts relies on three components: Leadership, project management and Change Management. Therefore, successful sustainability implementation depends significantly on the performance of a project manager, how well they are equipped with the knowledge about sustainability and supported with tools and internal processes. But first of all, how well they are aware of the importance of sustainability for the organisation and how strong their intention to implement the changes is.

The project manager is an enabler of sustainability in a construction project. Hence, they can contribute to the construction industry to meet sustainable development goals. To facilitate the process of sustainability implementation and create opportunities for action, more knowledge is required about current drivers and barriers for the project managers. This research investigated these drivers and barriers utilising behavioural theories. The main research question was:

> *What insights can help a consultancy firm translate sustainability from the strategic mission into the project execution?*

Main results.

The research design used a mix of qualitative and quantitative methodologies. The literature and organisational documents were used to study the current state of sustainability implementation in theory and practice, and at the same time, several exploratory interviews were conducted. DINAMO survey identified which barriers PM specialists encounter during project delivery. Four main barriers resulted from the survey:

- Complexity of the change
- Lack of Information
- Lack of Involvement
- Manageability of the change

After collecting and analysing the survey results, each barrier from the list was interpreted utilising the findings (the quotes) from interviews with sustainability experts. Discussion of the findings with the theory has pointed to the practical recommendation and recommendations for future research.

The study has indicated three points that can help to translate sustainability into project execution. First, the research has shown the importance of the strategic context. Explanation of the strategic goals and their alignment with other organisational goals plays an essential role in strategy implementation.

Second, it has been concluded that project management practices require significant revisions. Being a key figure in the project, PM must enable opportunities for sustainable goals. Sustainable goals should be inseparable from the project's success, and the integration of these goals should be facilitated by sustainability leadership.

Third, the study has disclosed that the behavioural control and intention of project managers to change play a significant role in the implementation of sustainability in projects. Behaviour is directly dependent on the working environment created by strategic settings. It is, therefore, a closed loop in which strategic settings influence the behaviour, and behaviour can provide valuable information to re-adjust the strategic settings.

Main recommendations for practice.

To reduce the complexity of the change, research recommends reinforcing the Integrated Approach in the organisation. It is recommended first to define the impact on the content of the work of a PM. Then develop, when necessary, new tools and processes, testing them on smaller-scale construction projects to ensure their 'fit for purpose'.

To increase the involvement (of PM) in the change process research refers to the Leadership Actions. It is highly recommended to assign leaders. These leaders should ensure the PMs are guided and trained in sustainability implementation to keep them are motivated and inspired. Leaders also should manage stakeholders of sustainability to facilitate the process for PMs who have other important goals on the project.

To provide more information research suggests combining the Integrated approach and Leadership Actions. It is recommended for the leaders to become a sustainability ambassador and carefully manage the information. Information must be up to date and conveyed to the right people. Important information must reach everyone via compulsory workshops or trainings. An internal information hub for sustainability can be created to ensure exchange of knowledge and information.

To facilitate manageability of the process, the research refers to the Leadership Decisions and Leadership Actions. It is recommended, again for the leaders, to negotiate within and between units about necessities for sustainability. Resource allocation is crucial. Change program should be developed to provide rough estimations of expenditures and plan of actions. All steps should be followed by continuous feedback from practice.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

CSR- Corporate Social Responsibility

GHG – Green House Gases

PM – Project Manager

RHDHV – Royal HaskoningDHV

SDG – Sustainable Development Goals

TBL – Triple Bottom Line

WCED - World Commission on Environment and Development

WBCSD - World Business Council for Sustainable Development

1. Introduction.

1.1. Problem domain

Transition to Sustainable Development is no longer an environmentalist's 'niche trend' but a responsibility that all businesses should seriously consider. Companies tend to become more sustainable to answer the growing demand for sustainable products, meet stakeholders' expectations and comply with governmental policies. By the definition of Markard et al. (2012), *sustainability transitions are long-term, multi-dimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption*. In the construction industry dominated by project-based production, projects are the instruments of sustainability implementation (Marcelino-Sadaba et al., 2015). However, organisations involved with the management of construction projects have been challenged by complexity when placing sustainability ambitions into their practice and often fail to implement the plans. Thus, more knowledge is needed to facilitate the sustainability transition.

The need for transition.

The challenges experienced by the planet and societies last decades do not leave us time for reflection. Extensive human activity has been disturbing the ecosystem and natural cycles and provoking the intoxication of natural resources (Lucas & Wilting, 2018); global warming has already reached 1°C above pre-industrial levels and is increasing at approximately 0.2°C per decade (Amanatidis, 2020); extreme events such as flooding and droughts, heavy rains and hurricanes have become more frequent and intense, the sea level has already risen by 20 cm and is expected to grow between 28cm and 100cm by the end of the century.

The Climate crisis reached the point when a decision must be made urgently. The ambitious goal of the Paris Agreement established in 2015 is to keep global warming below 1.5°C this century. To reach this ambition, the world must reduce annual greenhouse gas emissions in half during the next eight years (UNEP, 2021). The European Commission President Ursula von der Leyen said at the 2021 P4G Seoul Summit:

> *"Even though the finish line is 30 years away, the race starts now. The 2020s is the 'make or break' decade. And that is why Europe has committed to reduce our emissions by at least 55% by 2030, compared to 1990 levels".*

Another arising problem is global resource scarcity. Growing population and production methods that provide goods of higher availability for lower price challenge the limited planet's capacity. Linear economy "produce-consume-waste", in combination with the exponential growth of

production, will put at risk of non-renewable extinction resources and reduce the availability of vital renewable resources such as water and oxygen in the air. Homer-Dixon (2010) also claims environmental scarcity to be intricately connected to other social, political, and economic stresses. Evolving problems urge industries to reduce raw material usage and to motivate the regenerative use of resources (Hofmann, 2019; Lieder & Rashid, 2016; Munaro et al., 2020).

Problems of the climate crisis and resource scarcity are closely linked to the industries. Industries increasingly utilise raw materials, water, and energy to supply products for growing demand. Besides manufacturing demanded goods, industries also produce greenhouse gas (GHG) emissions and waste. European Commission acknowledged the construction industry's significant impact on the environment: consumption of about 50% of extracted materials and production of around 35% of all European Union waste is reported. Carbon emissions from the extraction of raw materials have been estimated at up to 12% of all national emissions. Increasing the efficiency of (re)using materials can save 80% of those emissions (European Commission, 2020).

Meanwhile, organisations operating in the construction industry are highly restricted by risk and cost boundaries. A long history of the lowest bid tendering led to the practice of lowering risk and costs to ensure profit; as a result, the actors make sure that they understand the process, the materials, and the risks to be confident about the outcome (Hanák et al., 2021). The application of more resource-efficient construction materials and processes is lacking. The built environment contains an enormous proportion of all the materials ever extracted, and the turnover rate of buildings is considered relatively low. Hence, the construction must switch from a traditional to a restorative and regenerative approach (Sanchez & Haas, 2018).

The challenges of transition.

More considerable transformations are expected to battle the accumulating problems, where the traditional economic model of production and consumption is revised. Change in the current situation in the construction industry is a complex, extended and gradual process as it involves a *system transition* or *system innovations* (Geels, 2005; Loorbach, 2010). One of the necessary steps for reaching these goals is to incorporate and use renewable and recyclable resources, innovative products and strategies to reduce the environmental impact of construction projects.

Organisations are placed in a changing environment where they must react accordingly to survive. Creating the strategies enables organisations to embrace the pace of change and deal with competition in the market (Hockenberry, 2019). To outperform its competitors, a company needs to realise its competitive advantage. Sustainability strategy implementation enables the company to achieve higher value than its competitors and creates value for the company and its shareholders. Therefore, it becomes a matter of existence for an organisation. Transitioning to Sustainable Development by responding to Sustainable Development Goals (UN DESA, 2015) is a way for a company to realise its corporate social responsibility and obtain an advantage over competitors. Internal stakeholders must be alert to emergent factors and actively initiate changes rather than following specified innovation or collaborative management trajectories (Brown et al., 2020). If the companies fail to implement sustainability in their products and processes, they risk losing market value.

Therefore, an organisation operating in the management of construction projects needs a transition from the current state of practice, behaviour and organisational process because the traditional way does not enhance sustainability.

Existing literature provides diverse methods and tools to reach built environment sustainability, such as circular economy, Net Zero construction, design for disassembly, reuse, longevity, and many others. However, those concepts are not easy to be implemented in the construction industry because they conflict with the business-as-usual model. To support the transition process, academics suggest expanding research at the intersection of two following fields: transition studies and management research. An example from Köhler et al., (2019) is to utilise concepts and frameworks from management studies, employing and altering them to research related to sustainability transition.

To frame the sustainability transition challenges, this research utilised the Prosci triangle (Figure 1). The framework combines three critical fields to support the transition process in the organisation.

Figure 1. Prosci Change Triangle model. (Source: own picture based on Prosci, n.d.)

These fields are:

- Leadership/Sponsorship, which is responsible for strategising sustainability and ensuring its implementation.
- Project Management, which provides solutions for sustainability implementation.
- Change Management, which makes employees embrace, adopt and use these solutions.

All three elements are essential to a successful transition. The framework includes many variables, and all of them have a significant impact on the project delivery. Adjustments must be made considering the balance between all three elements and the variables inside them, as only together do they sustain the system.

1.2. Problem definition

Organisations need to become sustainable. There are several reasons for this: personal liability, government policies, and consumer demand. Pursuing a rapidly changing perception of corporate responsibility, organisations introduce sustainable goals and ambitions into their company objectives. Those goals and ambitions are commitments companies make, and markets closely observe them. So, to stay relevant in business, the goals and strategies must be converted into plans, and roadmaps with clear deliverables, ensuring sustainable transition.

Sustainability transition, by definition, is a fundamental transformation of practice which leads to more sustainable modes of production and consumption. Hence, it does have a significant impact on all aspects of the company's functions. Therefore, effective implementation of the sustainability concept in the management of projects requires all-embracing measures and changes in the organisation. When companies claim sustainability to be one of their strategic goals, they need to ensure this goal is aligned with other core goals within the company and cascaded at all organisational levels. Conflicting goals remain a complex and challenging issue that requires change management effort and further knowledge development. Lately, more and more organisations have been setting goals regarding sustainability, but most of them struggle to implement these goals in practice. There is a gap between strategic ambitions to offer a sustainable practice in construction projects and the implementation of these ambitions in practice.

In the first phase of the research, the author discussed current sustainability practices with specialists in the engineering and consultancy company Royal HaskoningDHV. All specialists have been involved with the topic of sustainability implementation in construction projects; hence, they obtained knowledge about the current efforts and troubles. During these introductory discussions, practitioners shared a few concerns, which from their perspective, might have a hindering effect on the process of sustainability implementation. Table 1 contains quotes from the discussion categorised by themes characterising these quotes. These discussions later supported the formulation of the research question.

Job title	Quote	Theme
1. Lead Sustainability Consultant at RoyalHaskoningDHV	1. "Involvement in sustainability is usually client-driven, but sometimes we need to come first solution. It depends on who does the sale"	Drivers for involvement
	2. "Little understanding of how we internalise knowledge".	Documentation of acquired knowledge
	3. "It is important to map people inside the company, now it is difficult to reach the right people".	Organisational structure
2. Consultant Sustainable Building at RoyalHaskoningDHV	4. "Sustainability consultants are very dependent on PM, budget-wise"	Role of the PM
	5. "The main challenge is being involved on time"	Early involvement

3. Project director at Royal HaskoningDHV real estate (Business Development)	6. "Not all PM understand what sustainability entails, some think the sustainability consultant's job is reporting" 7. "Need to translate strategic objectives to the building and working environment" 8. "Added value of sustainability is recognised but the information gets lost on the way from C-management (top-level management positions in a company) * - program manager - project manager". *-author's note	Knowledge about sustainability in project Strategy interpretation Sustainability alignment

Table 1. Quotes from introductory discussions with sustainability specialists.

To conclude, the process of sustainability transitions is innovative and requires reconsidering 'typical' project delivery processes. On the strategic level, sustainability is recognised as a potential competitive advantage for the firm. Nevertheless, strategic change for increasing value, as stated by Teece & Pisano (1997) in their 'Dynamic Capability Approach', is difficult and costly because it is hard to change the organisational process; it can only happen gradually. **The problem, thus, lies in the internal strategy alignment process and the commitment of project managers to strategy implementation.** There is a gap between how sustainability is embedded in a company's strategy and how it is perceived at the operational level in project management. The practical and academic relevance of the problem is presented below.

Academic relevance

Sustainability brings in a new variable in the practice of project management. Although sustainability transition is mainly associated with natural science in literature, it also has a powerful social science side (Loorbach et al., 2017). The role of human behaviour in sustainability transitions is understudied and lacks attention from academia. Meanwhile, the adoption of numerous innovative technologies and practices by actors is gaining more value (Köhler et al., 2019, Upham et al., 2020). There are no clear instructions in the literature on implementing sustainability individually or collectively and guaranteeing the transition. Sustainability transition requires fundamental changes in norms, belief systems and cognitive heuristics (Sachs et al., 2019). Knowledge about sustainability transition in the making and how individual actors respond to it will provide insights for accelerating the process. The academic value of this research, thus, is to obtain empirical data which helps to understand how intermediate actors at the operational level (PMs) perceive the sustainability strategy implementation and how their behaviour relates to the strategic transition.

Practical relevance

The senior leadership of RHDHV decided to incorporate Sustainability in the company's vision and a new strategy to safeguard the internal and external focus. These were based on 17 SDGs. In practice, it is important to verify if this is sufficient to ensure the alignment of organisational strategy with sustainability and broad commitment throughout the organisation (Haanaes, 2022).

Yet, according to Sachs et al., (2019), internal stakeholders lack a common understanding of the operationalisation of the 17 SDGs. In the practice of RHDHV consultancy, project managers do not consider sustainability as a project constraint such as cost scope and time. Even though the company claims sustainability as its core value, there is a lack of acknowledgement of responsibility for sustainability implementation. Therefore, the practical value of this research is to deliver insights on what hinders sustainability implementation in project management and provide recommendations on this hindrance can be battled based on academic research.

1.3. Research objective

The research objective is to contribute to the existing scientific knowledge about sustainability implementation in construction projects and deliver practical results for the organisation involved and challenged with the management of such projects. It can be characterised as twofold. First, the research investigates how a consultancy firm can better integrate sustainability scope in its operation. Second, to assess what factors from the work setting environment hinder the implementation of sustainability at the operational level.

Hence, **the objective** can be summarised as **providing the leadership of sustainability transition with the barriers that hinder sustainability implementation and how to deal with them by building on existing knowledge**. This objective was achieved by creating a theoretical framework that establishes a research foundation, evaluating current trends in practice, and analysing the results according to existing scientific theories. Meeting the objective entailed four main steps.

Firstly, perform the literature review that covers sustainability concepts applied to the organisational strategy. This helped clarify the intended role of sustainability in the organisation and other organisational goals and explain the transition process from one strategy to another.

Secondly, further explore the literature to identify specifics of sustainability implementation in projects and prove that a project manager can considerably influence the process.

Thirdly, investigating the current state of sustainable strategy implementation at the operational level. The empirical study of the barriers to sustainability implementation has been provided from the PMs' perspective.

And finally, processing the result of the empirical study while linking it to the theoretical knowledge developed in the first two steps. This final fourth step allowed to generate recommendations for the practice to overcome identified barriers.

1.4. Research question

This research aimed to determine factors hindering sustainability implementation in construction projects and find a way to reinforce these factors. Using scientific and practical knowledge for developing recommendations for practice by focusing on the strategic goals of the organisation and the change management of those organisations.

RQ: What insights can help a consultancy firm translate sustainability from the strategic mission into the project execution?

Preliminary research and exploratory interviews/discussions with experts conducted during the first stages of the study resulted in three observations which helped to formulate sub-questions for the research (Table 2).

Observation 1. Sustainability strategy implementation needs to be adequately interpreted and aligned at the organisational level (Table 1, Quotes 7,8).	***SQ1:*** *What is the current knowledge about sustainability transition and organisational strategy in the literature?*
Observation 2. The role of a project manager in the implementation of the sustainable development strategy is not clearly defined (Table 1, Quotes 3,4,6).	***SQ2:*** *What is the current knowledge about sustainability implementation in the practice of a project manager?*
Observation 3. There can be different drivers for involvement in sustainability strategy implementation (Table 1, Quotes 1,5).	***SQ3:*** *Which drivers can help the RHDHV consultancy firm to support the process of sustainability strategy implementation?*

Table 2. Observations and sub-questions.

1.5. Research outline

A supporting scheme in Figure 2 has been drawn to visually display the research structure and how the sub-questions were answered.

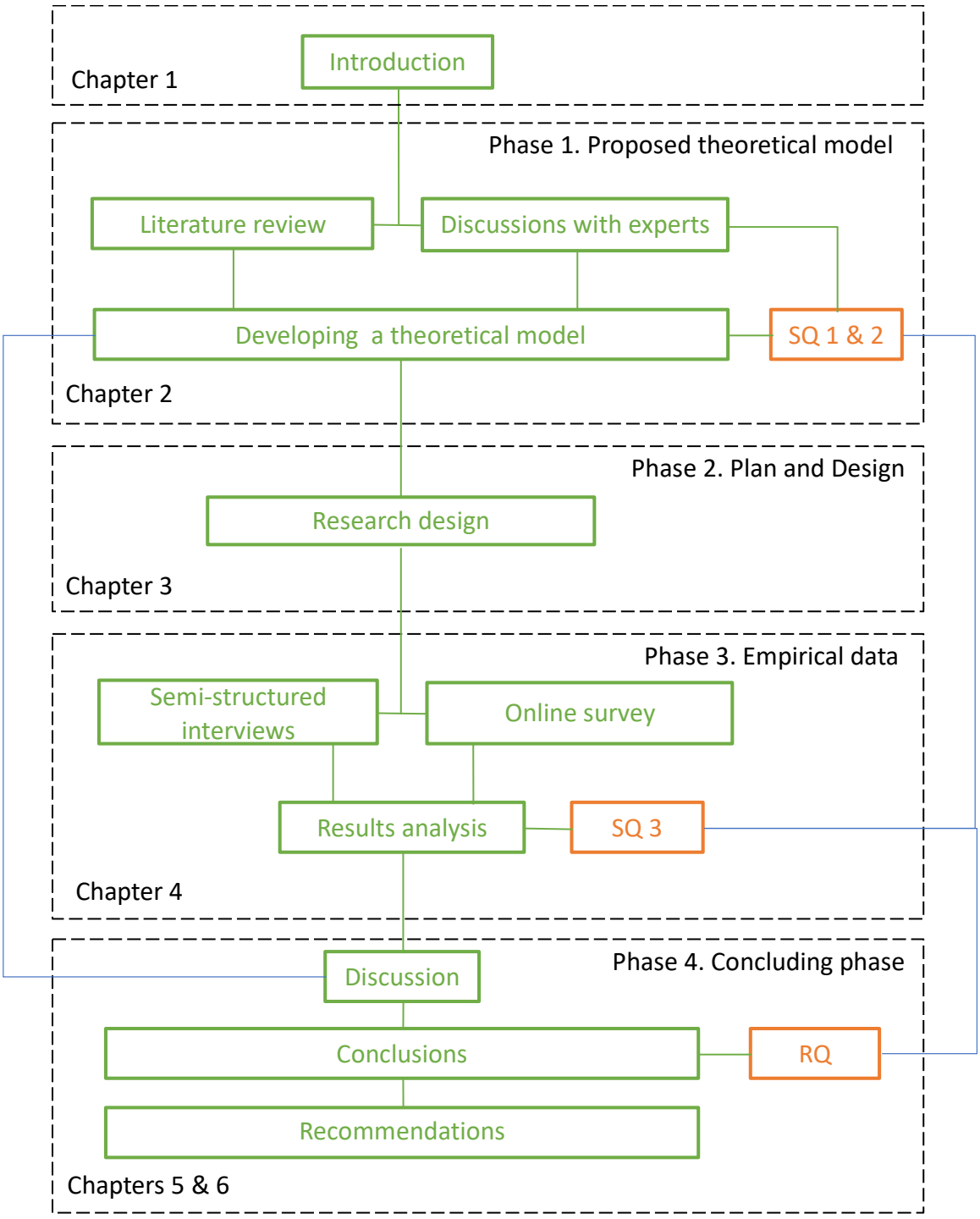


Figure 2. Research outline. (Source: own picture)

2. Theoretical framework

As follows from the introduction (Figure 1), this research focuses on three main concepts: leadership, change management and project management, all in the context of sustainability. This chapter examines existing definitions and theoretical models from the academic literature to establish a clear understanding of these concepts and acknowledge their interaction. Furthermore, it develops a knowledge base on how the theory can support the organisation's sustainability strategy implementation. Chapter 2 consists of two parts. Part 1 of this chapter covers the concept of sustainability and organisational strategy together with change management, which answers sub-question 1. Part 2 is focused on Project management and behavioural theory, which answers sub-question 2.

Part 1

2.1. The urge for sustainability

Organisations face different challenges while transitioning towards sustainable development. To start the literature review, it is necessary first to understand the roots of the problem and explain why companies need this sustainability transition (SQ1).

SQ1: What is the current knowledge about sustainability transition and organisational strategy in the literature?

Sustainability concept

Sustainability is a broadly defined 'umbrella' term. The fact that there is no one common definition for it leads to various perceptions and sometimes misinterpretations of the original idea. Therefore, defining the concept offered by the existing academic works is essential. It is believed that the current use of the term is influenced by the Brundtland Report "Our Common Future" held by the UN World Commission on Environment and Development (WCED). In this report, Sustainable Development was defined as the *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (Brundtland, 1987). Thus, sustainable development is concerned with changing the current economy by including environmental and social interests. Even though Brundtland Report is the most known and cited source leading to the origin of the definition, it is worth mentioning that the principles of sustainable development were stated earlier by K. Boulding (1966) criticising linear economy and Meadow et al. (1972) demonstrating the model of exponential economic and population growth,

which will lead to a planet's collapse. Thus, scientists have been spreading awareness for over half a century and proving the necessity of change.

Triple bottom line.

Sustainability always involves three aspects: economic, social, and environmental. Elington (1997) introduced the sustainability framework called Triple Bottom Line (TBL), built on these three pillars. TBL framework enables organisations to measure their performance and estimate their impact on the economy, society and environment. Even though some studies show an imbalanced distribution among these three aspects, the focus is usually leaned toward environmental or social sustainability (Dubey et al., 2017, Zhong & Wu, 2015). To achieve "true" sustainability(Alhaddi, 2015), new construction and renovation projects are required to be consistent in following the triple bottom line (TBL) approach (Figure 3) intersection of all three dimensions: economic, environmental, and social (Liu et al., 2019)

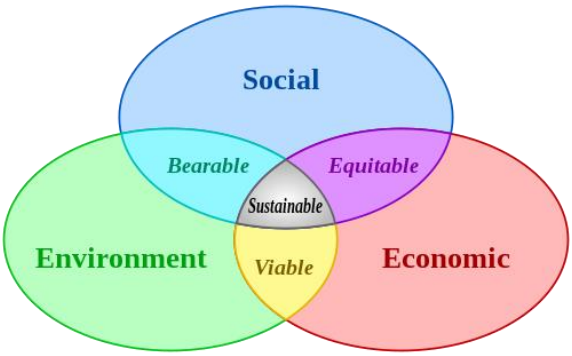


Figure 3. The Three Dimensions of Sustainability. (Souce: Available online: https://commons.wikimedia.org/wiki/File:Sustainable_ development.svg (retrieved on 23 July 2022).

Sustainable Development Goals.

Sustainable Development Goals (SDGs) cover all three aspects of the TBL by calling for an *"action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity"* (UN DESA, 2015). Following this call, the United Nations adopted 17 goals (Figure 4) to transform the sustainability concept into a policy and provide an outline that would help to fight the economic, political, and environmental challenges.

The introduction of SDGs allowed states to include them as a well-formulated framework in their policy and agenda. SDGs are universal, inseparable, and transformative goals, which means that no matter what country uses them, they must be developed together. Moreover, they were established to transform current problems into opportunities (Zamora-Polo et al., 2019). SDGs, through a clear framework, call for the responsibility of member states, citizens and companies. The transformations caused by the implementation of SDGs are unprecedented, and their governance is fully exploratory and needs further refinement through the 'learning-by-doing' and 'doing-by-learning' (Sachs et al., 2019, Loorbach et al., 2017). Therefore organisations must explore their way of applying SDGs to their practice through experiments and constant feedback.

Figure 4. 17 SDGs (Source: UN, n.d.)

Responsibility for Sustainability in the Construction Industry

The construction industry significantly impacts the environment, consuming about 50% of extracted materials and producing around 35% of all EU waste, as the European Commission reported it. Carbon emissions from the extraction of raw materials have been estimated at up to 12% of all national emissions. Increasing the efficiency of (re)using materials can save 80% of those emissions (European Commission, 2020). These numbers advocate for a high potential hidden in the construction industry, a potential to advance its environmental performance by reducing resource usage, transiting to non-carbon energy resources, and improving energy efficiency (Yu et al., 2021, Sabini et al., 2019).

The social aspect of Triple Bottom Line in the construction industry can be distinguished as a concept of Corporate Social Responsibility (CSR) which is defined as the "*continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large*" (Dahlsrud, 2006). Otherwise stated, the construction industry is responsible for the health and safety of its workers and the well-being of a community influenced by its economic activity. Some academics, however, argue that corporate responsibility must be differentiated from corporate sustainability (Bansal and Song, 2017) as they historically take different perspectives to study the relationship between business and society.

The economic part of sustainability in the construction industry is defined by several factors, such as cost accounting methods, investment schemes and business models. Current traditional methods of cost accounting have been proven to lead to environmentally inappropriate decisions (Hamner and Stinson, 1995). The British Standards Institution introduced an alternative Life Cycle Costing (LCC) method in 2008. It enabled practitioners to include the costs of an asset throughout its lifecycle. Life cycle costs include construction, maintenance, operational, occupancy, end-of-life, and non-construction costs (BCI, 2008). Hence, it helps to find a good balance between an asset's cost and actual value.

The construction of buildings contributes to a large proportion of gas emissions and resource consumption of the entire industry sector (Pomponi & Moncaster, 2017). With the population growth and densification of the cities, there is a constant demand for new buildings. On the other hand, in The Netherlands, there is a high rate of vacant office buildings that require functional transformation, which is the only sustainable way to avoid economic loss from demolishing a structure and keep the environmental value of materials, but at the same time provide a strategy to cope with the social, cultural, or historical importance (Remøy, 2009). Moreover, longstanding buildings, especially ones from the massive post-war construction in the 50-s, now require a retrofit. Refurbishment and retrofit of buildings create feasible opportunities to achieve sustainability in the built environment at relatively low costs and in high demand (Ma et al., 2012).

Existing literature provides diverse methods and tools to reach built environment sustainability. Among them are Circular Economy, Net Zero construction, Design for disassembly, reuse or longevity, and many others (Pomponi & Moncaster, 2017, Boorsma et al., 2021, Rahla et al., 2021, Loorbach et al., 2017). Thereby, a theoretical and technological basis seems to be established and what is needed now is urgent actions until we haven't reached the "too little, too late" scenario. Organisations need a robust sustainability model to be integrated into their strategies to develop a sustainable product (Gaziulusoy, 2010). To ensure the integration of sustainability, organisations must carefully design their transition process first. Kossoff (2015) criticised current developments focusing on single aspects of the transition (single discipline or activity), while in his opinion, it requires a holistic and more human-centred approach.

Thus, section 2.1 explains why companies should consider implementing sustainability. This overview was needed to understand how the sustainability concept evolved and what it implies. Also, how governments and enterprises translate sustainability into guiding tools and policies such as SDGs and CSR. The following section will review how a company operating in the construction sector deal with these new circumstances.

2.2. Sustainability in the organisation

The changing environment urged companies to integrate the sustainability concept into their day-to-day business. The independent engineering consultancy firm Royal HaskoningDHV (RHDHV) hosted the current research. The 'business-as-usual' of a consultancy в is that the company works for a client by fulfilling its needs and requirements. As stated above, under the current environment's pressure, clients often embed their corporate social responsibility (CSR) in the set of requirements. Thus, the main priority of RHDHV is to interpret and implement these requirements thoroughly. But moreover, RHDHV demonstrates its CSR in open sources, such as the corporate website (HaskoningDHV, R., 2022) and is supposed to bring it into client conversations.

RHDHV strategy

The Strategic Management of RHDHV has recently developed a new strategy, Stronger25 (HaskoningDHV, R., 2022), which provides the direction for the organisation to achieve the desired state in future. Stronger25 is considered a logical continuation of the previous strategy, Strong22. Therefore, it is not considered a significant organisational change. The following Table 3 presents the objectives of two strategies for comparison.

Strong22	Stronger25
1. We want our clients to be happy and see us as their partners in making them succeed in their business. 2. We all want to feel safe and engaged (proud), aligned (strategic direction) and supported (leadership/management). 3. We want to deliver excellent projects. 4. We want to achieve market leadership in the areas we are really good in. 5. We want to be able to invest in people, markets, services, innovations.	1. Enhancing society together. Responsibility for having a positive impact in the world. Sustainable solutions to local and global issues. 2. We focus on where to play. Growth in nine leading markets and strengthening position in the Netherlands. 3. Shift our service mix. Integrate engineering, design, consulting skills, software and technology to deliver added value for clients. 4. Achieve our ambitions. Sustainably grow the turnover and make healthy profit to invest in the company.

Table 3. Strategy objectives Strong22 vs Stronger25 (Source: HaskoningDHV, R., 2022).

The leading dimension of the strategy, as stated on the website of RHDHV, is the company's motto: "Enhancing society together", which adopted a new interpretation under the Stronger25 strategy. The focus of this dimension is on five themes to be advanced further in 2022:

- Climate change (SDG7,13). Significantly reduce greenhouse gas emissions to mitigate climate change. Adapt positively to inevitable climate change.

- Biodiversity & natural systems (SDG14, 15). Protect and enhance biodiversity and restore the functioning of natural systems.

- Resources & circularity (SDG6,12). Reduce the demand for water and natural resources and actively support the circular economy.

- Social value & equality (SDG4,5,8,9,11). Seek and provide community and broader social benefits. Vocally promote equality and diversity.

- Safety & well-being (SDG3). Proactively embed safety in design, operation and culture. Support people's positive physical and mental well-being.

"*The five themes are relevant to everything we do – for our people and our clients, the way we operate as an organisation, and how we implement our projects. They will also be the fundament to report on our impact and progress and relate to specific UN Sustainable Development* (HaskoningDHV, R., 2022).

The Stronger25 strategy is a continuation and reinforcement of the Strong22 strategy, not an introduction to a radical organisational change. However, the concept of sustainability was, for the first time, cohesively announced as an official leading goal for the organisation. The RHDHV management refers to the five themes directly to the UN SDGs and expresses ambitions about the overall implementation of the strategic objectives. This approach might involve organisational changes. Moreover, the concept can be completely new and unfamiliar to some employees responsible for its implementation. Therefore,–RHDHV introduced a tool – purpose matrix - developed to support the new strategy. The purpose matrix is a simplified scale to assess the projects' impact to sustainable development. It can be used as a reference for conversations, proposals, projects, products and services to easily define whether they will have a negative, neutral, positive or very positive impact against each of the five themes without needing to be a theme expert. The purpose matrix is developed for all employees. Still, some are explicitly mentioned: Business developers and Account managers to inspire clients and identify opportunities, Proposal managers to structure influence on the scope of the client, Proposal approvers to challenge the team on the use of matrix in each proposal and Line managers to lead by example in using matrix in all conversations.

Therefore, sustainability efforts are closely linked to the business strategy of the RHDHV strategic leadership.

2.3. Organisational strategy in theory

In this research, leadership in the Prosci triangle (Figure 1) is associated with strategic leadership and organisational strategy that embeds sustainability. First, the following paragraphs explain the concept of business strategy and its paradox.

The environment in which an organisation exists and operates shapes its organisational strategy. The term strategy has military origins, and the recognition of the usefulness of the business strategy implementation originated in the 1950s with the introduction of the Ansoff matrix (Ansoff, 1957), SWOT analysis, and BCG matrix (1970). According to Porter (1996), the idea behind the strategy is to provide competitive capability by "deliberately choosing a different set of activities to deliver a unique mix of value". Well-known in business strategy literature, Porter developed the tool to analyse business competition based on the **Five Forces**:

(1) Threats of new entry,
(2) Threat of substitution,
(3) Bargaining power of suppliers,
(4) Bargaining power of buyers and
(5) Competitive rivalries.

Porter's Five Forces were criticised for being fixated outside in, giving too much importance to defining the company's profit. While developing a strategy, one should consider different viewpoints from which to look at the strategy, argues Mintzberg (1987). Mintzberg developed a strategy by using the **Five Ps** approach:

(1) Plan,
(2) Ploy,
(3) Pattern,
(4) Position,
(5) Perspective.

This approach enables the creation of a strategy aimed not only at the competitors but also at the inclusion of organisational culture, behaviour patterns and other aspects of the internal environment. Mintzberg (1973) also believed that a critical part of a management job is to provide information, be decision-maker and facilitate internal communication.

Porter and Mintzberg have been widely used to create strategies for over 25 years. However, Moore (2011), comparing the two gurus, stated that the planning school of Porter is no longer relevant, unlike the ideas of Mintzberg, which allow more flexibility and room for mistakes. An extremely competitive, innovative and changing environment, according to Bruijl (2018), pursues a smoother approach complementing Porter's framework with alternative strategic models oriented inside-out. For example, the resource-based view (RBV), Delta model or Blue Ocean strategy. This will create an opportunity to shift toward new ways of strategic thinking, including fit-for-future and creating long-term values along with technological development.

Creating a strategy for Sustainable development creates unique problems in terms of potential internal goal conflicts. Long-term strategic orientation must be acknowledged as a precondition for sustainable development so that short-term inconsistencies in performance are not misinterpreted as a failure of decision-making. (Oertwig et al., 2017). This should be taken into account when planning and monitoring the strategy implementation.

The organisational strategy provides a connection between the organisation and its environment. Since the environment of an organisation is not static, the strategy must not only identify the core competencies which will be strengthened in due course but also include an effective response to the changes in the landscape (Dawson, 2000). When the competitive landscape is unstable, the dynamic capabilities by which firm managers '*integrate, build, and reconfigure internal and external competencies to address rapidly changing environments*' (Teece et al., 1997) become the source of competitive advantage. The competitive advantage must be difficult, if not impossible, to replicate. It cannot be considered a competitive advantage if it is easy to reproduce (Teece and Pisano, 1997). The knowledge resources are especially critical in such markets (Eisenhardt & Martin, 2000) The knowledge organisations - such as RHDHV - create value by applying their intellectual assets to the processes: '*drawing on people with diverse expertise and knowledge both to enhance existing value chains, and to create new ones*' (Dawson, 2000). According to Dawson, knowledge capabilities are those organisational capabilities of dealing with the core knowledge to reach the organisation's effectiveness. The strategy plays a vital role in enhancing the performance of a company. The RHDHV has developed a Stronger25 strategy focusing on sustainability to guide the employees and fulfil the client's demands. Implementing their mission to "Enhance Society Together" is a principal focus. They concentrate on five areas (Climate change, safety and well-being, Biodiversity and natural systems, resources and circularity, social value and equality) where they have the most potential to make a positive difference for people and the planet. Everything the company does for its employees and customers, as well as its internal procedures and the delivery of its projects, is informed by these themes. They will also support reporting on our effect and progress and connect to particular UN Sustainable Development Goals.

Effective and motivating organisational strategies increase the performance of an organisation which can convert it into a high-performance organisation (HPO). De Waal (2007) also argued that HPOs are growing significantly to tackle the rapid changes in the competitive business environment during the last decades. Miller (1986) examined high-performing organisations and concluded that the organisational environment and structure, together with a strategy, can merge into different patterns. According to Miller, these patterns are helpful in how they are composed of mutually supporting elements. De Waal formulated the definition of an HPO based on the common achievements and attributes from the literature: '*A high performance organisation is an organisation that achieves financial results that are better than those of its peer group over a longer time by adapting well to changes and reacting quickly, by managing for the long term, by setting up an integrated and aligned management structure, by continuously improving its core capabilities, and by truly treating the employees as its main asset*'.

HPOs ensure a better employee attitude, better cooperation inside and outside the organisation, better organisation, better financial results and competitive advantage (Han et Al., 2019). To enhance a company's sustainable performance, it is required to adopt the principles of HPOs. In

HPOs, employees have a greater sense of ownership over the quality of the firm's products and activities. They show greater initiative, leading to a higher rate of invention. There are increasing and faster introductions of innovative products and services. Both optimism and participation have increased among the employees of HPOs (Owen et al. 2001). Staff members work together more effectively with one another and across departments, as well as with external parties like vendors and clients. They are more receptive to new information and ideas and recognise that everyone in an organisation contributes to the chain's success. Communication across departments and between managers and staff is improved and more frequent. The company takes a different approach than its competitors. Differentiation exists in the strategy's substance or implementation and often in both. This distinguishes the company from its competitors and makes it more appealing to prospective clients and workers. There's a sharper mentality and stricter routine. There is a strong sense of corporate social responsibility among the staff. This boosts the company's standing in the eyes of customers and the public (Javidan, 1991).

Aligning the organisation's strategy

HPOs consist of effective and sustainable strategies. More than having developed strategies in HPOs is needed to reach organisational goals. Any strategy to have a real effect on the organisational performance must be aligned with the activities at all levels. A company can achieve its sustainable goals more effectively and efficiently when the strategy is aligned with organisational goals. The term "organisational alignment" refers to applying methods and philosophies to guarantee that everyone in an organisation, from entry-level workers to upper-level managers, is working toward the same goals and has the same overarching vision for the company's future (Kiron et al. 2016). When departments within a business are aligned, employees are more likely to share information openly and take responsibility for their actions. Kathuria et al. (2007) studied the evolution of research on organisational alignment. A study has proved the presence of an organisational alignment–performance relationship. Although, they stated that significantly less research could be found in horizontal alignment. For the sustainability transition, horizontal alignment is essential since many different functional areas are involved (Figure 5).

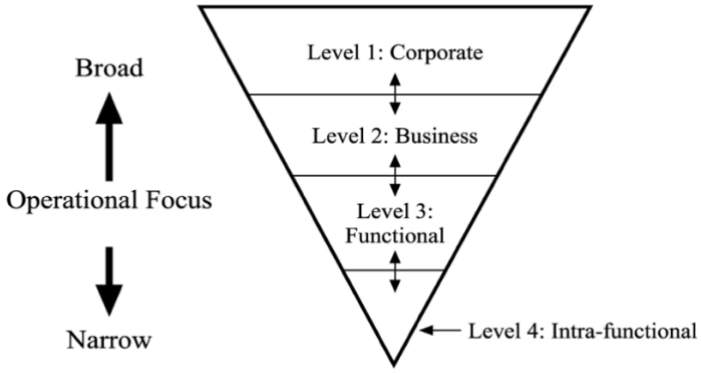


Figure 5. Hierarchy alignment (Source: Kathuria et al. 2007)

In contrast, Sull et al., (2015) disprove that proper vertical alignment necessarily equals successful execution of the strategy. According to their study, 84% of managers trust their direct reports, while only 9% can rely on colleagues from other functions and departments, just as they were external partners. Several long-term benefits to an organisation's profitability and productivity may be attained via organisational alignment, including promoting cooperation and the shared pursuit of business goals.

2.4. Sustainability Transition and its challenges

Transition usually refers to changing from one form or condition to another. The definition of sustainability transitions according to Loorbach et al., (2017), is “large-scale disruptive changes in societal systems that emerge over a long period of decades”. Such transitions deal with a socio-technical system where technology, organisation, markets, regulations, and user practices are linked together and developed this way over a long period, making them resistant to change (Geels et al., 2017).

These transitions impend established systems influenced by sustainability challenges and open opportunities for radical changes. Loorbach et al. (2017) also argue that such transitions bridge scientific disciplines and practice. This way, systemic change brings together different domains to complete and empower each other. It does require effort to manage these domains, albeit only some methodologies have been developed. The most known example is the energy transition which developed over decades evolving as a technological shift followed by intense socio-cultural changes affecting the change of beliefs and behaviours.

RHDHV have recently launched a new strategy, which means that the company is transitioning toward the officially stated management goals. One of the biggest goals of this strategy is the integration of sustainability in all operations and projects. The organisation must align its new strategy to its organisational goals in order to effectively transition from the current state to the desired future.

2.5. Change management

Sustainable transition requires a strategic change in the organisations. Historically, the transition process is initiated and driven by changes in societal subsystems. Organisational strategy implementation is almost always allied with change. This change of strategies needs to be managed to align with the new goals of an organisation. Change management is a methodical, organised approach to the transition or transformation of an organisation's objectives, procedures, or technology. Implementing techniques for bringing about change, maintaining control over change, and assisting individuals in becoming used to change are the primary objectives of change management. The implementation of organisational change can be complex. It frequently necessitates collaboration on a multitude of levels and may involve a variety of autonomous entities operating inside an organisation. It is essential to devise a systematic strategy to change to assist in ensuring a successful transition while minimising disturbance.

There prevail several models to manage the change effectively. The model published by Lewin (1951) unfreezing current behaviour, – moving to the new behaviour, – refreezing the new behaviour, is still practical despite how much the world has changed. Change management strategists proposed various strategies for ‘unfreezing current behaviour’ – changing the mindset by generating motivation for change. This is usually done by formulating a desirable future state, highlighting the gaps between the current state and what is aimed to achieve, and emphasising the ability to succeed.

Change management is defined by PROSCI as the '*application of a structured process and set of tools for leading the people side of change to achieve a desired outcome'* (Prosci, n.d.). Adaptability is a critical component of every successful business. When a company adopts the Prosci methodology, its leaders receive access to change management tools that emphasise the human element. Planned, flexible, and repeatable, the Prosci approach was developed from the shared experiences of professionals in the field of organisational change management worldwide. This comprehensive and user-friendly approach combines the technical and people side involved in organisational change (Figure 6).

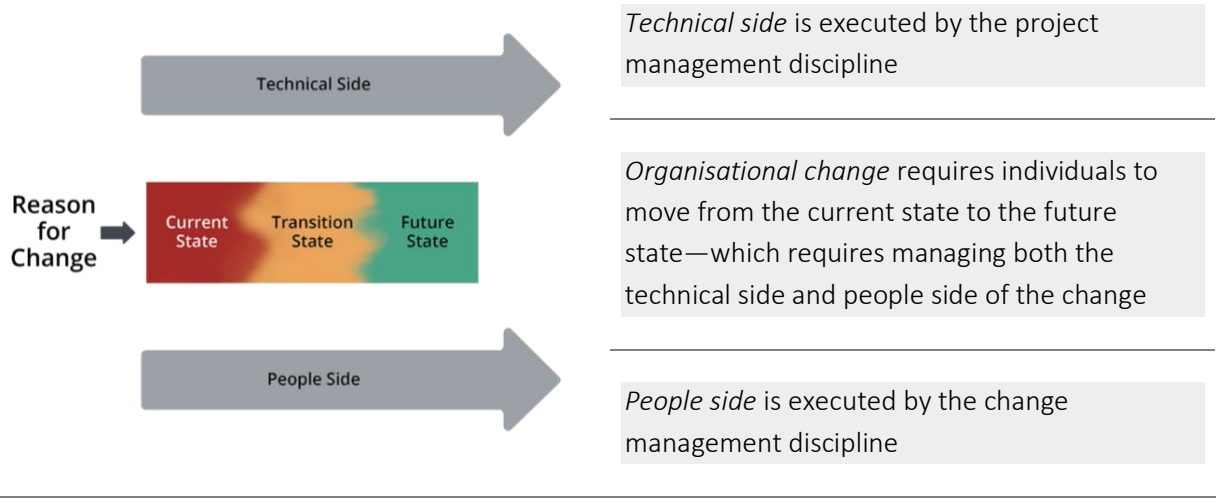


Figure 6. The Prosci Methodology (Source: Prosci, n.d.)

Generally, the change in theoretical studies has been conceptualised in two ways. First sees the change as the process for organisations to adapt to a new course by developing an effective strategy of action. The second finds the change as a natural selection process accompanied by the typical organisations' resistance to change. Hence, failure to accept the need for it. In other words, either organisation adapts to a change, or it gets replaced. According to McKinsey & Company's global survey (2008), change management is only successful in one-third of all organisational change attempts. Ash (2009) claims three reasons why employees resist change. The first is a negative experience with previous organisational change attempts. Here he distinguishes the difference between change and transition particularly. Change is situational because of certain factors, whilst the transition is the process where people experience the most psychological discomfort when reaching a new situation. The second reason is the struggle to lose the "status quo". Resistance to change is typical behaviour following this loss. Finally, the third reason is uncertainty since the change always disrupts a certain order in people's lives. Therefore, to make a change, successful change-makers should get rid of the status quo and get on to trial and acceptance as soon as possible (Ash, 2009).

Transition design.

The transition design approach is a way to address societal transition. Irwin (2017) points out several specific characteristics of the "systems problems":

1) multiple stakeholders with conflicting agendas;
2) overlapping disciplinary boundaries;
3) the problems are ill-defined and rarely understood by stakeholders
4) the problems are continually changing and evolving;
5) the problems exist at multiple levels of scale and are interdependent and interconnected;
6) any intervention (attempted solution) in one part of the system ramifies elsewhere in unpredictable ways;
7) interventions take a long time to evaluate, and problems take a long time to resolve.

A valuable input from the transition design approach is that the design system interventions must be based on several practices such as Multi-Level Perspective (MLP), Social Practice Theory, Design for Behaviour Change etc. (Figure 7). It highlights the importance of social and behavioural components in managing the transition again.

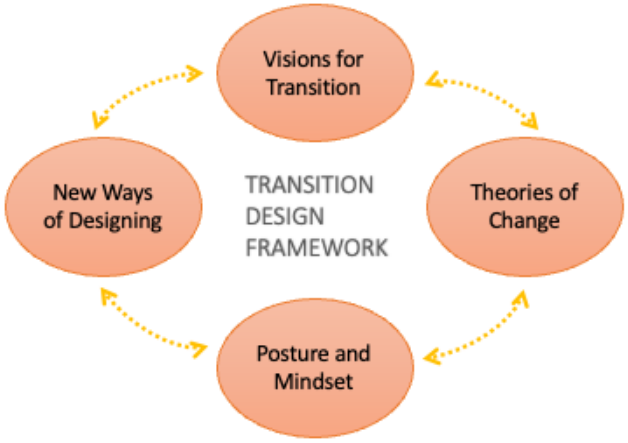


Figure 7. The Transition Design Framework (Source: Irwin 2017)

The framework is designed to understand the problem's origins and its consequences and recognise the leverage points for making the right interventions for a transition toward the planned future. Transition teams focused on operational methods alone fail because they neglect the human dynamics of social systems that generate resistance and inertia.

Part 2

The second part aims to develop conceptual knowledge about the factors influencing the sustainability transition in a company (SQ2). In RHDHV, a project manager is a figure providing the link between internal and external organisational goals. The PM, on the one hand, is an employee of RHDHV who is following the organisation's goals and, on the other hand, fulfilling a client's needs by realising its program of requirements.

SQ2: What is the current knowledge about sustainability implementation in the practice of a project manager?

2.6. Project management and sustainability transition

A project is considered an instrument for an organisation to implement its sustainability ambitions. Now, when businesses recognise the need for change, the integration of sustainability in project management has become a significant development. Summarising literature on this topic, Marcelino-Sadaba et al. (2015) aligned four Project management aspects: Products, Processes, Organisations and Managers with three sustainability dimensions: Economic, Social and Environmental. These disciplines traditionally have been addressed separately but must be integrated now. According to Marcelino-Sadaba et al., the management of sustainable projects should be based on four dimensions: product, processes, organisation and managers. Likewise, Tharp (2012) criticised how project managers work on projects as they are isolated and unrelated to the strategy and societal context. Tharp showed (Figure 8) the importance of the strategic context by placing short-term project constraints in the centre of the model surrounded by sustainability factors. These factors are inseparable from the project's success as they influence the project by constraining its options and ensuring long-term orientation. This way, the importance of tackling the two interconnected disciplines of sustainability and project management was legitimately recognised. For those working in the project management industry, sustainability means taking an approach to business that strikes a good balance between the environmental, social, and economic aspects of project-based working to satisfy the needs of stakeholders today without compromising or overburdening those needs of tomorrow.

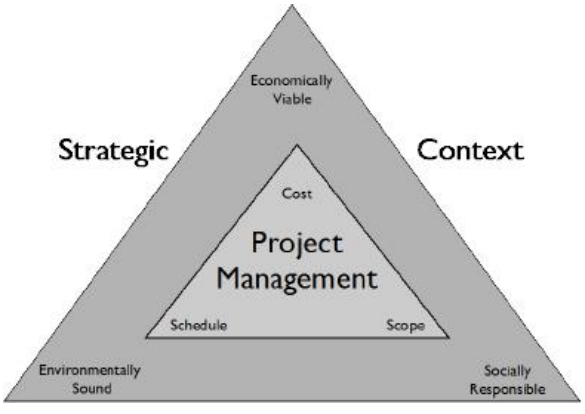


Figure 8. Sustainability: Strategic context for project management (Source: Tharp 2012)

Also, the latest literature has mainly been focused on the sustainability of products and services, whilst the sustainability of the project management itself needs to get more attention. project managers see their contribution to project sustainability mainly concerning the project process.

According to the study of Magano et al. (2021a), sustainability in a project can differ. Figure 9 summarises the project's sustainability types and briefly explains each type's basic principles. And it is important to be aware of these different types in order to assign responsibility for each of them.

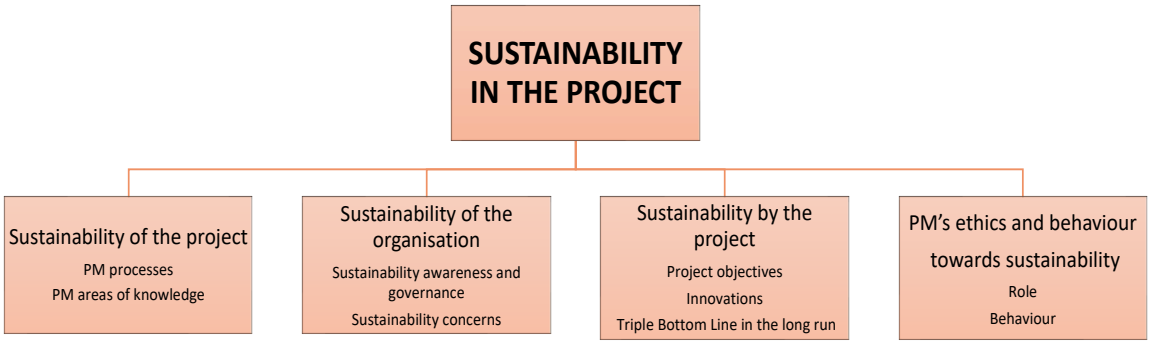


Figure 9. Sustainability in the project (Source: own picture from Magano et al. 2021a)

One of the most pressing problems of our day is ensuring long-term success in project operations, including financial, social, and environmental aspects. Researchers and the business community's perspectives on project management have shifted due to the growing interest in sustainable business practices. The importance placed on ensuring the long-term viability of corporate operations and the environment's natural and environmental resources has profoundly affected how project management is conceived, planned, scheduled, and carried out. From project discovery through feasibility studies, conceptualisation, design, appraisal, funding, execution, monitoring, and evaluation, specific metrics and criteria need to be created for initiatives to be sustained. Most projects fail because they do not have a proper sustainability strategy, which is a confirmed fact (Davis-Peccoud et al., 2016). Thus, before a project's execution, a thorough examination of the surrounding social, economic, legal, cultural, instructional, and political surroundings is essential. Plan contents must include a detailed description of the project's guiding principles and intended outcomes. A sustainable project can only be done by ensuring sustainable project management. The complete definition of sustainable project management is formulated by Silvius & Schipper (2014) based on the previous works on this topic:

> *"Sustainable project management is the planning, monitoring and controlling of project delivery and support processes, with consideration of the environmental, economic and social aspects of the life cycle of the project's resources, processes, deliverables and effects, aimed at realising benefits for stakeholders, and performed in a transparent, fair, and ethical way that includes proactive stakeholder participation."*

Silvius (2019) claims that project managers' actions and behaviour play a central role in sustainable project management. The sustainability transition, therefore, implies a 'mind shift' for the project manager as a responsible actor in this process (Silvius & Schipper, 2014). Accordingly, a paradigm shift is "an important change that happens when the usual way of thinking about or doing something is replaced by a new and different way" (Reschly et al., 2002). A paradigm shift can explain the sustainable transition of project management because traditional project management needs to change or be replaced by sustainable project management.

The goal of sustainable project management is to bring sustainability into the project. A project is sustainable when defects can be corrected, meet new requirements, make future maintenance more manageable, and cope with the changing environment (Adelman et al., 2014). Over the course of a project's entire life cycle, when managers make decisions about how those resources will be used, they should consider everything that might affect the project, both inside and outside the organisation. Armenia et al. (2019) extracted five dimensions for the successful integration of sustainability into project management from existing studies: corporate policies and practices, resource management, life cycle orientation, stakeholders' engagement, and organisational learning. At the same time, Silvius (2019) stated that the impact of sustainability on a project's process and the outcome must be translated into practical tools. Through these tools, along with the necessary knowledge and beliefs, the actions and behaviours of a project manager can be steered toward sustainable project management.

2.7. Behavioural change

The importance of the role of an individual's behaviour has already been stated in the HPO framework (de Waal, 2007), in the knowledge capabilities development (Dawson, 2000) in the Transition Design approach (Irwin, 2017). The behaviour and ethics of a project manager have been mentioned as part of sustainability in the project or management of sustainable projects (Marcelino-Sadaba et al., 2015, Magano et al., 2021a, 2021b) and as a central factor in sustainable project management (Silvius, 2019). Therefore, this research focuses further on behavioural theories.

People resist change because it is human nature. To support employees in their transition, it is important to understand the roots of the problem. The employees in the socio-technical system usually resist not technological change but the social change that follows (Lawrence, 1969). Examples of social change are changes in attitudes developed by conventional practice and uncertainty created by transitioning to new ways of working. Thus, it is believed that a system can be steered by changing the behaviour of its participant, boosting their willingness to change.

The theory of planned behaviour (TPB) (Ajzen, 1991) is widely known and used in different behavioural studies, from medicine to management. Aizen argues that the behaviour can be grounded by the individual's intention to engage in this behaviour. The theory set out to explain all human actions that can be subject to deliberate choice. TPB model (Figure 10) midpoints on the concept of behavioural intent, which is affected by an individual's subjective assessment of the risks and advantages associated with specific actions and their belief in the likelihood that it will produce the desired outcome. In other words, TPB suggests that employees are much more likely to perform specific behaviour when they feel confident about the successful outcome.

The possibility to plan behaviour is highly important for predicting the acceptance of strategic organisational changes by the employees. Hence it is a powerful instrument for leadership.

Metselaar (1997) elaborated further on Ajzen's theory (TPB) by developing the DINAMO model (Figure 11). In his work Metselaar, instead of "resistance to change", used the term "willingness to change" in order to look at the resistance from a more positive perspective which does not judge

employees' (natural) attitudes toward the change. The definition of willingness to change as given by Metselaar et al. (2011):

> *"Willingness to change is an employee's positive behavioural intention towards the implementation of a change in the structure, culture, or working methods of an organisation or department, resulting in an effort from this employee to actively or passively support the change process involved."*

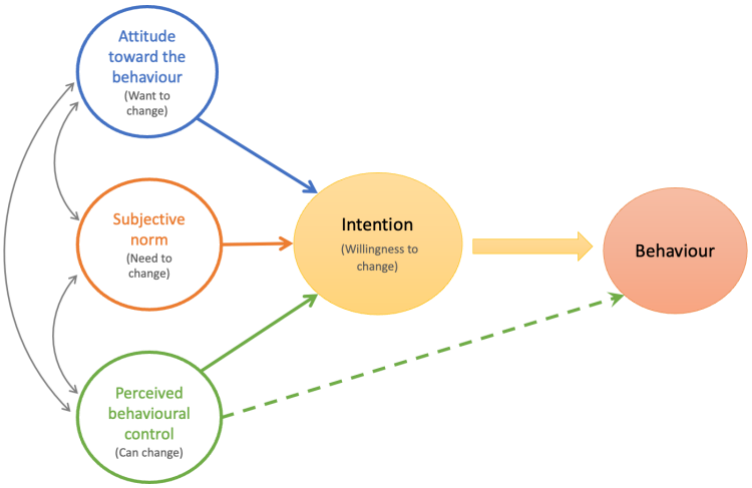


Figure 10. The theory of planned behaviour (Source: own picture from Ajzen, I. 1991).

Professionals' willingness to change is necessary for successfully implementing changes in the organisation. This study has instrumented the DINAMO model to evaluate the willingness to change (behavioural intention) of a project manager in the organisation. The central factor of the model is the Intention to perform the behaviour. Attitudes, Subjective Norms, and Perceived Behavioural Control influence this intention. The first factor - Attitude - refers to the degree to which a person wants to change the behaviour (Want to change) coloured in blue. The second - Subjective Norms - indicates the need for change driven by internal and external pressure (Need to change) coloured in orange. The third predictor - Perceived Behavioural Control - is the ability to perform the behaviour (Can change) coloured in green. When willingness to change is developed under the influence of different criteria accompanying changes in the organisation, it can further transform into actual behaviour. More positive Attitudes, more encouraging Subjective Norms, and greater Perceived Behavioural Control should result in a stronger intention to perform the behaviour.

From Figure 11 can be concluded that the extent to which project managers would want to change depends on how they feel about this change. A positive attitude to change can be achieved by the positive consequences the change is having on their work, positive emotions evoked by the change, and the knowledge of what added value the organisation receives from this change and involving them to participate in the change process.

Want to change:

1. Consequences of the change for work
2. Emotions evoked by the change
3. The added value of the change for the organisation
4. Involvement in the change process

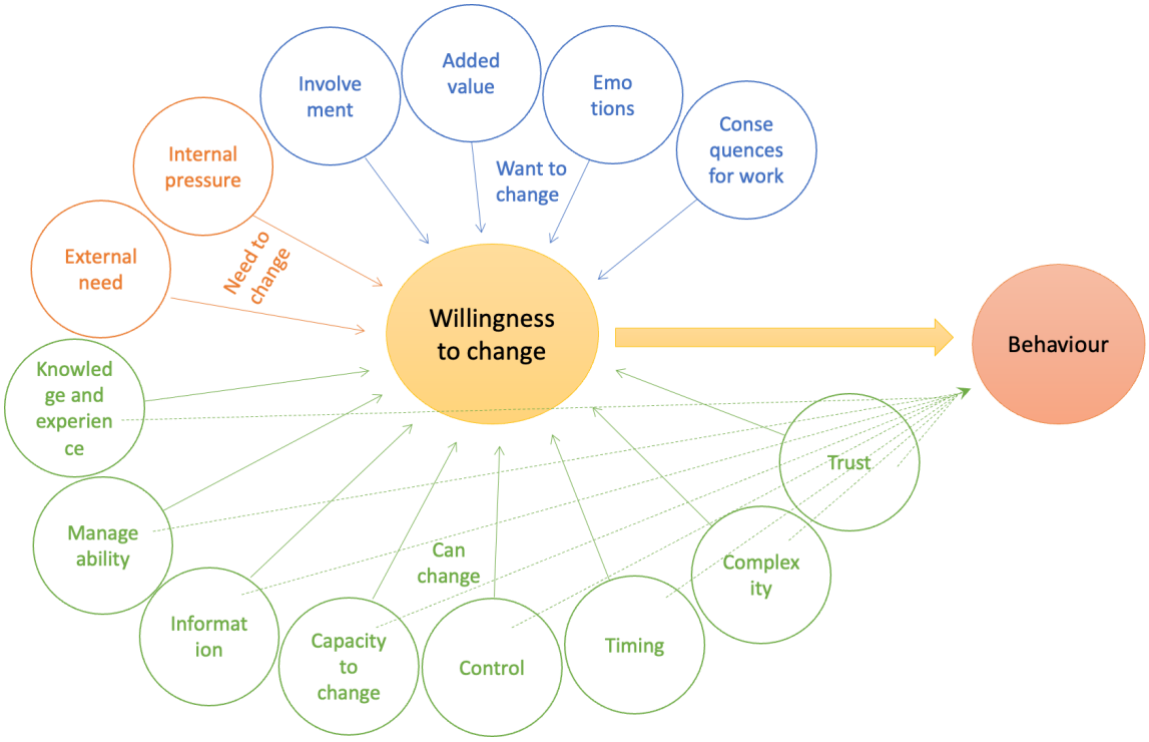


Figure 11. DINAMO model (Source: own picture from Metselaar et al., 2011)

The employees are also influenced by internal pressure and external needs, which helps them to recognise the need to change or, in other words, provides a subjective norm to form the behaviour. Subjective norm developed externally is when clients demand (pull) a particular, sustainable product or service, the project manager must fulfil that demand. Internal subjective norms can be formed by proactive colleagues and leaders who push for sustainability.

Need to change:

1. Experienced internal pressure to change
2. Experienced external need to change

The third element of DINAMO represents the notion of a project manager about their capability to change. The more control they believe they have over their behaviour, the stronger they can perform the behaviour. Moreover, perceived behavioural control can influence behaviour directly, bypassing the intention to change, which was a major development of TPB theory. Therefore, if project managers perceive that they have more substantial control, their attempts to succeed will be harder and longer. And to perceive strong control, a project manager must have sufficient knowledge and experience to deal with the change, must be supported by the system they work in, be informed about the consequences of this change, must know the change is under the control of the management and is happening at the right time and in adequate pace, also need to believe the change is manageable in terms of resources and external factors, understand how complex is the change and finally, trust their leaders do and want the best for the company.

Can change:

1. Knowledge and experience
2. Manageability
3. Information
4. Capacity for change
5. Control
6. Timing
7. Complexity
8. Trust

The framework represents motivational factors by which individuals can control their behaviour. Although the DINAMO model is intended for middle managers, the underlying meaning is that it is designed for the managers from the lower organisational levels who are responsible for the change implementation. The morale of the workforce has also been suggested as a moderating variable for further research on strategic vertical alignment (Kathuria et al., 2007).

The DINAMO model has been utilised to find out the behavioural intention of project managers and, most importantly for this research, the major criteria of influence on the behavioural intention behind the sustainability transition. The strategic change in the organisation needs evaluation, and by doing so, the model provides information for the recommendations to the organisational leadership.

2.8. Conclusions

Summarising the data obtained during the literature review, it can be resumed that the transition to sustainable development should begin with the development of a strategy. The sustainable development strategy combines two fields: business and social. Based on the goals of sustainable development, the organisation must build its strategy in a certain way so as to achieve high performance and ensure a competitive advantage in the market. When creating a new strategy, it is important to consider the specifics of the transition. Introducing sustainability in the strategy entails significant changes and requires special attention. Therefore, it is necessary to design this transition with change management in mind.

Next, the literature review has shown that the project is an instrument for embedding sustainability in construction projects. Hence the project manager is an enabler of sustainability in projects. This means that it is necessary to pay special attention and support project managers so that they can realise sustainability potential. And this will help the company achieve its strategic goals. It's also important to understand how sustainability affects project managers' jobs and what types of sustainability can be influenced by the project manager and which cannot. The actor's behaviour plays a central role in organisation performance, transition processes and change management as well as in sustainable project management. The intention to perform behaviour according to the theory of planned behaviour can be influenced by different criteria of the organisational environment and work settings. Therefore, it is possible to ensure better execution of the strategic goals by increasing the willingness to change among project managers. The proposed theoretical model summarises the findings of the literature review (Figure 12).

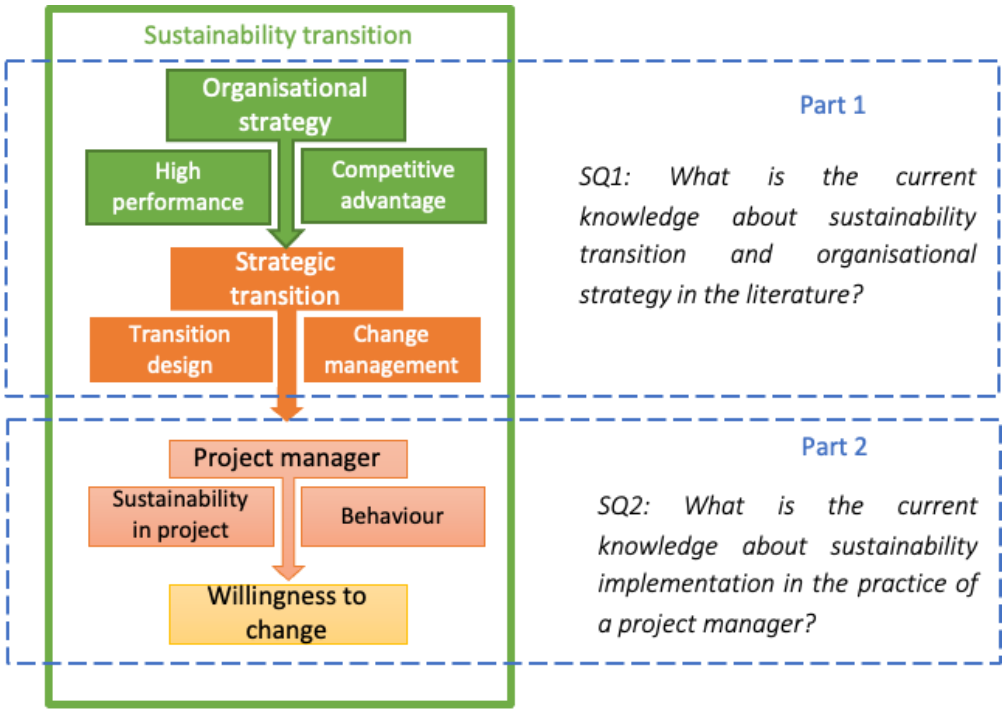


Figure 12. Theoretical model. (Source: own picture)

3. Research design.

This chapter explains the approach to the research design by first outlining the research scope, then explaining in detail the type of research and research methodology, including the methods of data gathering and complemented with an outline of expected results.

3.1. Research scope

The research aims to contribute to the academic knowledge about sustainability transition in a specific type of organisation and be practically relevant by providing recommendations grounded on existing academic knowledge. Thus, the current research focused on the implementation of sustainability in construction projects from the perspective of an organisation managing the projects for an external client. The field of this research is project management in such organisations.

According to Loorbach et al. (2017) role of social science in the sustainability transition needs to be studied more. That is why the research is limited by the employee's behaviour in response to the changes in the organisation. People in such organisations are the main asset to reaching organisational goals. The influence of the organisational environment created by the change process on people's behaviour can become a valuable tool for change leadership to overcome the barriers in the sustainability strategy implementation.

3.2. Research Methodology and Design

The transition process in socio-technical systems is complex, uncertain and ill-structured; thus, the research seeks to investigate the nature of the problem first, to know more details about it. In the sustainability domain, necessary data can be gathered mostly from experts in the field. In general terms, this work is exploratory and open-ended. This study has utilised both quantitative and qualitative research methods to find out the behavioural intention of PM regarding the sustainable transition of the construction industry (Creswell, 2009). The simultaneous utilisation of quantitative and qualitative methods provides the general sequential, which can be used to utilise the findings of the qualitative method for expanding on the quantitative method. The implication of using both quantitative and qualitative approaches at different levels of the respondents in the organisation enables investigating the problem from multiple perspectives.

The first step was a qualitative survey (interviews) to find out the general information about the sustainability phenomenon in construction projects. The qualitative survey was conducted through five unstructured interviews with the respondents. Qualitative research is intended to gather and evaluate non-numerical data (such as text, video, or audio) in order to better comprehend concepts, views, or experiences. It can be utilised to gain in-depth insights into a topic or to develop

fresh research ideas (Braun et al., 2021). An in-depth investigation of viewpoints, symbols, meanings, descriptions, and perceptions of the objects or phenomena of interest is the essence of qualitative research. Because this is a major step in the data collection and analysis process, qualitative research frequently uses non-numerical data such as text, photos, graphics, video, and audio recordings (Creswell, 2011). A qualitative approach is appropriate, according to Creswell (2011) when the researcher wants to thoroughly examine a certain occurrence. Therefore, it was decided that a qualitative technique was suited for the study for two reasons. First off, using a qualitative approach would be helpful in measuring research variables and the connections among them.

In addition to the qualitative research approach, the quantitative approach was used. Data collection and statistical analysis are examples of quantitative methods. These techniques can be used to show how closely two variables are related to one another, how much variation there is between them, or to summarise the data by calculating averages and variances (König et al., 2016). The suggested research bears many of the characteristics of quantitative studies. To begin, scientists rely on deductive reasoning in quantitative studies, with an emphasis on putting hypotheses to the test (Rutberg & Bouikidis, 2018). Deductive reasoning presupposes that current theories will be mined for hypotheses by quantitative researchers. When using a quantitative approach, it is essential to conceptualise, operationalise, and quantify key variables (König et al., 2016). It is important to note that a quantitative research issue has to be narrowed down to a set of variables that can be tested with well-defined quantitative instruments (Rutberg & Bouikidis, 2018). Fourth, a quantitative approach may entail aggregating data through descriptive statistics like means and frequencies, or it may involve analysing differences and connections between variables (König et al., 2016).

The strategy of the research, including methods used in the study and expected results from each method, is summarised in Figure 13.

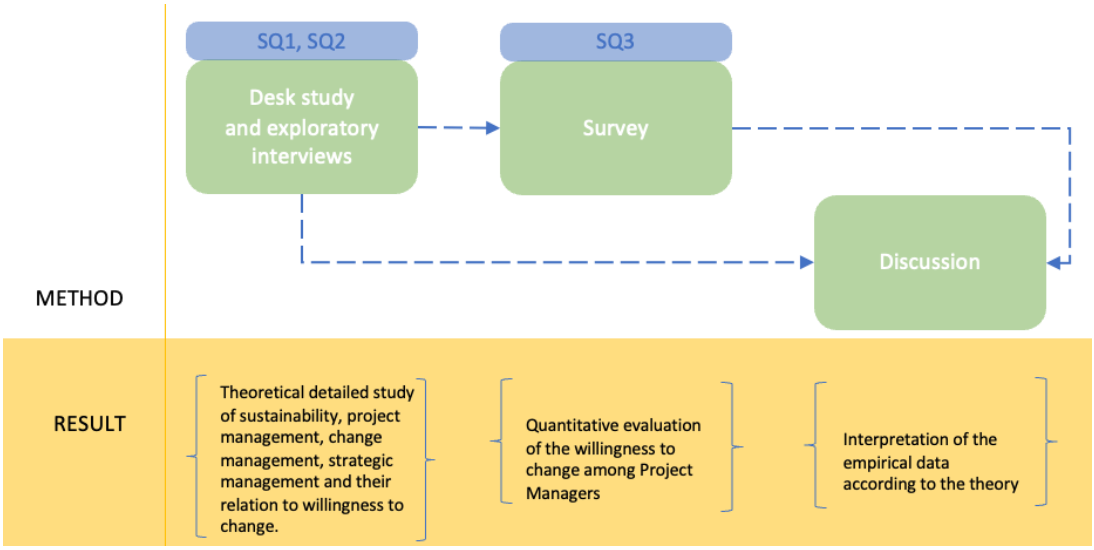


Figure 13. Research methods and results. (Source: own picture)

3.3. Desk study

The research started with a literature review on the general topic of sustainability transition. The number of scientific papers related to sustainability has increased significantly during the last decades (Shrivastava et al., 2020). Nevertheless, this topic is still developing, and a thorough literature review and analysis were fundamental to generating a sound theoretical basis. Sustainability is also an extensive topic with different perspectives and a range of features that can be included. This means it was essential to keep the borders of the research scope in mind not to disseminate focus and justify and contextualise the research (Rojon & Saunders, 2012). Building the research upon the existing knowledge increases the understanding of the chosen topic and provides scientific value by adding together knowledge from different sources.

For the literature review were used trustworthy academic platforms: Elsevier, Researchgate, and ScienceDirect. These platforms provide access to international academic articles, magazines and books via the institutional account. The search of articles was conducted using the set of keywords and filtered by the content relevance and number of citations. Sources were collected and aggregated using the Zotero research assistant tool. Zotero has embedded functions to categorise articles and create citations and bibliography. The examples of keywords used: Sustainability in construction, Sustainability in project management, Sustainability strategy, Strategic alignment, Competitive advantage, Dynamic capabilities, Sustainability Transition, Transition in Socio-Technical System, Change management, Behavioural approach in management, Planned behaviour, Resistance to change, Motivation for sustainability etc. A review of existing validated scientific works and proper citation provided traceability of knowledge and scientific value to the current research.

3.4. Exploratory interviews.

The author conducted face-to-face and video interviews in Teams with the specialists involved with sustainability implementation. The qualitative results were stored in recording format and notes. First, exploratory, unstructured interviews were conducted with practitioners from different departments by convenience sampling. Among the interviewed roles were:

- sustainability consultant
- project manager
- business developer

These roles were chosen because they are important links between internal sustainability strategy and external clients and projects and obtain knowledge about current sustainability practice in the company.

Later, another set of semi-structured interviews was performed within the Advisory Group ‘project management & Consultancy’ (PM&C) within the Multinationals Department of the Business Unit ‘Industry & Buildings’. When the focus of the research was placed on the project management field PM&C group of 90% consisted of the project managers.

In the first set of interviews, general questions about sustainability practice were asked to investigate the organisational environment of the problem and acquire more variables for further research. The second set of interviews aimed at discussing how PMs are involved in implementing sustainability. Later in the study, the results of these interviews were used to prove and validate the survey results.

3.5. Survey.

Survey research has been chosen due to its excellent ability to measure unobservable data. The survey method is well suited to collect the data from a large sample group remotely. Since project managers in the RHDHV organisation are spread around the globe and to get a valid representation, diversity between the offices must have been included, which was only possible by utilising an online tool.

The sample of the survey population was framed with the limitation of one business unit - Industry and Buildings and one advisory group - project management & Consultancy. The decision to limit the survey to project managers has been made following the theoretical model (Figure 12)

Summarising the data obtained during the literature review, it can be resumed that the transition to sustainable development should begin with the development of a strategy. The sustainable development strategy combines two fields: business and social. Based on the goals of sustainable development, the organisation must build its strategy in a certain way so as to achieve high performance and ensure a competitive advantage in the market. When creating a new strategy, it is important to consider the specifics of the transition. Introducing sustainability in the strategy entails significant changes and requires special attention. Therefore, it is necessary to design this transition with change management in mind.

Next, the literature review has shown that the project is an instrument for embedding sustainability in construction projects. Hence the project manager is an enabler of sustainability in projects. This means that it is necessary to pay special attention and support project managers so that they can realise sustainability potential. And this will help the company achieve its strategic goals. It's also important to understand how sustainability affects project managers' jobs and what types of sustainability can be influenced by the project manager and which cannot. The actor's behaviour plays a central role in organisation performance, transition processes and change management, as well as in sustainable project management. The intention to perform behaviour according to the theory of planned behaviour can be influenced by different criteria of the organisational environment and work settings. Therefore, it is possible to ensure better execution of the strategic goals by increasing the willingness to change among project managers.

The limitation on one business unit has been done due to the same organisational microclimate of this sample and the projects the PMs work on. This means the behaviour is not influenced by the different organisation environment factors.

The survey consisted of three blocks of questions:

Block 1

The scope of the first block of Demographic questions was to define the characteristics of a population sample that participated in the survey. The diversity of the respondents' sample was checked on the representativeness of the entire sample to ensure the validity of the survey responses.

Block 2.

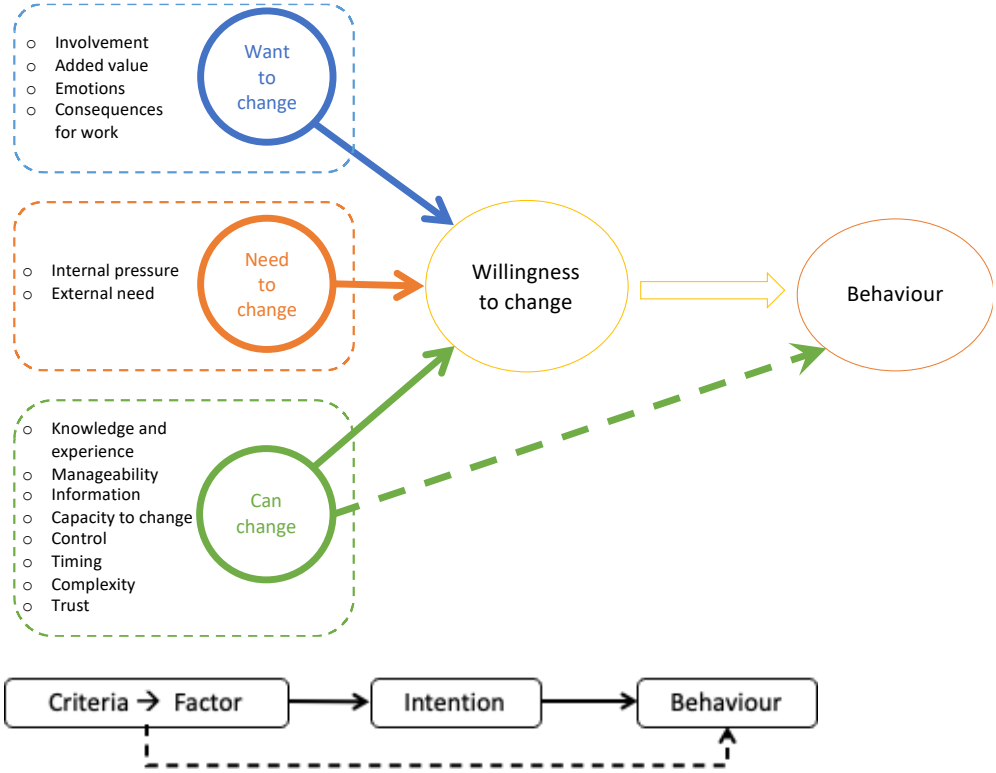


Figure 14. DINAMO model revised. (Source: own picture)

The second block of questions is based on the DINAMO model (Metselaar, 1997, 2011). This part of the survey allowed revealing the factors influencing behaviour in a way which might hinder the change process. The most recent version of the original DINAMO questionnaire consists of 14 variables (Figure 11). Each variable is explained by various criteria originating from the organisational environment experiencing change. The change related to the implementation of the new strategy was still considered vague to employees. Therefore, the questions were altered and reduced in number to simplify the survey for respondents. Figure 14 presents a revised by the author DINAMO model; in this way, a reader can see the core model of TPB (Figure 10) and associated with each factor criteria of the change environment in the organisation by Metselaar.

Block 3

The third block was finalised with three open questions. These questions allowed for bringing up the problems and concerns that were not covered by the questionnaire. The open questions were taken from the same questionnaire DINAMO by Metselaar.

Expected results

The results obtained from the survey enabled the researcher to analyse the current state from the perspective of the PM, the 'instrumental actor' for sustainability, as related to the theoretical framework. These provided the author with insights for the recommendation of possible actions to support the established sustainability strategy on its way to successful implementation.

A quantitative analysis was conducted to rank the criteria based on their influence on the sustainable transition of project management. A file with quantitative survey results was produced by the survey platform in Microsoft Teams and further imported into Microsoft Excel for analysis. The data analysis was conducted to find out the descriptive statistics parameters such as mean, standard error, median, mode, standard deviation, sample variance, kurtosis, skewness, range, minimum and maximum value. The criteria from the DINAMO model were compared among themselves and rated by utilising descriptive statistics. As a result, the factor showing a lower value of the mean is considered to be the most negatively influential factor in the sustainable transition for project managers. Frequency distribution is also an essential tool for displaying the survey results in the case of this research.

3.6. Validation and verification

This study has utilised the method of "triangulation" to validate the findings of this study because it has used qualitative and quantitative methods simultaneously. The name "triangulation" comes from the navigation field, which uses angles from two known points to pinpoint a place (Heale & Forbes, 2013). The goal of employing two or more independent measurements to confirm a claim is to boost confidence in the findings. The results thus offer a more complete picture of the outcomes than either strategy could do. When two or more approaches are utilised in research, this is known as mixed methods. To address a particular research subject, combining quantitative and qualitative methodologies may lead to one of the following three results: The results could be (1) converging and leading to the same conclusions, (2) relating to various things or phenomena but being complimentary to one another and utilised to support the individual results, or (3) diverging or contradicting one another. Divergent discoveries may provide new and improved hypotheses for the phenomenon under inquiry. Converging results strive to boost the validity through verification; complementary results emphasize distinct elements of the phenomenon or demonstrate different phenomena. Qualitative methods used in the research are literature review and interviews with experts and the quantitative method is surveying project managers.

This study has found the major burdens of sustainable project management transition in the construction sector. To increase the validity of obtained data, the results were interconnected with the findings from the interviews with experts and from theory.

3.7. Population and Sampling Method

project managers in the construction sector were the focus of this research. The theoretical model in Figure 12).

Figure 12 shows how the literature review has led the study from the role of sustainability in the organisational strategy to the importance of the figure of a PM for sustainability implementation. Therefore, for the scope of this research, the PM was used as the central figure to provide valuable insights into sustainability implementation.

To begin, this research had five direct interviews with sustainability consultants/project managers. After that, 31 respondents participated in the quantitative survey research. The sample size for the proposed study was determined using convenience and snowball sampling techniques (Emerson et al. 2015). When a complete list of components in the study's target population is unavailable for probabilistic sampling, researchers may typically turn to convenience sampling. Because the population of interest – project managers in construction projects - is so large, convenience sampling was used in the proposed study. Most of the participants were found at the same Multinationals Advisory Group (AG) by personal contact between employees and utilising the internal mailing lists. The author resorted to one AG sample for collecting sufficient data. There are about 120 people in the Multinationals AG including two countries: Netherlands and Nigeria.

project managers were not easily accessible for random surveys; therefore, convenience sampling could not be used unilaterally. In order for convenience sampling to work, a sizable proportion of the population must be open to being interviewed and surveyed at random (Etikan, 2017). As a result, even though there was a sizable enough number of potential respondents among the Netherlands' project management community, only a few of its members were willing to participate in surveys. Therefore, in addition to the convenience sampling method, snowball sampling was deemed a suitable combination (Handock & Gile, 2011). The sampling was done via the mailing list, including one department, which mainly consists of project managers. Therefore, the recruitment of participants was carried out via the use of a distribution list, with updates sent out weekly, followed by two reminders. In addition, the office in Vietnam was recruited via direct communication with the line manager. The author also used social connections from early on contacts to involve more project managers participating in the survey.

3.8. Research ethics

Any research involved with human data is a subject of human research ethics. Since the research design includes surveying people means, it must include ethical considerations of how the data will be gathered, processed and published. These ethical considerations include different principles such as confidentiality, anonymity, informed consent, risk evaluation and sharing of data. Social scientists must act in ways that cause no harm and are just and cope with up-to-date ethical issues (Israel & Hay, 2006).

Despite the low sensibility of the research topic and thus low risks for participants, the recent regulation requires all Master students who in their research use any kind of data obtained from human participants (interviews, surveys etc.) to apply for approval for Human Research at Human Research Ethics Committee (HREC).

The author made sure all of the ethical requirements for the study were met. The author began the process of ensuring the study's ethical validity by submitting a request for permission to the university's HREC. Second, the author made sure the research was conducted ethically with regard to the Belmont Report participants. In this study, participants gave their agreement beforehand so that their privacy would be protected. The participants in this study were fully briefed about the advantages and risks of taking part. Participants were also aware of their right to discontinue participation in the study at any time.

The author also took precautions to guarantee that the subjects were not seriously harmed. Potentially harmful to participants in the planned study is the possibility that their private information will fall into the wrong hands. Details like contact information might be included. The collected data and other details about participants were saved on a computer with a password and in encrypted files to safeguard their anonymity. Finally, all paper records containing personal information were securely archived for a period of 10 years or more, following the TU Delft Research Data Framework Policy. Documents containing participants' personal information will be destroyed by shredding or burning.

Required documents for approval:

1. A completed HREC Checklist signed by the Responsible Researcher
2. Completed Informed Consent materials
3. Data Management Plan

The procedure was completed in two iterations. After comments from HREC were incorporated, the revision was submitted and approved. In Appendix 3, attached: letter of approval, HREC Checklist, Data Management Plan and revisions template.

4. Results.

This chapter provides the empirical study results. Findings from the survey are presented in graphs and explained. The significant criteria of influence from findings are withdrawn in a table for further use in the recommendation section. This chapter answer sub-question 3.

SQ3: Which drivers can help the RHDHV consultancy firm to support the process of sustainability strategy implementation?

4.1. Data collection.

Population

This survey was distributed among the project management and Consultancy (PM&C) Advisory Group of the Industry & Building Business Line. The survey aimed to evaluate the 'willingness to change' of the project managers as central actors in sustainability implementation. It was explained to participants that in the survey, the 'willingness to change' means the willingness to adopt and implement the core element of the Stronger25 strategy - sustainability - introduced by the CEO of RHDHV in April 2022. PM&C group comprises 119 specialists (project managers, consultants, and technical experts) located in the Netherlands and Nigeria. It was also decided to include in the survey list the office in Vietnam, adding 6 PMs to the entire sample. The reasoning for that was several large projects ongoing in the Asia Pacific area plus current interest in the sustainability transition topic. Thus, the intended sample consisted of 125 people.

Trial

To ensure readability and practicality, the survey was sent to a small group of 5 participants first for the test trial. The primary purpose of the trial was to collect feedback, check the amount of time needed to fill in the survey and make sure the provided link was functional and collection and storage of results were operational for further analysis.

The invitation for the survey was sent in the weekly updates email from the Director of the Advisory Group. The first week resulted in 9 responses. After one week, the reminder has been sent, also via the weekly updates. This added four responses, a total of 13. The final reminder was sent two weeks after the invitation in a separate email from the Line Manager of the researcher's group, followed by a message containing a personal appeal to participate in the survey. This resulted in a total number of 31 responses. Nevertheless, this result was considered acceptable due to (1) the exploratory nature of the research, which does not require strong statistics and (2) the PM&C group

sample of 125 people was diverse and included specialists who might not consider themselves suitable for this survey for PMs, so they might not have answered the invitation.

Representative sample

Representation of the surveyed population was tested in different demographic categories: gender, age, work experience and geo-location. The balance between the target sample and the actual sample is represented in Figure 15. The actual sample has been considered adequately representative of the entire population by the age, gender, location and job position factors. Information about the educational background of the whole population wasn't available for the researcher to compare.

Figure 15. Intended and actual sample representation. (Source: own picture)

4.2. Survey Results.

The main goal of the survey was to provide criteria of the organisational environment influencing the willingness to change of project managers. This would help to answer the research question. The main (second) block of the survey – the DINAMO questionnaire - consisted of 49 statements which determined 14 criteria of willingness to change divided into three factors: want to change, need to change and can change. The respondents were asked to mark their agreeableness on the 14 criteria of willingness to change. They evaluated each criterion based on a five-point Likert scale (Figure 16).

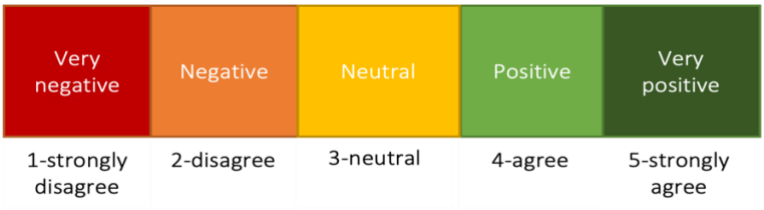


Figure 16. Five-point Likert scale interpreted. (Source: own picture)

Statements in the survey were expressed in the same manner. The more respondents disagree, the more negative the connotation toward criteria is and vice versa. Disagreement means reducing the extent to which the responder is willing to change. A value close to 1 represents strongly disagree, and any value from respondents close to 5 means strongly agree.

After collecting the data on opinions on the 14 main criteria, the average scores were estimated to rank the criteria. The main reason for ranking the criteria was to find out the most influencing organisational environmental factor among the tested 14 criteria. The large average value of a criterion indicates that it has a more positive impact on the willingness to change or implement sustainability in project management. On the contrary, the small average value of a criterion indicates that it has a more negative impact on the willingness to change of PMs.

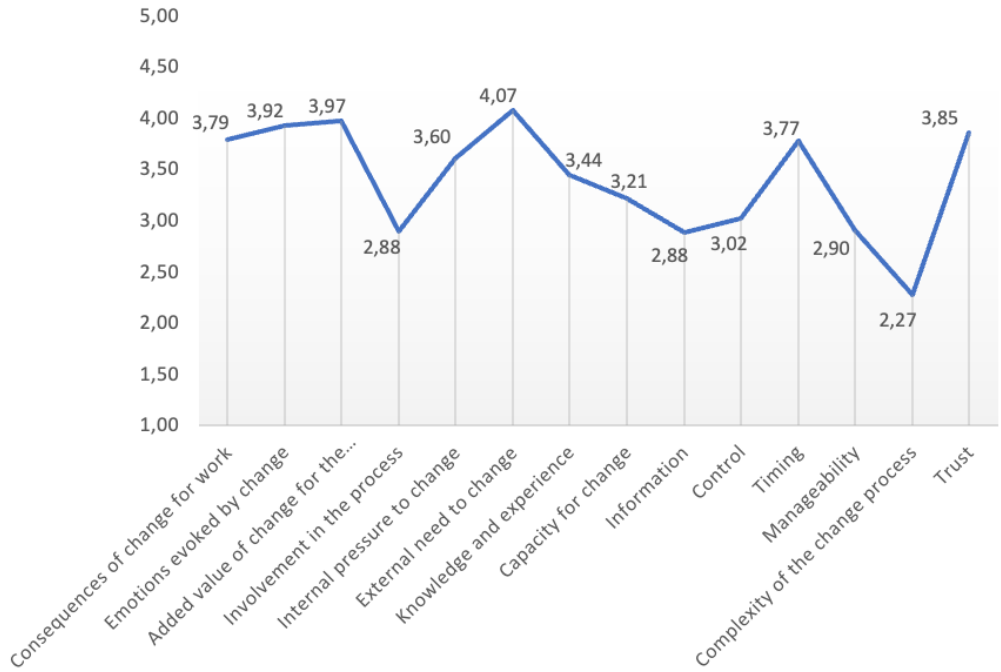


Figure 17. Overview of the average scores for all participants on the scales of DINAMO. (Source: own picture)

Figure 17 shows the average scores for each criterion determining the project managers' willingness to change. The graph explicitly displays which criteria are sustainability implementation's peaks and pitfalls.

Overall willingness to change

By bringing together all results generated by the questionnaire, the willingness to change can be estimated numerically. Table 4 presents mean numbers of estimated willingness to change for each of 14 work setting criteria, for each of 3 factors total mean number.

Criteria	Mean for criterion	Factor	Mean for factor	Mean total
Consequences of change for work	3,79	Want to change	3,64	**3,55**
Emotions evoked by change	3,92			
Added value of change for the organisation	3,97			
Involvement in the process	2,88			
Internal pressure to change	3,60	Need to change	3,84	
External need to change	4,07			
Knowledge and experience	3,44	Can change	3,17	
Capacity for change	3,21			
Information	2,88			
Control	3,02			
Timing	3,77			
Manageability	2,90			
Complexity of the change process	2,27			
Trust	3,85			

Table 4. Average scores for each criterion, for each factor and for total willingness to change.

From this table, it can be noted that the least resistance is caused by the "need to change" factor, and next is the factor "want to change". "Can change" scored the lowest. The overall willingness to change scored 3,55, which can be considered a mediocre result, and it seeks improvement by looking critically at the problematic criteria, which scored the lowest in estimations.

Drivers and barriers to a willingness to change

The DINAMO model was utilised to identify critical influencing factors of the project manager's willingness to implement sustainability at work. DINAMO model has encompassed three substantial factors of willingness to change which are distinguished as "Want to Change", "Need to change" and "Can change" (Figure 18). By combining the DINAMO model Figure 14 and numerical estimations of the willingness to change from Table 4 it can be visualised how the work setting criteria influence the behaviour of PMs changes related to sustainability implementation. The criteria in the environment of organisational change which influence the behaviour of project managers most negatively are highlighted in red and positive criteria are highlighted in green colour.

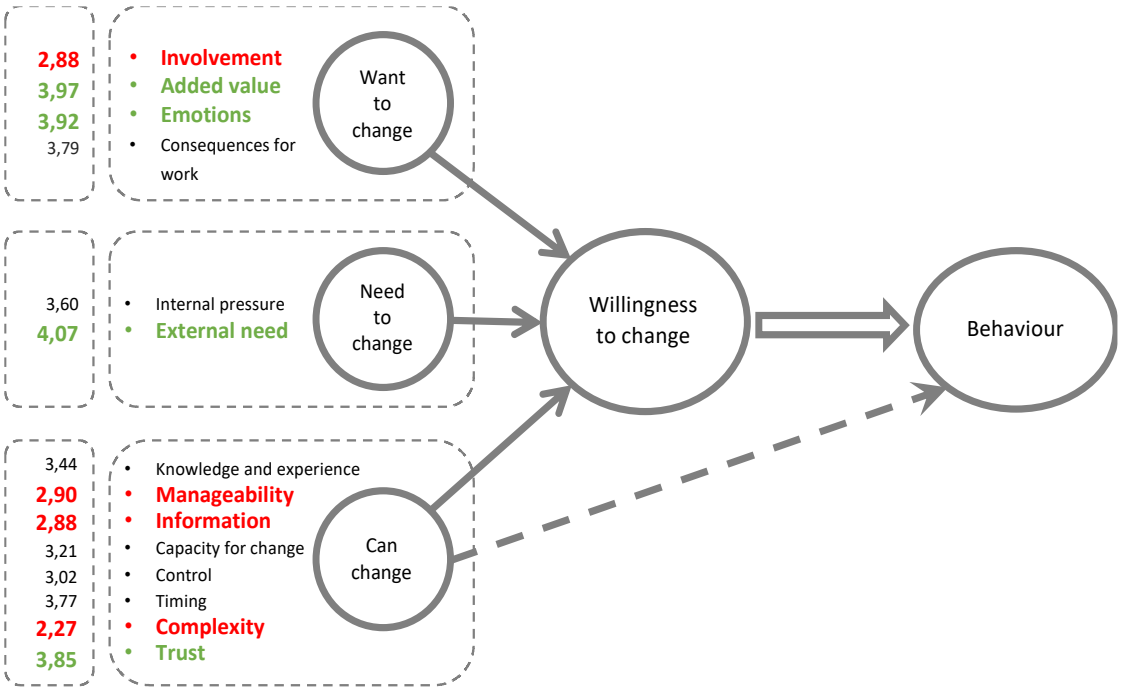


Figure 18. Criteria of positive and negative influence on behaviour. (Source: own picture)

"Want to change" describes an employee's attitude toward the willingness to change, focusing on the parameters such as involvement, added value, consequences and emotions. Now, let's look at Figure 18. We can see that criteria added value, emotions and consequences for work have a mean value of 3,79 and greater, ensuring a positive impact on the employee attitudes towards sustainable changes. The *Added value* of the change for the organisation shows the second largest value of the average score, which indicates the second major factor of enhancing the sustainability transition of project management. Based on the results from the Dinamo questionnaire, the employees believe that the transition to sustainable project management can add value to the company. They also think changing their traditional way of working will positively affect the project and they experience positive *Emotions* about changing the traditional working environment to a more sustainable practice.

But the lack of Involvement in the change process negatively impacts the willingness to change. *Involvement* in the process shows the second lowest average score value, indicating the second most significant burden of sustainability transition of project management. Respondents do not feel sufficiently involved in the process and do not discuss the changes related to sustainability implementation with colleagues. This reduces the extent to what they would want to change. Although the employees have a positive attitude toward accepting the sustainable project management transition, the organisations fail to involve the employees in the sustainable project management transition process.

"Need to change" aligns with the "Subjective Norms" of the TPB. Individuals can be influenced by the attitudes of their surroundings to shape their behavioural intention, which is called "Subjective Norms". We can find out the primary influence of the surroundings of an employee on the behavioural intention of sustainability transition. DINAMOs' "Need to change" covers the internal pressures and external need which influences the sustainability transition of project management

positively. Recently, the clients became aware of the adverse effects of climate change. So, they want to develop a sustainable project to reduce the negative impact on the environment. They demand the development of a sustainable project for the organisation, which can make firm external pressure to manage the project sustainably based on client demand. The government and regulatory bodies also create external pressure to manage their project sustainably. The organisation often creates pressure on the employees to manage a project sustainably. In a nutshell, this study has proved that internal pressure and external need positively influence employees (Figure 18) to change their traditional working behaviour to sustainable construction project management. *External need to change* has the largest average score value, indicating that it has the most positive impact on the sustainability transition of project management in the construction industry. It can enhance sustainability integration in the construction industry.

"Can change" can be described elaborately as "Perceived Behaviour Control" of the TPB. "Perceived Behaviour Control" shows the ability of an individual to conduct a course of action for a certain intention and behaviour. Likewise, in "Perceived Behaviour Control", the employee requires the ability to support the change. The "Can change" concept covers complexity, manageability, information, control, capacity and knowledge. As we see in Figure 18, three elements negatively impact the sustainability transition.

The *Complexity* of the change has the lowest value of the average score. This means the complexity of the change process has the most negative impact on the sustainability transition of project management in RHDHV. In the context of the Dinamo questionnaire, complexity implies how great the impact of change is on the position of the company on the market and how it is run, decision-making and the content of work. The result analysis showed that the employees have a significant lack of ability to perceive and implement the sustainable transition in their project. It is thus the main pitfall for sustainability integration in the company. The vast majority of respondents agreed with all statements about the complexity of change. This complexity is creating resistance to change. People tend to stick to the usual ways of doing things and respond naturally to changes (Fuchs et al., 2012). For employees to be aware of the complexity of the change, resistance becomes even more substantial.

In the respondents' opinion, there is a lack of *Information* about personnel, financial and organisational change consequences. Even though the information criteria in the respondent's direct functional area, such as the consequences of the change process for the respondent's position and the content of the work in their department, were rated higher than those that the respondent cannot influence and is uninvolved with. It was noted that these criteria received high ratings overall.

When asked about the process's implementation complexity, reliance on complex external factors, and resource (time, money, knowledge) requirements, most respondents agreed with all statements. This shows the low *Manageability,* or in other words, respondents acknowledge the poor state or quality of this change to be managed.

Moreover, some criteria may also raise concerns since they scored near-neutral mean values. Many respondents disagreed with the statement that the change process is divided into clear phases and is based on a clear change plan. Hence, they experience a lack of control over the change process.

The control criterion has a mean of 3.02. Similarly, Capacity for change and Knowledge and experience scored near neutral. Neutral values show that opinions on these criteria split among responders; the mean is on the positive side, yet many responded with negative opinions. Negative experience with previous attempts at organisational change delimits knowledge and experience for a change. Responders having had a negative experience might feel less capable of changing, and many of them doubt the necessary knowledge of the people who direct the change as the statement S36 scored low (Appendix 1,2).

Therefore, to visualise better how the opinions are divided in the sample, the frequency distribution of scores for each criterion is presented in Figure 19. Frequency distribution is important in the result analysis as it allows us to see not only the pitfalls and peak values, as does Figure 17 but also the number of respondents in each measurement and whether the data is concentrated in one area or scattered throughout the scale. Frequency analysis described the data set conveniently and provided a picture. Detailed statistical analysis is attached in Appendix 2.

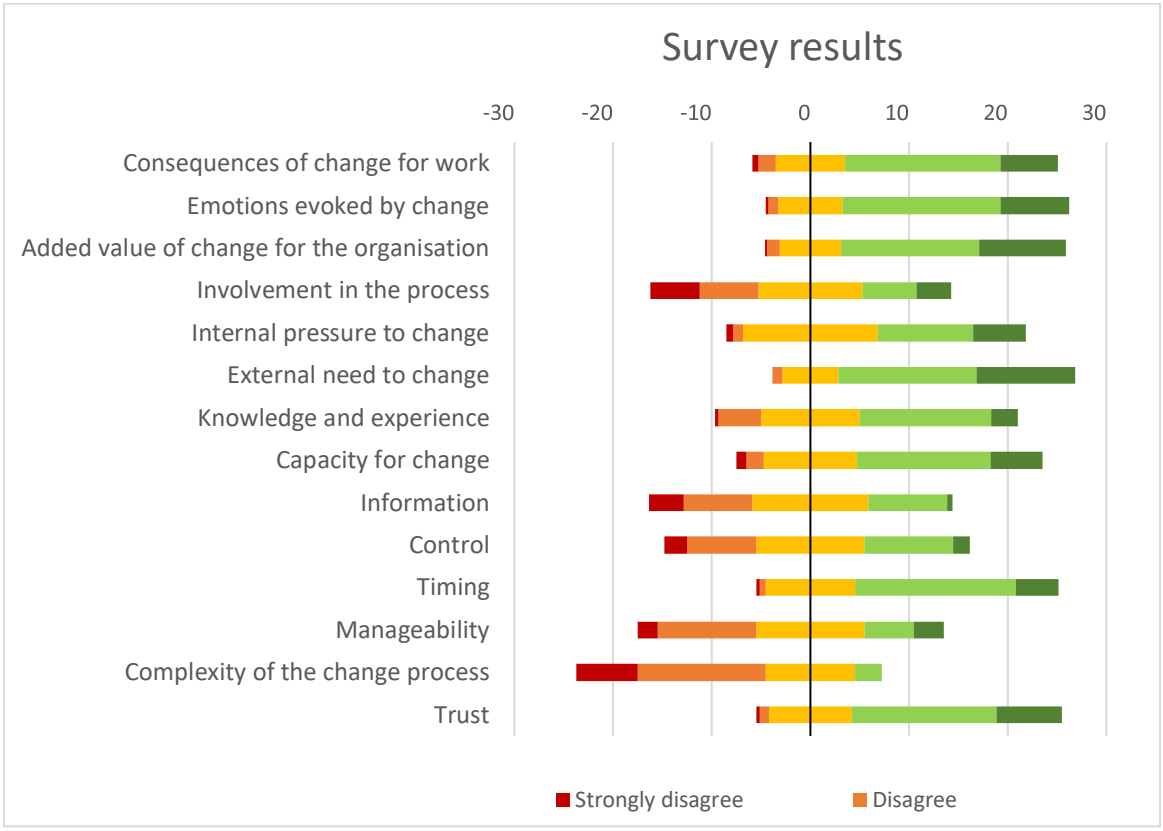


Figure 19. Survey result. Frequency of scores. (Source: own picture)

The survey based on the DINAMO model produced four main criteria acknowledged to affect project managers' willingness to implement sustainability-related changes negatively. The negative influence factors had more weight in this research as they were necessary to formulate recommendations for improvement, hence overcoming this negative influence. The recommendations for solving those negative parameters are described further in chapter 6.

Complexity of the change

We find the change process complex → We cannot change.

The complexity criterion has the lowest mean value (2.27). Most respondents think the sustainable project management transition is a very complex process. Important to understand that the meaning of complexity in this survey was framed by the statements about the impact of the change on the organisational system, how the organisation is run and how the change will influence the decision-making or position of the organisation in the market (Survey in Attachment 1). The result showed that this complexity is creating resistance to change. People tend to stick to the usual ways of doing things and respond naturally to changes. Being aware of the complexity of the change, resistance becomes even more potent.

However, the author found a discrepancy in the statement regarding this criterion in the survey. For example, if the respondent answers "strongly agree" to statement 43: "The change will have a great impact on the position of your organisation in the market" in the context of sustainability transition it would have a positive connotation. But if he/she answers "strongly agree" to statement 45: "The change will have a great impact on the content of the work of your employees/colleagues" this would more likely have a negative connotation, since it adds to the complexity. This is mentioned in the delimitations of the research.

As for the numbers in the statistics report Complexity of the change is considered the most negative in terms of influence on the behaviour.

> Q1 *"[…] We lack tools, we don't have enough tools or support to make that step forward […]" (Interviewee 3)*

> Q2 *"[…] How to approach sustainability then when there is no easy way? And where is the trigger? Does the client want to pay for it, and will it fit in all procedures? People are not persuasive to influence their own company and when it will be a big change in the process and they have a lot of changes and they have a lot of concerns about the project, they will skip it[…]" (Interviewee 5)*

But at the same time interviewee 1 said:

> Q3 *"[…]80-90% of our people find it most satisfying to work on finding good solutions to complicated problems […]"(Interviewee 1)*

This can be interpreted as employees being enthusiastic about complexity, but they need more explanation and feasible plans from the leadership.

Involvement in the change

We are not involved → we do not want to change.

The respondents also believe they are not sufficiently involved in the change process (mean 2.88). In the survey, involvement implies that they do not discuss the change with colleagues and do not feel engaged in the process.

> Q4 *"[…] We take for granted that there are people who won't use it (Purpose Matrix, an internal tool for Sustainability assessment). That's also the downside of this approach because it's all free… It's strongly recommended to use the purpose matrix, but it's all free. So that definitely has a downside. But the positive side is that we don't make anything mandatory. Just ask people to do it and people will do it [...]" (Interviewee 4)*

This quote points out that the leadership does not push for sustainability but expects the employees to be proactive by giving them a tool. So, this can signify to the leadership that the project managers expect more active actions from the leaders to feel involved in the process.

> Q5 *"[…] Get back to the KPIs per person. What do you assess people on? This is your target as a company, then you should all the way through your entire organization assess people also on this target. To achieve it. And also facilitate, of course, there's the other part of it, you can't only assess people if you don't help them to educate themselves, become better at it [...]" (Interviewee 1)*

Another example of how employees expect to be involved in the process. It offers goal alignment by means of assessments and enabling opportunities for education.

Information

We are not informed about consequences → We cannot change

Another major barrier is lacking information about the consequences (personnel, financial, work content) of the change in the organisation (mean 2.88). However, it was noticed that those information criteria in the direct functional area of the respondent - the consequences of the change process for the respondents' position and the content of the work in their department – were rated higher than ones that the respondent cannot influence and is distant from.

None of the interviewees mentioned information specifically about the consequences of their work. This can also be a red flag that the criterion plays an important role but is not realised by employees as a barrier. Although the information was often mentioned as the barrier in terms of troubles in information exchange:

> Q6 *"[…] We get that much information to us that we don't read it anymore. There are a lot of links to usable documents. But all those experienced people don't use the management system or maybe when they are forced to. They already did well because they're professionals […]" (Interviewee 5)*

Manageability

We do not believe we can manage the process → we cannot change

Manageability is also an essential barrier to successfully implementing sustainability in a project (mean 2.90). This means PMs feel insecure about the change because the management of this process is complex, it depends on external factors and scarce resources such as time, money and knowledge.

Interviewees 1 and 2 were critical of the management of the change:

> Q7 *"[…] The knowledge is spread. All around all the corners of the company, among 6000 people, it's massive. So, the knowledge, t's very much diluted. I don't see one direction. I see many cowboys crossing the desert. They are doing sustainability, but they are doing it freestyle. It's another style. And of course, I really defend the empowerment of people, but you have to be in a control frame. […]" (Interviewee 1)*

This critic is pointed to the decentralised organisation. The organisational structure is not facilitating knowledge exchange and lacks control.

> Q8 *"[…] What you can't measure doesn't exist. We need to develop a new product, if we want to transition from being behind the client to going ahead of the client, we must go there with a portfolio. This has to be paid for by the company. But this is seen as a cost because it's not clients related […]" (Interviewee 2)*

From this interview can be concluded that the allowance of time/money for the necessary effort on sustainability implementation is restricted by the organisation's management.

Besides the above-mentioned critical criteria, another 3 criteria raised concerns among respondents, which scored close to neutral number (3.5), were also included as possible criteria of negative influence but only as an awareness. The research provides recommendations only for the critical factors so that this study can propose some strategic guidance to remove the barriers to the sustainable transition of project management:

Respondents disagreed with the statement that the change process is divided into clear phases and is based on a clear change plan. Hence, they experience a lack of control over the change process. Moreover, they doubt the necessary knowledge of the people who direct the change as the statement S36 scored low.

We have no clear change plan → we cannot change

The current system and organisational structure raise doubts among respondents, the score is close to neutral, but many respondents expressed concerns about these statements.

We do not believe the current organisational structure contributes to the change success → we cannot change

Negative experience with previous attempts at organisational change delimits knowledge and experience for a change. Responders having had a negative experience might feel less capable to change.

We have negative experience → we cannot change

5. Discussion

The aim of the discussion chapter is to explore further the meaning of the findings of this research (Chapter 4) along with the literature review (Chapter 2) and possible improvements for the field of the study. The following paragraphs will first discuss the general outcome of the research, the importance of settings for the strategy implementation, and the barriers to the strategy implementation in detail.

5.1. Introduction.

The research focused on the gap between the strategic level of sustainability in a consultancy firm and its implementation in projects. The literature review pointed out that this gap is framed mainly by the fields of strategic leadership, change management and project management. In this study, a theoretical model (Figure 12).

Figure 12) was developed suggesting researching the project managers' behavioural role in sustainability transition (Magano et al., 2021a; Silvius, 2019; Silvius & Schipper, 2014). The central model of the empirical study was a DINAMO model (Metselaar, 1997) based on the theory of planned behaviour (Ajzen, 1991). This model has never been applied to the sustainability transition context as to the author's notion.

Metselaar, in his academic work, proved that if the work environment is not accommodating and hostile towards the change, it is more likely that the employee will show resistance and will not be able to change their behaviour to embrace the change. If, on the other hand, the working environment is positive towards the change process, the chance of active participation by the employee in the change process increases. The DINAMO model was suitable for this research for two reasons. First, it estimated PMs' willingness to change, which impacts strategy implementation at the operational level. Second, it discovered which work settings created by the strategy influence the PM's intention to implement the strategy-related changes.

DINAMO questionnaire (Metselaar et al. 2011) produced valuable data. This data embraced criteria of the working environment which influenced the PMs' willingness to change and their behaviour (Figure 18). These criteria capture the motivational factor and define how hard PMs will try to perform their behaviour. As a result of the study, the willingness to change is supported by subjective norms – the internal and external pressure to become sustainable (Table 4). In PMs' opinion, the change is increasingly being pulled externally and sufficiently supported internally, so they understand the persistent need to change. Their attitude toward the behaviour is also positive. PMs acknowledge the added value of the change for the company and their work and express positive emotions about it, which means they want to change. On the negative side, the hindrance to PMs' behaviour is created by perceived behavioural control. In Table 4 'can change' factor is

estimated as rather low. […] *Management does not know how to implement change. There is no mandate from our clients yet […]. […] We have to define what sustainability is (in terms of the changes that we would like to strive for before proceeding with the 'how's. Otherwise, the implementation & realization result will / might be questionable. The second foreseeable problem is that we need NOR budget (or some kind of investments) to make changes […].* And so, in the opinion of PMs, they do not obtain sufficient information about the change, nor secure enough opportunities and resources for being able to change the behaviour. Perceived control is an important measure in TPB since it is directly linked to the behaviour (Ajzen, 1991). So, to steer behaviour, the perceived control must be increased.

The results are aligned with the research aim (1.3) to fill the knowledge gap of what kind of barriers PMs experience in the sustainability transition and what kind of support is required for project management to execute the strategy in a case study of RHDHV.

5.2. Settings in sustainability strategy.

Firstly, the current study was intended to determine how sustainability has been implemented in the management of construction projects by RHDHV. The new organisational strategy includes sustainability as a leading goal. Sustainability is explicitly mentioned in two out of four strategic objectives (Table 3). During interviews with specialists and a study of internal documentation, the observations showed that even though sustainability is embedded in the organisational strategy, it is perceived as something other than a goal for managing construction projects. project managers as employees comply with the project delivery process assigned by RHDHV, the current delivery process does not include the elaborated sustainability deliverables but follows the iron triangle of time-budget-scope disregarding the long-term SDGs. Examples of sustainability deliverables can be a precise target setting, sustainability choices, or a design review workshop. Tharp (2012) observed already a decade ago that construction projects remain isolated from the strategic and societal context.

Moreover, due to conflicting goals, sustainability can be restrained by the management. For instance, the resource allowance for new developments is not included in the internal time reporting system. A particular project/client must pay 75% of the PM's time. *[…] And I was trying to find somebody interested who would give me the job for the company (doing the internal research and development), but nobody was really interested. Everyone was busy selling their time to clients […].* So, PMs can only change their behaviour once the working environment allows them to change it. The same is interpreted from the survey results (Figure 18) where the 'can change' factor shows the weakest ratings. PMs expect the strategic leadership to provide more support, such as accurate change programs, metrics for reporting sustainability and resources for its implementation.

A study of organisational documents showed that strategic management embedded sustainability in the organisation's strategy. Yet the distribution of goals down to the lower organisational levels and between units and departments needs to be aligned. Experts prove that with a call for action from the ownership of sustainability in the company: *"[…] explain it well and set up the channels to make it happen, making it tangible, understandable, and actionable. Otherwise, we are lost and don't understand what you want from us. […]".* Alignment of the goals is expected from the leadership to enable PMs for further actions.

As Kathuria et al. (2007) and Kiron et al. (2016) argue, strategic goals aligned throughout the organisational levels and an overarching vision positively influence organisational performance. However, implementing sustainability in project management remained optional, which might contradict the organisational goals. Strategic management relies on the active participation of initiative groups and thus gives project managers freedom of choice and action concerning sustainability implementation *"[…] We take for granted that there are people who won't use it (Purpose Matrix, an internal tool for Sustainability assessment) …we don't make anything mandatory. Just ask people to do it, and people will do it […]"*(Q4 p.47). Therefore, the research on the willingness to change among PMs brought valuable results to the current practice. DINAMO results proved that willingness to change depends directly on the leadership actions and specifically how well the strategic goals are conveyed and distributed to the lower levels of the organisation.

A contradiction was found between the company's documented strategic goals entailing significant changes and requiring a review of current PM practices and substantial support for strategy at the operational level. The new strategy declares goals for the implementation of sustainability in projects. For example, points one and four of the strategy (Table 3) address responsibility for having a positive impact and sustainable solutions to local and global problems, as well as sustainable growth of the company and ensuring healthy profit.

1. *Enhancing society together.*
   Responsibility for having a positive impact in the world.
   Sustainable solutions to local and global issues.
4. *Achieve our ambitions.*
   Sustainably grow the turnover and make a healthy profit
   to invest in the company.

Though, the organisation cannot implement these points through 'business-as-usual' methods because the new strategy does require project management revision. To manage sustainable projects, project managers need to acquire new knowledge and competencies. The integrated approach to sustainability in projects goes beyond the project management standards such as project management Body of Knowledge (PMBoK) or ISO 21500 which are based only on processes (Magano et al., 2021a; Marcelino-Sadaba et al., 2015; Tharp, 2012). However, in the course of several casual verbal conversations, which were not recorded, experts firmly denied essential changes for their work the new strategy entails.

From an academic perspective, this relates to the misalignment of sustainability goals with the overall business goals of RHDHV and the lack of strategic alignment – vertical, between strategic and operational levels and horizontal - between different departments. The effort to implement sustainability is fragmented throughout the organisation. Different local strategies are being formed by different initiative groups locally, and the results of their effort are not aligned with each other: *"[…] there are different groups, different meetings about sustainability* (*material transition or something). They are just holding on somebody's initiative and are not connected to each other. There is no general structure for supporting this initiative […]".* Although, a decentralised structure might support emergent innovations and empower decision-making and implementation by people who already obtain the knowledge and expertise (Lee et al., 2016). People do not need to spend time promoting and approving their ideas instead of creating value. On the other hand, the sustainability concept is too big to be covered by separate local initiatives. Management of such a

decentralised structure still requires centralised control over major strategic decisions and demands a great effort and time investment in coordinating activities between units (Gutterman, 2021).

5.3. The drivers and barriers to sustainability strategy.

Secondly, the study aimed to reveal the main barriers to sustainability implementation among PMs. The barriers were limited by the work of Metselaar et al. (2011) on the willingness to change. In this case study the change implies a transition toward sustainable project management. In general, any innovation comes with change, and sustainability drives significantly different sorts of innovations either technology or process related. Therefore, 14 criteria proposed by Metselaar were found applicable for looking at the individual perception of this change. There were found four positive criteria of influence which drive PMs to change. They are listed in Table 5:

External need to change	Awareness of the external need for sustainability implementation to respond to Clients' demands and for a positive impact on society and future generations at big.
Added value to the company from the change	Recognition of the added value of sustainability as a competitive advantage and also as the respectable image of the company on the market.
Emotions evoked by the change	Acceptance of sustainability with a neutral to a positive attitude.
Trust to change leaders	Confidence in the right intentions and choices of the leadership and in a successful outcome.

Table 5. Positive criteria with interpretations

In general terms, positive results showed that project managers are aware of the need for changes and are ready for them; they have enough enthusiasm and trust in leadership. At this stage, moving on to clear action plans is necessary. However, the sample size of 31 participants cannot reflect a full situation. Also, the participation in the survey was completely voluntary so that it is likely that only people interested in the sustainability topic participated in the survey.

And four critical negative criteria of influence which created barriers to the sustainability transition are listed in Table 6. The results have not discovered any new horizons. These criteria in a varying degree are mentioned in the literature. Nevertheless, the results are valuable in the sense that they were identified in the course of the current practice and are limited to four points, which allows us to analyse the present situation and search for solutions to the problem.

Complexity of the change process	Uncertainty about the impact sustainability does on the content of work and the processes in the company.
Involvement in the change process	Non-engagement and lack of consistency in sustainability implementation.
Information about the change	Unawareness of the impact and consequences sustainability brings into the organisational processes and process of project management.

Manageability	Doubts associated with a high level of dependence on external unmanageable factors and the abundance of resources needed to ensure sustainable development.

Table 6. Negative criteria with interpretations.

The negative results show, first of all, a need for more knowledge. The sustainability transition process needs to be explained to PMs to reduce uncertainties and doubts. The knowledge here entails understanding which steps are required, what resources should be allocated to each step, and the consequences for the current processes.

From results to theory

The theoretical framework (Figure 12) suggested starting the analysis with the organisational strategy. The strategy aims to keep an organisation competitive in the market. Sustainability is embedded in the organisational strategy, but is the strategy designed well to support the necessary actions? In paragraph 5.2 the importance of settings in strategy has been discussed in detail. From this, we know that sustainable practice knowledge from the management studies impossible without sufficient effort made in the strategic context.

The findings of this research provide the points of reinforcement in the context of strategy. According to Moore (2011), an emergent strategy might be more relevant in today's fast-changing circumstances. Long-term visions must be translated into short-term goals accommodating the **Complexity** of the concept of sustainability and related changes. Existing literature has also shown that the complexity of change may work as a major burden of change in any organisation (Simpson et al., 2012).

Involvement, **Information** and **Manageability** correspond to three managerial roles by Mintzberg (1973) - Interpersonal, Informational and Decisional. Thus, it is expected of the leadership to switch between these roles whenever it is required.

Leadership in an Interpersonal role, according to Mintzberg, safeguards involvement by 1) representing themselves as visible promoters of sustainability, 2) giving employees motivation and inspiration by means of guiding and coaching them, and 3) coordinating stakeholder networks in and beyond the organisation. This role also corresponds to the Leadership Actions – communicate, build coalitions and be active and visible - from the Prosci triangle (Figure 1).

Leadership in an Informational role should 1) monitor information in and out of the organisation, 2) distribute and communicate important information to appropriate employees and 3) be a sustainability ambassador and spokesperson outside their workstation. The informational role combines leadership actions and an integrated approach from the Prosci triangle. To communicate and distribute information, it is necessary to apply tools and develop processes for internal and external use.

The decisional role can increase manageability by 1) encouraging sustainability transition as a change in the organisation and supporting innovations by leading their implementation, 2) avoiding distractions such as coaching unwilling to change PMs or minimising contracts with unsustainable clients, 3) allocating and controlling resources, for example, needed to develop new tools and

procedures for sustainable project management, and 4) conduct important negotiations within the unit or entire organisation about sustainability implementation. The decisional role combines leadership decisions and leadership actions from the Prosci triangle. This intends to build coalitions and provide them with resources. Managerial roles juxtaposed with the barriers provided valuable insight for practice recommendations. This knowledge can guide leaders in positioning themselves about each barrier and understanding what actions are expected accordingly.

The sustainability transition is the second step of the theoretical framework. It implies the change process from one state - business-as-usual - to a future-proof way of managing projects. This process requires consideration of change management and a proper design of the transition. Both methodologies strongly suggest an integrated approach to the technical and people side of the transition. An integrated approach helps to tackle the **Complexity** of the change and creates a conducive environment for the **Information** exchange.

Next, the theoretical framework shows that project managers are important in a sustainability transition in construction projects. It means that the importance of PM **Involvement** must be acknowledged by the leadership and used as a powerful steering point in sustainability implementation. It was also proved by Carmeli et al. (2017), Reed (2002) that employee involvement is the main driving force to the sustainable transition of project management. Although, PMs' willingness to change is a prerequisite to setting the sustainability transition in motion. The research showed that knowledge and expertise are the foundation for enhancing the willingness to change. This is confirmed by Guerci et al. (2015), Kira et al. (2010) who also have demonstrated the importance of employees' expertise to sustainable project management.

Pieterse et al. (2012) have looked into the possibility that opposition to change may result from discrepancies in the professional speech of professional groups engaged in a change program. The data suggest that the non-aligned interaction between different professional discourses can be a source of resistance to change. Therefore, the leadership must ensure alignment of information exchange and unified implementation of strategic goals.

Despite the desire and need to implement sustainability in projects, PMs often lack sufficient knowledge of the methods to improve sustainability performance. A possible solution to this problem is regularly training and educating PMs about new developments and approaches to improve the transition to sustainable project management.

5.4. Concluding section

Oertwig et al. (2017) argue that sustainability must go beyond just being an ideology for change and control of behaviour by subjecting it to certain criteria. Thus, the sustainability would become definable and traceable. The DINAMO model provides instrumentation for this. This study has investigated that sustainability in projects is hindered by the PMs' behavioural intention to implement changes. The overall willingness to change is estimated to be moderate to low as it scored 3,55 out of 5 (Table 4).

Identification of criteria that affect the behaviour offers new insights for the leadership of sustainable transition in the organisation. Transition necessitates continuous critical self-reflection,

multi- and interdisciplinary debates, and strong feedback loops from practice (Loorbach et al., 2017). In this study, the DINAMO model was for the first time applied in the context of sustainability transition. The 14 measurement scales (work setting criteria) map out the hindrance to a change. The change within the organisational environment creates these criteria. The aim is to create support for change and understand it through behavioural theory. Further, with the help of this model sustainability in project management can be developed into a more definite concept in the context of the organisation via the feedback loop and alterations in the work settings.

Figure 20 illustrates the 'self-reflection' process where strategic change is not a definitive development. Yet, it is a continuous change process. A change defined by work settings criteria influences the behaviour of employees implementing the change. Reverse feedback received from the employees performing the change indicates weaknesses in the work settings, and that gives further reverse feedback to the strategic leaders. Strategic leaders using the provided feedback can introduce further changes.

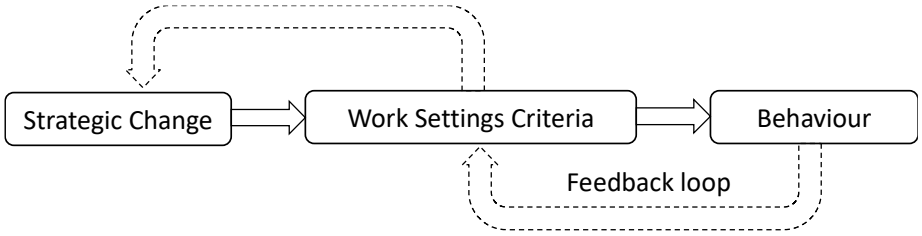


Figure 20. Utilising behaviour in strategic change management. (Source: own picture)

The questionnaire distributed to managers, who are a part of the change, immediately creates a dialogue about the change. This method fits well in a bottom-up approach to a change issue. The model, filled in with results, can be utilised as an exercise during a management session to focus on the frameworks of the change issue, and to determine which aspects deserve extra attention. This method, therefore, fits well in a top-down approach to a change issue.

Maintaining consistency and adhering to change management theory when designing such complex transitions is important. Referring to the Prosci change management model, one can draw links between the identified criteria and a related field of leadership decisions, leadership actions and integrated approach. For example, the main problems associated with the **Information** and **Complexity** of change and employees' **Involvement** can be solved by strengthening the field of leadership actions, such as communicating the change across the department, building coalitions, and being active and visible in implementing the change. According to Vanegas (2003), all the principles of achieving sustainability can be made operational by translating them into terms of specific objectives, associated measurable goals, and a detailed execution plan for achieving these goals. These operationalisation actions will support PMs' morale and help to change their behaviour.

Organisations must be committed to implementing these effective strategies rapidly. Only then alterations in PMs' behaviour, improvement in sustainable development, and better outcomes for the construction industry can be achieved.

6. Conclusion and Recommendation

With this chapter, the author concludes the research. The results were provided in chapter 4 and discussed in Chapter 5. In this chapter a clear conclusion about the research aims and research questions will be given, as well as recommendations for practice and future research.

6.1. Key findings.

The research objective stated in Chapter 1 was *to provide the leadership of sustainability transition with the barriers that hinder sustainability implementation and how to deal with them, building on existing knowledge.* The plan to meet this objective included a literature review of strategic sustainability goals and the role of PM in their implementation, an empirical study of the employee's perspective and the development of the recommendations.

The main findings of this research have answered three sub-questions:

SQ1: What is the current knowledge about sustainability, organisational strategy, and its relationship with the projects in the literature?

The research has shown that sustainability knowledge has developed significantly during the last decades. UN transformed the obscure concept into 17 SDGs, which became a policy. SDGs are now used as a foundation on which organisations build their sustainability strategies to obtain a competitive advantage for their businesses and fulfil their CSR. Although the implementation of SDGs is unprecedented, their governance can only be explored by learning in practice. The construction industry bears a large responsibility for the environmental, social and economic impact, which puts it under pressure to implement sustainability. Although a construction project is a complex system, adding sustainability makes it even more complicated. Even though diverse methods have been developed lately, their implementation still needs to be improved for construction project management. Strategic management of the organisation where the research took place cannot achieve visible results in implementing strategic goals on sustainability at the operational level of managing construction projects.

Sustainability implementation becomes a condition for the successful performance of an organisation. For planning a successful strategy, the literature research suggested being oriented on a constantly changing environment. A flexible strategy with room for change management will facilitate the transition. Effective translation and alignment of sustainability with other organisational goals at all levels of the organisation will improve the implementation of strategic goals relate to sustainability (Chapter 2, Part 1).

SQ2: What is the current knowledge about sustainability implementation in the practice of a project manager?

The research has shown that sustainability transition in the consultancy firm is highly dependent upon sustainable project management. A project is an instrument for sustainability implementation, while a project manager is acknowledged as a key figure in the project. The social factor - human behaviour, among other factors, merits proper consideration by management because the actions and behaviour of a project manager are allocated by the researchers to a central role in sustainable project management. Eventually, the sustainability transition is convoyed by transformations followed by changes. A typical human reaction to change is resistance. However, the behaviour has been proven by TPB (Figure 10) to be a product of behavioural intention and perceived behavioural control which means how the employees are engaged with and equipped for the change. Behavioural intention and control are accordingly shaped by the organisational working environment in which the change takes place. Therefore, by controlling and steering this environment, the behaviour can be turned towards strategy implementation. This study has utilised the DINAMO model (Figure 14) to interpret the project managers' willingness to change into organisational barriers for sustainability (Chapter 2, Part 2).

SQ3: Which drivers can help the RHDHV consultancy firm to support the process of sustainability strategy implementation?

The DINAMO questionnaire and interviews with practitioners produced empirical data for this research (Chapter 4). Respondents expressed the greatest degree of agreement with statements about personal readiness and ability to change, trust in the management's intentions and the necessity of this change for the image and competitiveness of the company. In general terms, PMs understand the company's need to change its way of working. They perceive themselves as capable of doing so only when they are guided and supported in this change by effective leadership. The main barriers to the successful transition for PMs in RHVDV are Complexity, Involvement in the change process, Information, and Manageability. Those criteria at the current moment were hidden barriers for the project manager to operationalise sustainability in the RHDHV (Figure 18).

By following these sub-questions, the research answered the main question:

RQ: What insights can help a consultancy firm translate sustainability from the strategic mission into the project execution?

The study has indicated three points that can help to translate sustainability into project execution. First, the research has shown the importance of the strategic context. Explanation of the strategic goals and their alignment with other organisational goals plays an essential role in strategy implementation. This is of utmost relevance in the case of the transition to sustainable development since this concept is difficult to interpret in the current practice of project management, and it contradicts the business goals of the organisation. So, a sustainability strategy might imply bigger-scale changes in the organisation.

Second, it has been concluded from the literature review and observations that project management practices require significant revisions. Being a key figure in the project, PM must enable opportunities for sustainable goals. However, following the 'business-as-usual' process, PMs rather block these opportunities. Current practices should consider different types of sustainability in construction projects and transition to sustainable project management. Sustainable goals should be inseparable from the project's success, and the integration of these goals should be facilitated by sustainability leadership.

Third, the study has disclosed that the behavioural control and intention of project managers to change play a significant role in the implementation of sustainability in projects. Behaviour, meanwhile, is directly dependent on the working environment created by strategic settings. It is, therefore, a closed loop where strategic settings influence the behaviour, and behaviour can provide valuable information to readjust the strategic settings.

New insights

This study has provided insights regarding the relationship between the behavioural intention of project managers and sustainability transition in an engineering and consultancy organisation. The construction project is a technical domain where more attention is given to the technical side and much less to the people side to provide notions for problem-solving. Nevertheless, the research proved that studying behaviour could deliver new observations into the problem of sustainability transition. The DINAMO model was developed for the management study field and was first applied in the environment of sustainability transition. The outcomes of this study have contributed to the existing body of knowledge by connecting behavioural theory to sustainability transition and change management.

The theoretical and empirical results provided valuable insights into the leadership/sponsorship of the sustainability-related changes in the company. Based on the identified criteria of negative influence, management can adjust actions aimed at the improvement in the operationalisation of sustainability.

Delimitations

This study has several delimitations regarding sample size, focus group, a revised version of the DINAMO questionnaire and researcher abilities.

First of all, the sample size appeared to be very small compared to the significance of this study. From the intended sample of 120 participants, the author obtained 31 responses, an insufficient sample for generalising results for the entire industry. And these 31 respondents might have participated in the survey because they were already interested in the topic, so they could have been biased, which could result in misinterpretation of the study. Such as the majority of respondents being optimistic about the change. If it had been possible to survey an entire sample of 120 participants, the results could have shown a more realistic and valuable picture.

Also, this study focused only on the project managers to investigate the sustainability strategy implementation. But since the process involves many other stakeholders, it would be beneficial to

explore how other stakeholders perceive sustainability implementation in the organisation and what the barriers are from their perspective.

Next, the questionnaire was slightly changed to make it shorter and remove irrelevant, in the opinion of the author, questions. This could influence the validity of the results. Also, the author found inconsistency in the way statements are given in criterion 13 (Complexity). This might have led the researcher to the wrong conclusions about this criterion.

And last but certainly not least, the researcher's abilities are limited by the absence of experience in the field of scientific research and report writing. The research aim and the main research question were not clearly defined until the late stage of the study. This led to a dispersed focus in the literature review and discrepancies in the research design implementation. The scope of discussion is reduced compared to more experienced academic writers.

6.2. Recommendations for Practice

So, the results showed that the willingness to change among project managers is highly influenced by perceived behavioural control (can change). PMs are aware of sustainability, they accept the fact that change is necessary for future generations, and they want to change. Except they need to be provided by enabling tools and knowledge.

After analysing the results, the following recommendations have been made to improve sustainability transition of project management (Table 7). Practice recommendations are provided four critical criteria of negative influence on the PMs' behaviour from Figure 18 and aligned with the Prosci triangle (Figure 1).

Complexity of the change process	Integrated Approach To reduce the complexity of the change, research recommends reinforcing the Integrated Approach in the organisation. This can be provided by bonding people, processes and tools in an organic system. In such a system, people have enough skills and knowledge to use tools and organisational processes to facilitate change. It is recommended to define first the impact on the content of the work of a PM. Then develop, when necessary, new tools and processes, testing them on smaller-scale construction projects to ensure their 'fit for purpose'. If any change is introduced to the process, it is important to align it with people (who are involved with this process) same as with tools (that are necessary to implement the process) and vice versa.
Involvement in the change process	Leadership Actions To increase the involvement (of PM) in the change process research refers to the Leadership Actions. Leadership in sustainability must be active and

	visible, and the coalitions should be built to combine the disseminated effort in sustainability implementation through the organisation. It is highly recommended to assign leaders. These leaders should ensure the PMs are guided and trained in sustainability implementation to keep them are motivated and inspired. Leaders also should manage stakeholders of sustainability to facilitate the process for PMs who have other important goals on the project.
Information about the change	Integrated Approach & Leadership Actions To provide more information research suggests combining the Integrated approach and Leadership Actions. It is strictly necessary to communicate all stages of the change process and use effective internal tools for knowledge exchange among people in the organisation. It is recommended for the leaders to become a sustainability ambassador and carefully manage the information. Information must be up to date and conveyed to the right people. However, it concerns not only the leaders. Important information must reach everyone via compulsory workshops or trainings. An internal information hub for sustainability can be created to ensure exchange of knowledge and information.
Manageability	Leadership Decisions & Leadership Actions To facilitate manageability of the process research refers to the Leadership Decisions and Leadership Actions. The scope, resources and time must be aligned with the strategic goals in sustainability. Leadership Decisions must be sufficiently reinforced by the Leadership Actions which need to be monitored and tracked. This is a top-down approach. For the bottom-up approach the leadership of the change should allocate resources to the initiative actors and groups to incentivise and empower them. It is recommended, again for the leaders, to negotiate within and between units about necessities for sustainability. Resource allocation is crucial. Change program should be developed to provide rough estimations of expenditures and plan of actions. All steps should be followed by continuous feedback from practice.

Table 7. Recommendations for practice.

Moreover, the organisational structure might also play an essential role in all four criteria. The network decentralised structure of RHDHV can both enhance and hinder innovation development. On the one hand, there is more freedom for decision-making and local expertise development, but on the other hand, knowledge development and information exchange can take place in silos.

Therefore, it is suggested to organise a hybrid structure with the possibility of combining the advantages of different structures, such as having an umbrella sustainability unit which guarantees the collection and exchange of knowledge and information and alignment with the strategic goals.

6.3. Recommendations for further research

- It is recommended to conduct a study on the willingness to change considering the delimitations of the current research. Further research can exploit a larger sample in the survey, which can allow for more rigorous statistical analysis and generalisation of the results. Further research can also include multiple companies. This can provide an inside on the relevance of organisational context. The questionnaire could be better adapted and more specific about the changes related to the sustainability transition.
- Further research can study barriers from the current findings in more detail. Without that the problem remains too broad.
- This research is focused on the project managers in a consultancy firm and their perception of sustainability implementation. The next study should also consider project managers from other types of organisations (client or contractor) to discover what are the barriers in their organisations.
- Furthermore, to deepen the knowledge, further research should specify actors and explain their responsibilities in resolving the barriers from the current study.
- This research revealed that the company attempts to resolve the problem by applying a bottom-up approach. It would be interesting to do further research into the effectiveness of both a top-down and bottom-up approach in the sustainability strategy implementation.

Reference:

Adelman, H. S., & Taylor, L. (2003). On sustainability of project innovations as systemic change. Journal of Educational and Psychological Consultation, 14(1), 1-25.

Amanatidis, G. (2019). European policies on climate and energy towards 2020, 2030 and 2050. 12.

Ansoff, I. (1957). Strategies for Diversification", Harvard Business Review, September-October.

Bansal, Pratima, Song, Hee-Chan, 2017. Similar but not the same. Differentiating corporate sustainability from corporate responsibility. ANNALS 11 (1), 105–149. https://doi.org/10.5465/annals.2015.0095.

Braun, V., Clarke, V., Boulton, E., Davey, L., McEvoy, C., (2021) "The online survey as a qualitative research tool." International Journal of Social Research Methodology 24.6: 641-654. https://doi.org/10.1080/13645579.2020.1805550

Bruijl, G. H. Th. (2018). The Relevance of Porter's Five Forces in Today's Innovative and Changing Business Environment. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3192207

Brown, P., Bocken, N., & Balkenende, R. (2020). How do companies collaborate for circular oriented innovation? Sustainability, 12(4), 1648.

Carmeli, A., Brammer, S., Gomes, E., & Tarba, S. Y. (2017). An organisational ethic of care and employee involvement in sustainability-related behaviors: A social identity perspective. Journal of Organisational Behavior, 38(9), 1380-1395.

Creswell, J. W. (2011). Controversies in mixed methods research. The Sage handbook of qualitative research, 4(1), 269-284.

Dahlsrud, A. (*2006*). How corporate social responsibility is defined: an analysis of 37 definitions, in*: Corporate Social Responsibility and Environmental Management, 15, 1–13,*

Davis-Peccoud, J., Stone, P., Tovey, C. (November 17, 2016) Achieving Breakthrough Results in Sustainability. CEOs who are passionate about change need to support the front line. Bain. com Retrieved from https://www.bain.com/insights/achieving-breakthrough-results-in-sustainability on 12 October, 2022

Dawson, R. (2000). Knowledge capabilities as the focus of organisational development and strategy. Journal of Knowledge Management, 4(4), 320-327. doi: 10.1108/13673270010379876

Emerson, R. W. (2015). Convenience sampling, random sampling, and snowball sampling: How does sampling affect the validity of research?. Journal of Visual Impairment & Blindness, 109(2), 164-168.

European Commission. (2020). A new Circular Economy Action Plan. Retrieved 18 February 2022, from https://ec.europa.eu/environment/pdf/circular-economy/new_circular_economy_action_plan.pdf

Fuchs, S., & Edwards, M. R. (2012). Predicting pro-change behaviour: The role of perceived organisational justice and organisational identification. Human Resource Management Journal, 22(1), 39-59.

Gaziulusoy, A.I. (2010).System Innovation for Sustainability: A Scenario Method and a Workshop Process for Product Development Teams. Ph.D. Thesis, University of Auckland, Auckland, New Zealand,

Geels, F. W. (2005). Technological transitions and system innovations: a co-evolutionary and socio-technical analysis. Edward Elgar Publishing.

Geels, F. W., Sovacool, B. K., Schwanen, T., & Sorrell, S. (2017). Sociotechnical transitions for deep decarbonization. Science, 357(6357), 1242-1244.

Guerci, M., Radaelli, G., Siletti, E., Cirella, S., & Rami Shani, A. B. (2015). The impact of human resource management practices and corporate sustainability on organisational ethical climates: An employee perspective. Journal of Business Ethics, 126(2), 325-342.

Gutterman, A. (2021). Organizational Design for Sustainability. https://www.researchgate.net/publication/350789961_Organizational_Design_for_Sustainability

Hanák, T., Drozdová, A., & Marović, I. (2021). Bidding strategy in construction public procurement: A contractor's perspective. Buildings, 11(2), 47.

HaskoningDHV, R. (2022). "Our Corporate CSR Structure." Retrieved from https://ireports.royalhaskoningdhv.com/rsb2021/our-role-in-society/our-strategy-/our-corporate-csr-structure on 1 November 2022.

Heale, R., & Forbes, D. (2013). Understanding triangulation in research. Evidence Based Nursing, 16(4), 98. doi: 10.1136/eb-2013-101494

Hockenberry, T. (2019). Embrace marketing ideas to impact change management. The Journal for Quality and Participation, 42(1), 19-21.

Hofmann, F. (2019). Circular business models: Business approach as driver or obstructer of sustainability transitions? Journal of Cleaner Production, 224, 361-374. doi: https://doi.org/10.1016/j.jclepro.2019.03.115

Homer-Dixon, T. F. (2010). Environment, scarcity, and violence Environment, scarcity, and violence: Princeton University Press.

Israel, M., & Hay, I. (2006). Research ethics for social scientists: Sage.

Javidan, M. (1991). Leading a high-commitment high-performance organisation. Long Range Planning, 24(2), 28-36.

Kira, M., van Eijnatten, F. M., & Balkin, D. B. (2010). Crafting sustainable work: Development of personal resources. Journal of Organisational Change Management.

Kiron, D., Kane, G. C., Palmer, D., Phillips, A. N., & Buckley, N. (2016). Aligning the organisation for its digital future. MIT Sloan Management Review, 58(1).

Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F., Fünfschilling, L., Hess, D., Holtz, G., Hyysalo, S., Jenkins, K., Kivimaa, P., Martiskainen, M., McMeekin, A., Mühlemeier, M. S., … Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions*, *31*, 1–32. https://doi.org/10.1016/j.eist.2019.01.004

König, J., Schmid, S., Löser, E., Neumann, O., Buchholz, S., & Kästner, R. (2016). Interplay of demographic variables, birth experience, and initial reactions in the prediction of symptoms of posttraumatic stress one year after giving birth. European journal of psych traumatology, 7(1), 32377. https://doi.org/10.3402/ejpt.v7.32377

Kossoff, G. (2015). Holism and the reconstitution of everyday life: A framework for transition to a sustainable society. Design Philosophy Papers, 13, 25–38. https://doi.org/10.1080/14487136.2015.1085698

Lawrence P.R. (1969) How to deal with resistance to change. Change Management. Harvard Business Review. Retrieved from https://hbr.org/1969/01/how-to-deal-with-resistance-to-change on 28 September 2022

Lewin K. (1951). Field theory in social science: Selected theoretical papers 1st edition. New York,: Harper.

Lee, J., Min, J., & Lee, H. (2016). The Effect of Organizational Structure on Open Innovation: A Quadratic Equation. In *Procedia Computer Science* (Vol. 91, p. 501). https://doi.org/10.1016/j.procs.2016.07.128

Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. Journal of Cleaner Production, 115, 36-51. doi: https://doi.org/10.1016/j.jclepro.2015.12.042

Liu, X., Schraven, D., de Bruijne, M., de Jong, M., & Hertogh, M. (2019). Navigating Transitions for Sustainable Infrastructures—The Case of a New High-Speed Railway Station in Jingmen, China. Sustainability, 11(15). Retrieved from doi:10.3390/su11154197

Loorbach, D., (2010). Transition management for sustainable development: a prescriptive, complexity-based governance framework. Governance 23 (1), 161e183.

Loorbach, D., Frantzeskaki, N., & Avelino, F. (2017). Sustainability Transitions Research: Transforming Science and Practice for Societal Change. Annual Review of Environment and Resources, 42(1), 599-626. doi: 10.1146/annurev-environ-102014-021340

Lucas, P., & Wilting, H. (2018). Using planetary boundaries to support national implementation of environment-related Sustainable Development Goals. 54. https://www.pbl.nl/sites/default/files/downloads/Using_planetary_boundaries_to_support_national_implementation_of_environment-related_Sustainable_Development_Goals_-_2748.pdf

Magano, J., Silvius, G., Silva, C. S., & Leite, Â. (2021a). Exploring Characteristics of Sustainability Stimulus Patterns of project managers. Sustainability, 13(7). Retrieved from doi:10.3390/su13074019

Magano, J., Silvius, G., Silva, C. S. e., & Leite, Â. (2021b). The contribution of project management to a more sustainable society: Exploring the perception of project managers. Project Leadership and Society, 2, 100020. doi: https://doi.org/10.1016/j.plas.2021.100020

Metselaar E. E. (1997). Assessing the willingness to change: Construction and validation of the DINAMO. [PhD-Thesis - Research and graduation internal, Vrije Universiteit Amsterdam]. Vrije Universiteit.

Metselaar E. E. Cozijnsen A. J. & Delft P. van. (2011). Van weerstand naar veranderbereidheid : over willen moeten en kunnen veranderen (6e dr. volledig herz.). Holland Business Publications.

Miller, D. (1986), “Configurations of strategy and structure: towards a synthesis”, Strategic Management Journal, Vol. 7 No. 3, pp. 233-49.

Moore, K. (2011, March 28). Porter or minzberg: Whose view of strategy is the most relevant today? Forbes. Retrieved from https://www.forbes.com/sites/karlmoore/2011/03/28/porter-or-mintzberg-whose-view-of-strategy-is-the-most-relevant-today/?sh=4a01d7cd58ba on 19 October 2022.

Munaro, M. R., Tavares, S. F., & Bragança, L. (2020). Towards circular and more sustainable buildings: A systematic literature review on the circular economy in the built environment. Journal of Cleaner Production, 260, 121134. doi: https://doi.org/10.1016/j.jclepro.2020.121134

Oertwig, N., Galeitzke, M., Schmieg, H.-G., Kohl, H., Jochem, R., Orth, R., & Knothe, T. (2017). Integration of Sustainability into the Corporate Strategy. In R. Stark, G. Seliger, & J. Bonvoisin (Eds.), Sustainable Manufacturing: Challenges, Solutions and Implementation Perspectives (pp. 175–200). Springer International Publishing. https://doi.org/10.1007/978-3-319-48514-0_12

Owen, K., Mundy, R., Guild, W., & Guild, R. (2001). Creating and sustaining the high performance organisation. Managing Service Quality: An International Journal.

Prosci, (n.d.) Change management. https://www.prosci.com/resources/articles/definition-of-change-management retrieved on 23 July 2022

Porter, M. E. (1996). What is strategy?

Reed, K. E. (2002). Everyone takes the field: How 3M encourages employee involvement in promoting sustainable development. Corporate Environmental Strategy, 9(4), 383-389.

Reschly, D. J., & Ysseldyke, J. E. (2002). Paradigm shift: The past is not the future.

Rojon, C., & Saunders, M. N. K. (2012). Formulating a convincing rationale for a research study. *Coaching: An International Journal of Theory, Research and Practice*, *5*(1), 55–61. https://doi.org/10.1080/17521882.2011.648335

Rutberg, S., & Bouikidis, C. D. (2018). Focusing on the fundamentals: A simplistic differentiation between qualitative and quantitative research. Nephrology Nursing Journal, 45(2), 209-213. https://pubmed.ncbi.nlm.nih.gov/30303640/

Sachs, J. D., Schmidt-Traub, G., Mazzucato, M., Messner, D., Nakicenovic, N., & Rockström, J. (2019). Six Transformations to achieve the Sustainable Development Goals. Nature Sustainability, 2(9), 805-814. doi: 10.1038/s41893-019-0352-9

Sanchez, B., & Haas, C. (2018). Capital project planning for a circular economy. Construction Management and Economics, 36(6), 303-312. doi: 10.1080/01446193.2018.1435895

Shrivastava, P., Stafford Smith, M., O'Brien, K., & Zsolnai, L. (2020). Transforming Sustainability Science to Generate Positive Social and Environmental Change Globally. *One Earth*, *2*(4), 329–340. https://doi.org/10.1016/j.oneear.2020.04.010

Silvius, A., & Schipper, R. P. (2014). Sustainability in project management: A literature review and impact analysis. Social Business, 4(1), 63-96.

Silvius, A. G., & de Graaf, M. (2019). Exploring the project manager's intention to address sustainability in the project board. Journal of cleaner production, 208, 1226-1240.

Simpson, P. (2012). Complexity and change management: analyzing church leaders' narratives. Journal of Organisational Change Management.

Sull, D., Homkes, R., & Sull, C. (2015). Why strategy execution unravels—and what to do about it. Harvard business review, 93(3), 57-66.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509-533. doi: https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

UN, n.d. Sustainable development. https://www.un.org/sustainabledevelopment/wp-content/uploads/2019/01/SDG_Guidelines_AUG_2019_Final.pdf Retrieved on 23 July 2022

UNEP (2021). Emissions Gap Report 2021. UNEP - UN Environment Programme. http://www.unep.org/resources/emissions-gap-report-2021

Upham, P., Bögel, P., & Dütschke, E. (2020). Thinking about individual actor-level perspectives in sociotechnical transitions: A comment on the transitions research agenda. *Environmental Innovation and Societal Transitions*, *34*, 341–343. https://doi.org/10.1016/j.eist.2019.10.005

de Waal, A. A. (2007). The characteristics of a high performance organisation. *Business Strategy Series*, *8*(3), 179–185. https://doi.org/10.1108/17515630710684178

Appendix 1.

PM SURVEY QUESTIONNAIRE

Introduction

This survey is intended for the project managers of the Industry & Building business line and it aims to evaluate their 'willingness to change'. Here, the 'willingness to change' means a willingness to adopt and implement the core element of the Stronger25 strategy introduced by the CEO of RHDHV in April 2022. The survey is focused on the first strategy dimension: ENHANCING SOCIETY TOGETHER. For this dimension there are FIVE THEMES to be advanced further in 2022:

- Climate change.
- Biodiversity & natural systems.
- Resources & circularity.
- Social value & equality
- Safety & well-being

"THE FIVE THEMES ARE RELEVANT TO EVERYTHING WE DO – for our people and our clients, the way we operate as an organisation, and how we implement our projects (https://global.royalhaskoningdhv.com/about-us/our-strategy).

The definition of sustainability in this survey **refers to the five themes** above, proposed by the RHDHV strategy.

Today's project manager fulfils not only 'traditional' PM roles but, according to theory, must also manage the project most efficiently and effectively for sustainability. The survey objective is, to identify which factors hinder the transition toward *sustainable project management* intended by the RHDHV strategy. The outcome of this research will be recommendations on how to promote further strategic alignment.

When the survey questions address **"Change"**, it refers to **the change in PM's practices** imposed by sustainability requirements. Such a change means a PM must anticipate in their practice consideration of resource management aspects, stakeholders' involvement, attention to benefits and changes generated by the project to its context and the environment etc. This could be a change in daily activities; reorganisation or restructuring; change in job responsibilities, work processes or procedures; transfer to another branch, department, etc. (Magano et al., 2021.). It might affect your functioning, feelings, or behaviour. Please fill in the questionnaire considering this Change.

The survey is a part of the master's thesis at the Delft University of Technology.
You are invited to participate in this research project. You may choose not to participate.
If you decide to participate in this research survey, you may withdraw at any time. This questionnaire is about your opinion and there are no right or wrong answers. Try to answer the questions quickly and with concentration; your first thought would often be the best fit. The procedure involves filling out an online survey that will take approximately 20 minutes. Your

responses will be confidential, and we do not collect identifying information such as your name, email address or IP address.
All data is stored in a password-protected electronic format. To help protect your confidentiality, the surveys will not contain information that will personally identify you. The results of this study will be used for research purposes and be published without further approval. Your participation in the survey shows your approval of the use of anonymous data.
The results of this survey will provide insights for the company in terms of improvements in strategy implementation aligned with academic research.

If you have questions or need clarifications about this research study, reach me at:
A.M.Nevostrueva@student.tudelft.nl

Block 1. Demographic questions (N=6)

What is your age?

- 25-34
- 35-44
- 45-54
- 55 or more

1. What is your gender?
    - Male
    - Female
    - Other
2. What is your educational background?
    - Architecture
    - Civil or structural
    - Another engineering
    - Management
3. What is your job title?
    - project management
    - Consultancy
    - Line Management
    - Engineering/Technician
    - Expertise/Specialist
4. What country do you work in?
    - The Netherlands
    - Nigeria
    - APac country
5. What is your PM experience in RHDHV?
    - 0-2
    - 3-7

- 8-14
- 15 or more

6. What is your overall experience in PM?
    - 0-4
    - 3-7
    - 8-14
    - 15 or more

Block 2 DYNAMO model

To what extent do you agree/disagree with the following statements? On a scale of 1 to 5, where 1 strongly disagree and 5 strongly agree.

1	2	3	4	5
Strongly disagree	Disagree	Undecided	Agree	Strongly agree

Revised questionnaire	Original questionnaire
Want to change	
1. Consequences of the change for work	
1. The change will increase the importance of my work to the organisation. 2. The change will increase the quality of my work 3. Because of the change, I will be more satisfied with my work. 4. I can bear the amount of responsibility related to the change 5. The change will improve employment conditions or develop new career opportunities for me. (1 strongly disagree – 5 strongly agree)	What influence do you expect from the change process on: 1. ... the degree to which you experience your work as interesting. 2. ... the importance of your work to the organisation. 3. ...the amount of responsibility you bear in your work. 4. ...the possibilities you have to perform your work as you see it. 5. ... the options you have to meet the wishes of (internal) customers. 6. ...the quality of your work. 7. ...satisfaction with your work. 8. ... the development of your salary and other (secondary) employment conditions. 9. ...your involvement in the organisation. 10. ...the development of your career. (1 very negative-5 very positive)
2. Emotions evoked by the change	
6. I experience the upcoming change as an opportunity rather than a threat. 7. I experience the upcoming change as something familiar and normal.	Indicate here how you experience the change process, given your position in the organisation. 11. Threatening or Challenging? 12. Bad or good?

8. I experience the upcoming change as positive. 9. I experience the upcoming change as inspirational. (1 strongly disagree – 5 strongly agree)	13. Strange or Familiar? 14. Negative or positive? 15. Oppressing or refreshing? (1-5 accordingly)
3. Added value of the change for the organisation	
10. The change will make the organisation stronger in the market 11. The change will make the organisation more efficient internally. 12. The change will increase the quality of the services and products of the organisation 13. The image of the organisation will be improved by the change (1 strongly disagree – 5 strongly agree)	In your opinion, how great is the added value of the change process for: 16. ...the strength of the organisation on the market. 17. ... the internal efficiency. 18. ...the quality of the services or products of the organisation. 19. ...the image of the organisation to customers. 20. ...the image of the organisation on the labour market. (1 no added value – 5 enormous added value)
4. Involvement in the change process	
14. I discuss this change a lot with my colleagues. 15. I feel involved in the change process. (1 strongly disagree – 5 strongly agree)	Please give your opinion on the following statements: 21. I experience the process of change. 22. The process of change occupies an important place in my work. 23. I talk a lot with colleagues about the change process. 24. I feel involved in the change process. (1 strongly agree – 5 strongly disagree)
Need to change	
5. Experienced internal pressure to change	
16. My colleagues support the change. 17. My line manager supports the change. 18. The top management supports this change. (1 strongly disagree – 5 strongly agree)	Indicate here how you think the following people feel about the change process: 25. Your colleagues? 26. Your employees (if applicable)? 27. Your immediate supervisor? 28. The management (if applicable)? 29. The Board of Directors (if applicable)? (1 very negative – 5 very positive)
6. Experienced external need to change	
19. This change is necessary to answer the current market demand for sustainability. 20. We must change to keep the organisation healthy	Please give your opinion on the following statements: 30. The change process is necessary in view of market developments. 31. We must change to keep the organisation healthy. 32. If the change process fails, I foresee problems for the organisation.

21. If the change process fails, I foresee problems for the organisation. (1 strongly disagree – 5 strongly agree)	33. The need to change is clear to me. (1 strongly disagree – 5 strongly agree)
Can change	
7. Knowledge and experience	
22. I have sufficient knowledge and experience to make the change process a success. 23. My competency profile is in line with what is expected from my position in the future. (1 strongly disagree–5 strongly agree) 24. I have had negative experiences in the past with the implementation of organisational change. (5 strongly disagree – 1 strongly agree)	Please give your opinion on the following statements: 34. I have sufficient knowledge and experience to make the change process a success. 35. Based on my experience with previous change projects, I can contribute to the success of the changes. 36. My competency profile is in line with what is expected from my position in the future. 37. I can contribute to the success of the change process based on my professional knowledge. (5 strongly agree – 1 strongly disagree) 38. I have had negative experiences in the past with the implementation of organisational change. (1 strongly agree – 5 strongly disagree)
8. Capacity for change	
25. The leadership style in the organisation helps to make the change process a success. 26. The systems that I work with in my department help to achieve the goals of the change process 27. The colleagues from my department are experienced enough to implement the changes successfully. 28. The current structure of the organisation contributes to the success of the change process. (1 strongly disagree – 5 strongly agree)	39. The leadership style in the organisation helps to make the change process a success. 40. The systems that I work with in my department help to achieve the goals of the change process. 41. The colleagues with whom I work are experienced enough to implement the changes successfully. 42. The support departments (eg HR) can successfully change along with it. 43. The current structure of the organisation contributes to the success of the change process. 44. The norms and values of my colleagues contribute to the success of the change process. 45 The strategic vision of senior management supports the change process. (5 strongly agree – 1 strongly disagree)
9. Information	
29. I can clearly see the consequences of the change process for my own position. 30. It is clear what are the personnel consequences of the change process in my department.	Please give your opinion on the following statements: 46. I can clearly see the consequences of the change process for my own position. 47. I can properly inform my colleagues about the consequences of the change process for the department. (5 strongly agree – 1 strongly disagree)

31. It is clear what are the financial consequences of the change process in my department. 32. It is clear what are the organisational consequences of the change process in my department. 33. It is clear what are the consequences of the changes to the content of the work in my department. (1 strongly disagree – 5 strongly agree)	48. In my department there is uncertainty about the personnel consequences of the change process. 49. In my department there is uncertainty about the financial consequences of the change process. 50. In my department there is uncertainty about the organisational consequences of the change process. 51. In my department there is uncertainty about the consequences of the changes to the content of the work. (1 strongly agree – 5 strongly disagree)
10. Control	
34. The management informs everyone in good time about upcoming developments. 35. The change process is divided into clear phases and is based on a clear change plan. 36. The people who direct the change process have the necessary knowledge and experience for this. (1 strongly disagree – 5 strongly agree)	Please give your opinion on the following statements: 52. The management informs everyone in good time about upcoming developments. 53. The change process is managed in a targeted manner. 54. The change process is divided into clear phases. 55. The people who direct the change process have the necessary knowledge and experience for this. 56. The change process is based on a clear change plan. (5 strongly agree – 1 strongly disagree)
11. Timing	
37. I am ready for this change. 38. I can keep up with the change process. 39. This change comes at the right time. (1 strongly disagree – 5 strongly agree)	Please give your opinion on the following statements: 57. I feel like I am behind the times when it comes to the change process. 58. I can keep up with the change process. 59. I'm ready to change my way of working. 60. The change process comes at a good time for me. 61. The change process is happening too fast for me. (strongly agree – strongly disagree)
12. Manageability	
40. I consider the change complex to implement. 41. The success of the change process depends on external factors that are difficult to manage. 42. Successful implementation of the changes depends on resources (time, money, knowledge) that are scarce in our organisation. (5 strongly disagree – 1 strongly agree)	Please give your opinion on the following statements: 62. I consider the change complex to implement. 63. The success of the change process depends on external factors that are difficult to manage. 64. A great effort will be required to get all employees to the desired level of competence. 65. Successful implementation of the changes depends on resources (time, money, knowledge) that are scarce in our organisation. 66. The current developments in the organisation make successful implementation of the changes difficult.

	(1 strongly agree – 5 strongly disagree)
13. Complexity of the change process	
43. The change will have a great impact on the position of your organisation in the market 44. The change will have a great impact in the way decisions are made within your organisation 45. The change will have a great impact in the content of the work of your employees/colleagues 46. The change will have a great impact in the way your organisation is run (5 strongly disagree – 1 strongly agree)	How great is the impact of the change process in your opinion on: 77. ...the position of your organisation on the market? 78. ...the objective(s) that your organisation is pursuing? 79. ...the way you interact within your organisation? 80. ...the way decisions are made within your organisation? 81. ...the content of the work of your employees/colleagues? 82. ...the way your organisation is run? 83. ...the way your organisation approaches the market? (5 no impact – 1 very big impact)
14. Trust	
47. I have confidence in management to make the right (strategic) choices 48. I trust that the management wants the best for the organisation 49. I have confidence in the successful outcome of this change process (1 strongly disagree – 5 strongly agree)	Please give your opinion on the following statements: 67. I have confidence in the successful outcome of this change process 68. I have confidence in the direction set by the management for the organisation 69. I have confidence in the (strategic) choices made by management 70. I trust that the management wants the best for the organisation 71. I have faith in the justice of management when decisions have to be made (5 strongly agree – 1 strongly disagree)
Excluded. (only questions related to the 14 variables were left in the revised version)	15. Willingness to Change Please give your opinion on the following statements: 72. I am willing to convince my colleagues of the usefulness of the change process. 73. I am willing to commit to the current objectives of the change process. 74. I am willing to remove any resistance to the change process among my employees/colleagues. 75. I am willing to make time to implement the changes in my department. 76. How do your colleagues react to the change process (tick, multiple answers are possible) 0 They are actively involved in realizing the change process. 0 They support the change process. 0 They feel involved in the change process and have .

	need for additional information. 0 They don't talk about it. 0 They adopt a wait-and-see attitude. 0 "In the corridors" they talk negatively about the change process. 0 They speak negatively about the change process at meetings. 0 They call in sick.
Excluded. (only questions related to the 14 variables were left in the revised version)	16. Result What result do you expect from the change process for... 84. ...the quality of leadership in the organisation? 85. ...the quality of the employees in the organisation? 86. ...thequalityofstrategyandpolicy? 87. ...the quality of resource management (time, money, people)? 88. ...the quality of work processes? 89. ...employee satisfaction? 90. ...customer satisfaction? 91. ...the valuation by the company? 92. ...the organisation's learning capacity?
Excluded. (only questions related to the 14 variables were left in the revised version)	17. Change Approach 93. Current Approach: Which of the elements below come out the strongest in the current approach to the change process? You may tick more options: a. The formulation of policy and the determination of principles by top management. b. A project-based approach in which all steps in the change process have been worked out. c. Coaching employees so that they can develop. d. Learning from each other so that knowledge and information are shared. e. Creating space for creativity and new ideas. 94. Desired approach: Which approach do you think the change process needs most right now? You may tick more options: a. The formulation of policy and the determination of principles by top management. b. A project-based approach in which all steps in the change process are worked out. c. Coaching employees so that they can develop. d. Learning from each other so that knowledge and information are shared. e. Creating space for creativity and new ideas.
See Block 3.	18. Open Questions

	This last part consists of three open questions. You can leave them blank, but you can also use them to bring up problems/bottlenecks that were not covered in the questionnaire. 95. What do you think is the added value of the change? 96. Do you foresee any specific problems for your department that could complicate the implementation of the change? If yes which one? 97. Do you think the change is necessary? If so, why? If not, why not?

Block 3. Open questions

In addition to the DINAMO questionnaire, respondents were asked to answer three open questions. The questions allow for bringing up the problems and concerns that have not been covered by the questionnaire. The same framework of Ajzen's theory was followed to formulate the open questions. Answers can be left blank.

Want to change:

1. What do you think is the added value of the changes? For your job, for the organisation.

Need to change:

2. Do you think there is a need for sustainability? If so, why? If not, why not?

Can change:

3. Do you foresee any specific problems for your department that could complicate the implementation of this change? If so, which ones?

Appendix 2

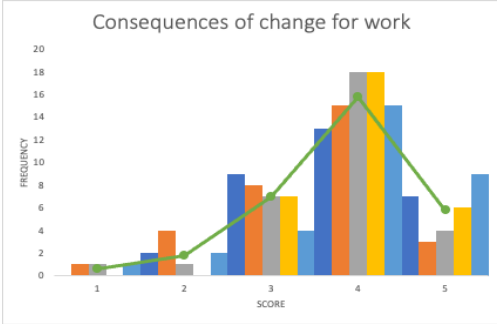
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Total mean
Consequences of change for work	1. The change will increase the importance of my work to the organisation.	5	3	3	4	3	3	3	3	4	2	4	4	5	3	5	4	3	4	4	5	3	4	4	4	4	4	5	4	2	5	5	118	
	2. The change will increase the quality of my work	4	3	3	4	2	3	4	3	4	4	1	2	4	4	4	4	3	4	4	5	4	3	4	3	2	4	5	4	2	3	5	108	
	be more satisfied with my work.	4	3	4	4	2	3	5	4	5	4	4	4	4	4	4	4	1	4	4	5	3	3	4	3	3	4	4	4	3	4	5	116	
	4. I can bear the added responsibility related to the change	4	4	4	4	3	5	4	4	5	3	4	4	3	4	4	4	4	5	5	5	4	4	3	3	3	3	4	4	4	4	5	123	
	5. The change will develop new career opportunities for me.	4	4	5	4	2	4	5	4	4	1	3	4	5	3	4	4	3	4	4	5	5	3	5	4	2	4	5	4	4	5	5	122	
	Total	21	17	19	20	12	18	21	18	22	14	16	18	21	18	21	20	14	21	21	25	19	17	20	17	14	19	23	20	15	21	25	587	18,93548387
Emotions evoked by change	6. I experience the upcoming change as an opportunity rather than a threat.	5	3	5	4	4	4	5	4	4	3	4	4	4	4	4	4	3	4	4	5	4	4	4	3	4	4	4	4	4	5	5	126	
	7. I experience the upcoming change as something familiar and normal.	5	3	5	3	4	2	4	4	3	5	3	4	2	4	4	3	3	3	5	5	4	3	4	3		4	3	2	4	3	5	109	
	8. I experience the upcoming change as positive.	5	4	5	4	4	4	5	4	5	4	3	4	4	5	4	4	3	4	4	5	5	4	4	3	4	4	4	4	4	4	5	129	
	9. I experience the upcoming change as inspirational.	5	3	5	4	4	3	5	4	5	4	2	4	4	5	3	4	3	4	4	5	4	3	4	3	3	4	4	5	3	1	5	119	
	Total	20	13	20	15	16	13	19	16	17	16	12	16	14	18	15	15	12	15	17	20	17	14	16	12	11	16	15	15	15	13	20	483	15,58064516
Added value of change for the organisation	10. The change will make the organisation stronger in the market	5	4	5	4	4	5	5	5	5	5	4	4	5	4	4	3	3	4	4	5	4	3	4	3	4	5	5	5	4	4	5	133	
	11. The change will make the organisation more efficient internally.	5	3	3	3	1	2	3	3	4	2	2	3	4	3	3	3	3		3	5	3	3	4	3	5	5	3	5	2	2	5	98	
	12. The change will increase the quality of services and products of the organisation	5	4	4	4	4	4	4	3	4	3	4	4	5	4	3	4	3	5	4	5	4	3	4	4	4	4	4	5	4	4	5	125	
	13. The image of the organisation will be improved by this change	5	4	5	4	4	4	4	4	4	4	4	4	5	4	4	4		5	4	5	4	4	4	4	4	5	5	5	3	5	5	129	
	Total	20	15	17	15	13	15	16	15	17	14	14	15	19	15	14	14	9	14	15	20	15	13	16	14	17	19	17	20	13	15	20	485	15,64516129
Involvement in the process	14. I discuss this change a lot with my colleagues.	4	3	5	3	1	1	4	3	3	1	1	4	4	2	4	3	3	2	3	5	2	2	5	2	1		3	3	1	3	5	86	
	15. I feel involved in the change process.	4	2	1	4	2	4	3	3	2	1	1	4	4	3	4	3	3	3	3	5	3	3	5	2	2	5	3	1	2	2	3	90	
	Total	8	5	6	7	3	5	7	6	5	2	2	8	8	5	8	6	6	5	6	10	5	5	10	4	3	5	6	4	3	5	8	176	5,677419355
																																	1731	55,83870968

Descriptive statistics						
Consequences of change for work	1. The change will increase the importance of my work to the organisation.	2. The change will increase the quality of my work	3. Because of the change, I will be more satisfied with my work.	4. I can bear the added responsibility related to the change	5. The change will develop new career opportunities for me.	AVG
Mean	3,806	3,484	3,742	3,968	3,935	3,79
Standard Error	0,157	0,173	0,154	0,118	0,179	
Median	4	4	4	4	4	
Mode	4	4	4	4	4	
Standard Deviation	0,873	0,962	0,855	0,657	0,998	
Sample Variance	0,761	0,925	0,731	0,432	0,996	
Kurtosis	-0,562	0,238	2,612	-0,502	1,478	
Skewness	-0,242	-0,672	-1,167	0,032	-1,155	
Range	3	4	4	2	4	
Minimum	2	1	1	3	1	
Maximum	5	5	5	5	5	
Sum	118	108	116	123	122	
Count	31	31	31	31	31	

Histogram represents frequency distribution for each statement and the linear graph shows average frequency values for the criteria.
Statements are scored on the five-point scale, where:
1 - strongly disagree
2 - disagree
3 - undecided
4 - agree
5 - strongly agree
Higher scores have positive connotation.

Frequency of scores for Consequences of change for work

	1. The change will increase the importance of my work to the organisation.	*2. The change will increase the quality of my work*	*3. Because of the change, I will be more satisfied with my work.*	*4. I can bear the added responsibility related to the change*	*5. The change will develop new career opportunities for me.*	
Score	*Fs1*	*Fs2*	*Fs3*	*Fs4*	*Fs5*	*Favg*
1	0	1	1	0	1	0,60
2	2	4	1	0	2	1,80
3	9	8	7	7	4	7,00
4	13	15	18	18	15	15,80
5	7	3	4	6	9	5,80



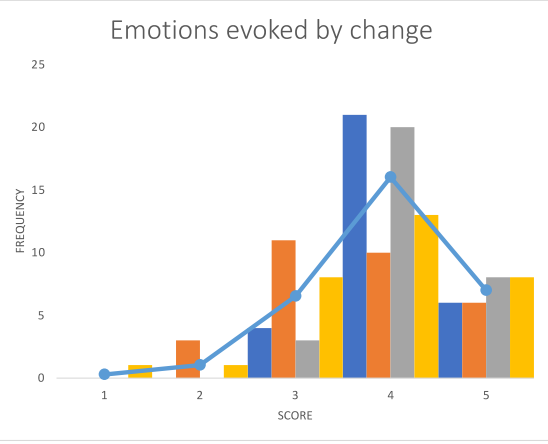
All 5 statements have mode 4, but the average mean is 3,79.

Statements 4 and 5 have means around the mode; S4 is almost normally distributed with skewness around 0 and lighter tails, 5 is skewed to the left but has higher kurtosis thus heavier left tail, the deviation is high but towards positive side. Statement 2 has positive kurtosis, thus heavier tails, skewed left which means the fracture of negative opinion is bigger here. Statement 3 skewed left more but has higher kurtosis so also heavier tail.

This data characteristics show that Consequences for the work in general are seen positively. Mostly the positive result is supported by the self-confidence and possibility of new career opportunities. Less enthusiastic participants feel about the positive consequences for the quality of their work and personal satisfaction.

Descriptive statistics					
Emotions evoked by change	*6. I experience the upcoming change as an opportunity rather than a threat.*	*7. I experience the upcoming change as something familiar and normal.*	*8. I experience the upcoming change as positive.*	*9. I experience the upcoming change as inspirational.*	
					AVG
Mean	4,065	3,633	4,161	3,839	3,92
Standard Error	0,103	0,169	0,105	0,174	
Median	4	4	4	4	
Mode	4	3	4	4	
Standard Deviation	0,574	0,928	0,583	0,969	
Sample Variance	0,329	0,861	0,340	0,940	
Kurtosis	0,336	-0,806	0,000	1,050	
Skewness	0,015	-0,003	-0,011	-0,830	
Range	2	3	2	4	
Minimum	3	2	3	1	
Maximum	5	5	5	5	
Sum	126	109	129	119	
Count	31	30	31	31	

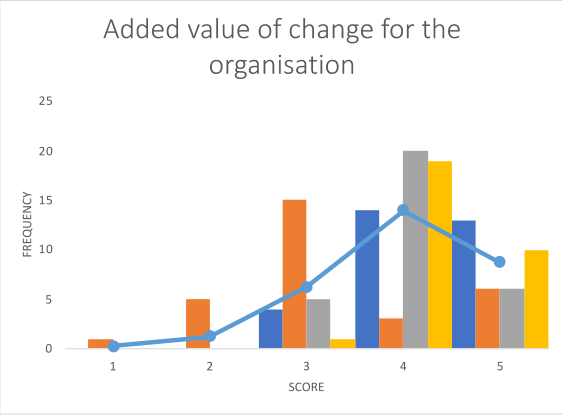
Frequency of scores for Emotions evoked by change					
	6. I experience the upcoming change as an opportunity rather than a threat.	*7. I experience the upcoming change as something familiar and normal.*	*8. I experience the upcoming change as positive.*	*9. I experience the upcoming change as inspirational.*	
Score	*Fs6*	*Fs7*	*Fs8*	*Fs9*	*Favg*
1	0	0	0	1	0,25
2	0	3	0	1	1
3	4	11	3	8	6,5
4	21	10	20	13	16
5	6	6	8	8	7



Statements 6,8 and 9 have mode 4, statement 7 has mode 3, the average mean is 3,92.
Statements 6,7,8 almost normally distributed, while S9 skewed left. S7 has negative kurtosis so more values are located near the mean.
Conclusion is that the change is emotionally experienced as an opportunity and something positive for all respondents. It is inspirational for most, but not for all.
Some negative emotions raise familiarity and normality of the change. Overall emotions can be seen as positive.

Descriptive statistics					
Added value of change for the organisation	*10. The change will make the organisation stronger in the market*	*11. The change will make the organisation more efficient internally.*	*12. The change will increase the quality of services and products of the organisation*	*13. The image of the organisation will be improved by this change*	*AVG*
Mean	4,290	3,267	4,032	4,300	3,97
Standard Error	0,124	0,197	0,109	0,098	
Median	4	3	4	4	
Mode	4	3	4	4	
Standard Deviation	0,693	1,081	0,605	0,535	
Sample Variance	0,480	1,168	0,366	0,286	
Kurtosis	-0,760	-0,402	0,008	-0,535	
Skewness	-0,460	0,303	-0,010	0,174	
Range	2	4	2	2	
Minimum	3	1	3	3	
Maximum	5	5	5	5	
Sum	133	98	125	129	
Count	31	30	31	30	

Frequency of scores for Added value of change for the organisation					
	10. The change will make the organisation stronger in the market	*11. The change will make the organisation more efficient internally.*	*12. The change will increase the quality of services and products of the organisation*	*13. The image of the organisation will be improved by this change*	
Score	*Fs10*	*Fs11*	*Fs12*	*Fs13*	*Favg*
1	0	1	0	0	0,25
2	0	5	0	0	1,25
3	4	15	5	1	6,25
4	14	3	20	19	14
5	13	6	6	10	8,75

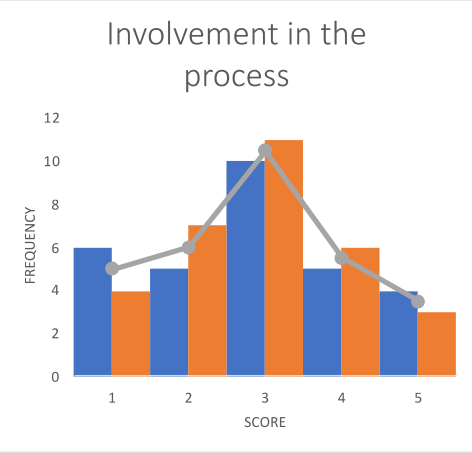


Statements 10,12 and 13 have mode 4, statement 11 has mode 3, the average mean is 3,97. Statement 10 is skewed left with negative kurtosis; more data is located around the mean. Statement 11 is bimodal, which might mean the opinion is split between the groups of respondents or the meaning of the statement was not clear for many of the respondents. Statement 12 is nearly normal distribution. Statement 13 skewed right with negative kurtosis which means more data located on the right from the mean. In summary data showed that respondents see much added value in improved image and stronger position in the market, also they are firmly positive about increase of quality due to change. The internal efficiency split the respondents into two groups: smaller part is positive about it and larger part is undecided with lean towards negative opinion.

Descriptive statistics			
Involvement in the process	*14. I discuss this change a lot with my colleagues.*	*15. I feel involved in the change process.*	*AVG*
Mean	2,867	2,903	2,88
Standard Error	0,238	0,209	
Median	3	3	
Mode	3	3	
Standard Deviation	1,306	1,165	
Sample Variance	1,706	1,357	
Kurtosis	-0,906	-0,587	
Skewness	0,064	0,064	
Range	4	4	
Minimum	1	1	
Maximum	5	5	
Sum	86	90	
Count	30	31	

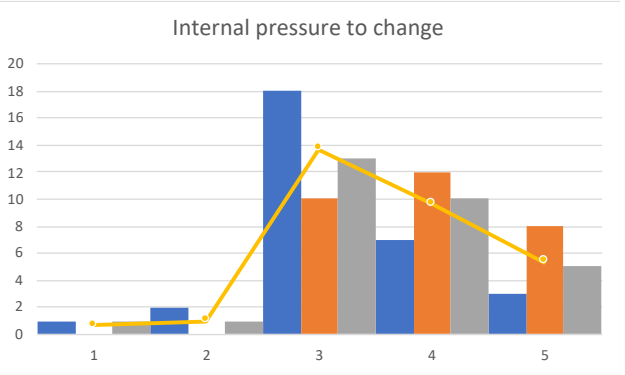
Statements 14 and 15 have mode 3 and slightly lower means, average mean is 2,88.
Statement 14 is bimodal, which again might mean the opinion is split between the groups of respondents. Statement 15 is nearly symmetric with negative kurtosis which means more data located on the tails.
Data showed that respondents in general are undecided about their involvement in the process which is characterised both with peak value around neutral opinion and high number of outliers on both sides.
Statement 14 has bimodal distribution which point on divided opinion in the group about discussing change with colleagues.

Frequency of scores for Involvement in the process			
	14. I discuss this change a lot with my colleagues.	*15. I feel involved in the change process.*	
Score	*Fs14*	*Fs15*	*Favg*
1	6	4	5
2	5	7	6
3	10	11	10,5
4	5	6	5,5
5	4	3	3,5



Internal pressure to change	*16. My colleagues support the change.*	*17. My line manager supports the change.*	*18. The top management supports this change.*
Mean	3,290	3,933	3,567
Standard Error	0,155	0,143	0,171
Median	3	4	3,5
Mode	3	4	3
Standard Deviation	0,864	0,785	0,935
Sample Variance	0,746	0,616	0,875
Kurtosis	1,106	-1,332	0,667
Skewness	0,041	0,121	-0,342
Range	4	2	4
Minimum	1	3	1
Maximum	5	5	5
Sum	102	118	107
Count	31	30	30

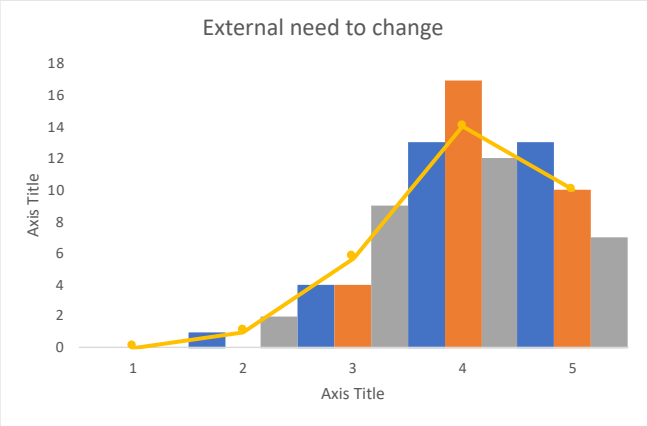
Frequency of scores for Internal pressure to change				
	16. My colleagues support the change.	*17. My line manager supports the change.*	*18. The top management supports this change.*	
Score	*Fs16*	*Fs17*	*Fs18*	*Favg*
1	1	0	1	0,67
2	2	0	1	1,00
3	18	10	13	13,67
4	7	12	10	9,67
5	3	8	5	5,33



External need to change	*19. This change is necessary to answer the current market demand for sustainability.*	*20. We must change to keep the organisation healthy*	*21. If the change process fails, I foresee problems for the organisation.*	
Mean	4,226	4,194	3,800	
Standard Error	0,145	0,117	0,162	
Median	4	4	4	
Mode	5	4	4	
Standard Deviation	0,805	0,654	0,887	
Sample Variance	0,647	0,428	0,786	
Kurtosis	0,395	-0,574	-0,646	
Skewness	-0,856	-0,214	-0,216	
Range	3	2	3	
Minimum	2	3	2	
Maximum	5	5	5	
Sum	131	130	114	
Count	31	31	30	

Frequency of scores for External need to change

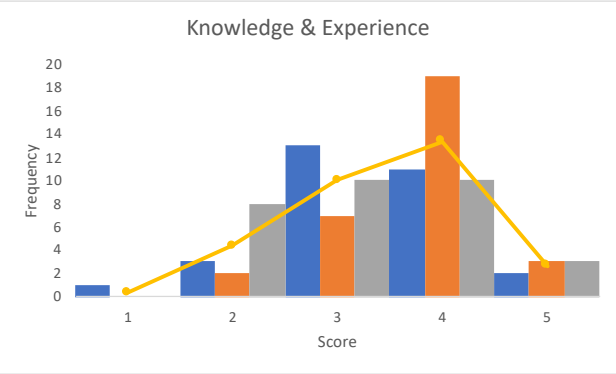
	19. This change is necessary to answer the current market demand for sustainability.	*20. We must change to keep the organisation healthy*	*21. If the change process fails, I foresee problems for the organisation.*	
Score	*Fs19*	*Fs20*	*Fs21*	*Favg*
1	0	0	0	0,00
2	1	0	2	1,00
3	4	4	9	5,67
4	13	17	12	14,00
5	13	10	7	10,00



Knowledge and experience	*22. I have sufficient knowledge and experience to make the change process a success.*	*23. My competency profile is in line with what is expected from my position in the future.*	*24. I have had negative experiences in the past with the implementation of organisational change.*	
Mean	3,333	3,742	3,258	
Standard Error	0,161	0,131	0,173	
Median	3	4	3	
Mode	3	4	3	
Standard Deviation	0,884	0,729	0,965	
Sample Variance	0,782	0,531	0,931	
Kurtosis	0,613	0,735	-0,942	
Skewness	-0,416	-0,656	0,152	
Range	4	3	3	
Minimum	1	2	2	
Maximum	5	5	5	
Sum	100	116	101	
Count	30	31	31	

Frequency of scores for Knowledge and experience

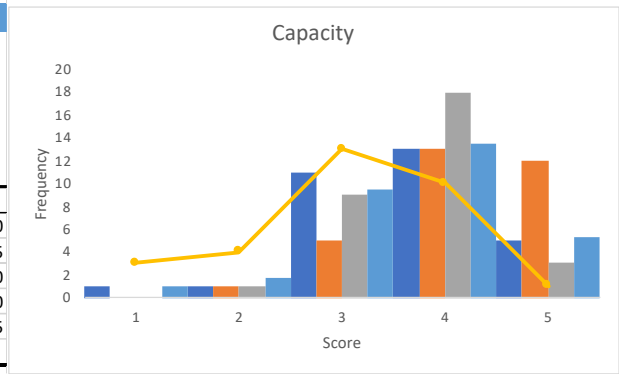
	22. I have sufficient knowledge and experience to make the change process a success.	*23. My competency profile is in line with what is expected from my position in the future.*	*24. I have had negative experiences in the past with the implementation of organisational change.*	
Score	*Fs22*	*Fs23*	*Fs24*	*Favg*
1	1	0	0	0,33
2	3	2	8	4,33
3	13	7	10	10,00
4	11	19	10	13,33
5	2	3	3	2,67



Capacity for change	*25. The leadership style in the organisation helps to make the change process a success.*	*26. The systems that I work with in my department help to achieve the goals of the change process*	*27. The colleagues from my department are experienced enough to implement the changes successfully.*	*28. The current structure of the organisation contributes to the success of the change process.*	
Mean	3,323	3,000	3,452	3,065	
Standard Error	0,214	0,174	0,196	0,179	
Median	3	3	4	3	
Mode	4	4	4	3	
Standard Deviation	1,194	0,966	1,091	0,998	
Sample Variance	1,426	0,933	1,189	0,996	
Kurtosis	-0,494	-0,894	-0,027	0,015	
Skewness	-0,428	-0,474	-0,692	-0,566	
Range	4	3	4	4	
Minimum	1	1	1	1	
Maximum	5	4	5	5	
Sum	103	93	107	95	
Count	31	31	31	31	

Frequency of scores for Capacity for change

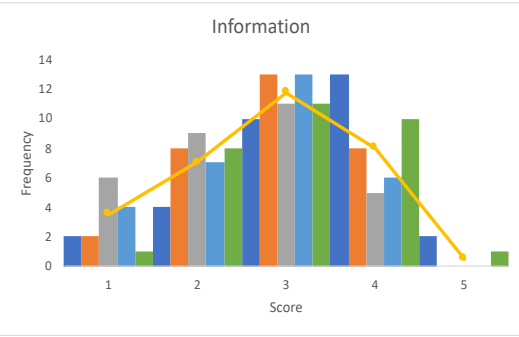
	25. The leadership style in the organisation helps to make the change process a success.	*26. The systems that I work with in my department help to achieve the goals of the change process*	*27. The colleagues from my department are experienced enough to implement the changes successfully.*	*28. The current structure of the organisation contributes to the success of the change process.*	
Score	*Fs25*	*Fs26*	*Fs27*	*Fs28*	*Favg*
1	1	0	0	3	1,00
2	1	1	1	4	1,75
3	11	5	9	13	9,50
4	13	13	18	10	13,50
5	5	12	3	1	5,25



Information	*29. I can clearly see the consequences of the change process for my own position.*	*30. It is clear what are the personnel consequences of the change process in my department.*	*31. It is clear what are the financial consequences of the change process in my department.*	*32. It is clear what are the organisational consequences of the change process in my department.*	*33. It is clear what are the consequences of the changes to the content of the work in my department.*	
Mean	3,290	2,871	2,484	2,700	3,065	
Standard Error	0,181	0,159	0,179	0,174	0,167	
Median	3	3	3	3	3	
Mode	4	3	3	3	3	
Standard Deviation	1,006	0,885	0,996	0,952	0,929	
Sample Variance	1,013	0,783	0,991	0,907	0,862	
Kurtosis	0,111	-0,526	-0,973	-0,638	-0,580	
Skewness	-0,637	-0,352	-0,061	-0,364	-0,134	
Range	4	3	3	3	4	
Minimum	1	1	1	1	1	
Maximum	5	4	4	4	5	
Sum	102	89	77	81	95	
Count	31	31	31	30	31	

Frequency of scores for Information

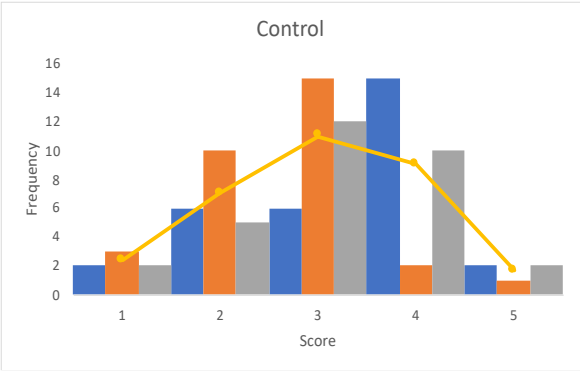
	29. I can clearly see the consequences of the change process for my own position.	*30. It is clear what are the personnel consequences of the change process in my department.*	*31. It is clear what are the financial consequences of the change process in my department.*	*32. It is clear what are the organisational consequences of the change process in my department.*	*33. It is clear what are the consequences of the changes to the content of the work in my department.*	
Score	*Fs29*	*Fs30*	*Fs31*	*Fs32*	*Fs33*	*Favg*
1	2	2	6	4	1	3,50
2	4	8	9	7	8	7,00
3	10	13	11	13	11	11,75
4	13	8	5	6	10	8,00
5	2	0	0	0	1	0,50



Control	*34. The management informs everyone in good time about upcoming developments.*	*35. The change process is divided into clear phases and is based on a clear change plan.*	*36. The people who direct the change process have the necessary knowledge and experience for this*	
Mean	3,290	2,613	3,161	
Standard Error	0,192	0,158	0,180	
Median	4	3	3	
Mode	4	3	3	
Standard Deviation	1,071	0,882	1,003	
Sample Variance	1,146	0,778	1,006	
Kurtosis	-0,455	0,836	-0,087	
Skewness	-0,630	0,255	-0,344	
Range	4	4	4	
Minimum	1	1	1	
Maximum	5	5	5	
Sum	102	81	98	
Count	31	31	31	

Frequency of scores for Control

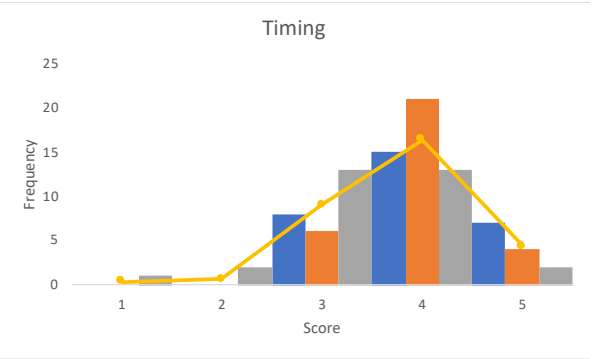
	34. The management informs everyone in good time about upcoming developments.	*35. The change process is divided into clear phases and is based on a clear change plan.*	*36. The people who direct the change process have the necessary knowledge and experience for this*	
Score	*Fs34*	*Fs35*	*Fs36*	*Favg*
1	2	3	2	2,33
2	6	10	5	7,00
3	6	15	12	11,00
4	15	2	10	9,00
5	2	1	2	1,67



Timing	*37. I am ready for this change.*	*38. I can keep up with the change process.*	*39. This change comes at the right time.*	
Mean	3,967	3,935	3,419	
Standard Error	0,131	0,103	0,152	
Median	4	4	3	
Mode	4	4	4	
Standard Deviation	0,718	0,574	0,848	
Sample Variance	0,516	0,329	0,718	
Kurtosis	-0,954	0,336	1,154	
Skewness	0,050	-0,015	-0,608	
Range	2	2	4	
Minimum	3	3	1	
Maximum	5	5	5	
Sum	119	122	106	
Count	30	31	31	

Frequency of scores for Timing

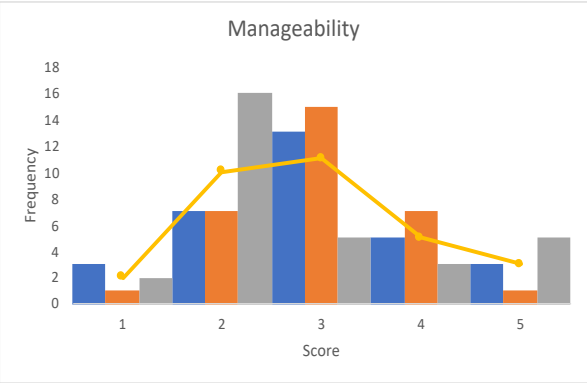
	37. I am ready for this change.	*38. I can keep up with the change process.*	*39. This change comes at the right time.*	
Score	*Fs37*	*Fs38*	*Fs39*	*Favg*
1	0	0	1	0,33
2	0	0	2	0,67
3	8	6	13	9,00
4	15	21	13	16,33
5	7	4	2	4,33



Manageability	*40. I consider the change complex to implement.*	*41. The success of the change process depends on external factors that are difficult to manage.*	*42. Successful implementation of the changes depends on resources (time, money, knowledge) that are scarce in our organisation.*	
Mean	2,935	3,000	2,774	
Standard Error	0,196	0,154	0,221	
Median	3	3	2	
Mode	3	3	2	
Standard Deviation	1,093	0,856	1,230	
Sample Variance	1,196	0,733	1,514	
Kurtosis	-0,238	0,158	-0,570	
Skewness	0,135	0,000	0,806	
Range	4	4	4	
Minimum	1	1	1	
Maximum	5	5	5	
Sum	91	93	86	
Count	31	31	31	

Frequency of scores for Manageability

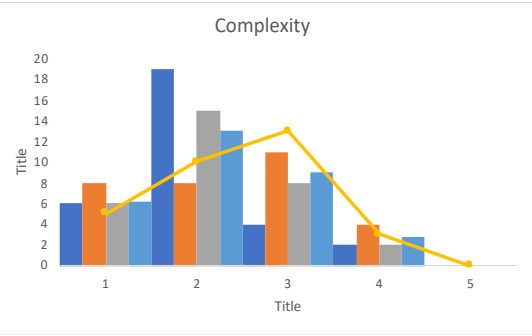
	40. I consider the change complex to implement.	*41. The success of the change process depends on external factors that are difficult to manage.*	*42. Successful implementation of the changes depends on resources (time, money, knowledge) that are scarce in our organisation.*	
Score	*Fs40*	*Fs41*	*Fs42*	*Favg*
1	3	1	2	2,00
2	7	7	16	10,00
3	13	15	5	11,00
4	5	7	3	5,00
5	3	1	5	3,00



Complexity of the change process	*43. The change will have a great impact on the position of your organisation in the market*	*44. The change will have a great impact on the way decisions are made within your organisation*	*45. The change will have a great impact on the content of the work of your employees/colleagues*	*46. The change will have a great impact in the way your organisation is run*	
Mean	2,065	2,355	2,194	2,452	
Standard Error	0,139	0,183	0,150	0,160	
Median	2	2	2	3	
Mode	2	3	2	3	
Standard Deviation	0,772	1,018	0,833	0,888	
Sample Variance	0,596	1,037	0,695	0,789	
Kurtosis	1,131	-1,116	-0,213	-0,642	
Skewness	0,816	0,017	0,349	-0,149	
Range	3	3	3	3	
Minimum	1	1	1	1	
Maximum	4	4	4	4	
Sum	64	73	68	76	
Count	31	31	31	31	

Frequency of scores for Complexity of the change process

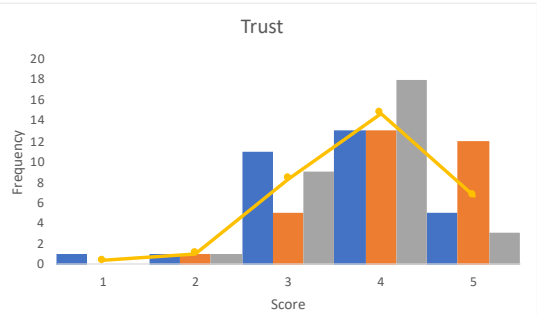
Score	*43. The change will have a great impact on the position of your organisation in the market* *Fs43*	*44. The change will have a great impact on the way decisions are made within your organisation* *Fs44*	*45. The change will have a great impact on the content of the work of your employees/colleagues* *Fs45*	*46. The change will have a great impact in the way your organisation is run* *Fs46*	*Favg*
1	6	8	6	5	6,25
2	19	8	15	10	13,00
3	4	11	8	13	9,00
4	2	4	2	3	2,75
5	0	0	0	0	0,00



Trust	*47. I have confidence in management to make the right (strategic) choices*	*48. I trust that the management wants the best for the organisation*	*49. I have confidence in the successful outcome of this change process*	
Mean	3,645	4,161	3,742	
Standard Error	0,164	0,147	0,122	
Median	4	4	4	
Mode	4	4	4	
Standard Deviation	0,915	0,820	0,682	
Sample Variance	0,837	0,673	0,465	
Kurtosis	1,053	-0,012	0,361	
Skewness	-0,601	-0,703	-0,301	
Range	4	3	3	
Minimum	1	2	2	
Maximum	5	5	5	
Sum	113	129	116	
Count	31	31	31	

Frequency of scores for Trust

	47. I have confidence in management to make the right (strategic) choices	*48. I trust that the management wants the best for the organisation*	*49. I have confidence in the successful outcome of this change process*	
Score	*Fs47*	*Fs48*	*Fs49*	*Favg*
1	1	0	0	0,33
2	1	1	1	1,00
3	11	5	9	8,33
4	13	13	18	14,67
5	5	12	3	6,67



Appendix 3

1. HREC approval letter

Date 06-Oct-2022
Contact person Dr. Cath Cotton, Policy Advisor Academic Integrity
E-mail c.m.cotton@tudelft.nl

Human Research Ethics Committee
TU Delft
(http://hrec.tudelft.nl/)

Visiting address
Jaffalaan 5 (building 31)
2628 BX Delft

Postal address
P.O. Box 5015 2600 GA Delft
The Netherlands

Ethics Approval Application: Sustainability in Project Management
Applicant: Nevostrueva, Anna

Dear Anna Nevostrueva,

It is a pleasure to inform you that your application mentioned above has been approved.

Thanks very much for your submission to the HREC which has been conditionally approved. Please note that this approval is subject to your ensuring that the following conditions are fulfilled:

- Please make sure that mitigation measures for points 5 and 6 are in place before conducting the interviews.
- Make sure the informed consent form specifies any residual risks for participants.

Good luck with your research!

Sincerely,

Dr. Ir. U. Pesch
Chair HREC
Faculty of Technology, Policy and Management

2. 4_RT-revisions template_2022 signed

Delft University of Technology
HUMAN RESEARCH ETHICS
REVISIONS TEMPLATE
(Version: January 2022)

This revisions template should be used to address queries raised by the Human Research Ethics Committee (HREC) in an ongoing ethics approval and uploaded into your live submission.

If you have any questions about your applying for HREC approval which are not dealt with on the Research Ethics webpages, please contact HREC@tudelft.nl

I. **Response to HREC queries:**

Query 1:

HREC Query	1) The internship dates in the checklist and the contract do not align. Is this a retrospective application?
Response	The internship has ended but the thesis project is still ongoing. I have a spoken agreement with supervisors in the company to launch the survey later.

Query 2:

HREC Query	2) Please use a different tool than Google Forms due to privacy and security risks; https://teaching-support.tudelft.nl/educational-tooling/
Response	The tool is switched to the Microsoft forms as one of suggested tools by the teaching support.

Query 3:

HREC Query	3) Could you please elaborate on questions 5 and 6?
Response	The survey is intended for the Project Managers from a department which includes offices in the Netherlands and Nigeria. Also, since the Asia Pacific offices are now actively involved in several large projects and trying to integrate sustainability in their work, in agreement with the Director of Advisory Group Vietnam, it was decided to include the Vietnam office in the survey participators list. Therefore, answering questions 5 and 6, I mentioned possible risks for the participants from the countries of Nigeria and Vietnam.

Query 4:

HREC Query	4) Please make it is clear in the Opening Statement that the internship provider does not have access to the raw data.
Response	Sentence {*None of the raw data will be shared with the employer}* added in the Opening Statement.

Please add more rows if necessary

II. **Signature/s**

Please note that by signing this checklist list as the sole, or Responsible, researcher you are providing approval of the completeness and quality of the submission, as well as confirming alignment between GDPR, Data Management and Informed Consent requirements.

Name of Corresponding Researcher (if different from the Responsible Researcher) (print)
Anna Nevostrueva

Signature of Corresponding Researcher: 

Date: 26.09.2022

Name of Responsible Researcher (print)
Daan Schraven

Signature (or upload consent by mail) Responsible Researcher: 

Date: 26.09.2022

3. HREC checklist

Delft University of Technology
HUMAN RESEARCH ETHICS
CHECKLIST FOR HUMAN RESEARCH
(Version January 2022)

IMPORTANT NOTES ON PREPARING THIS CHECKLIST

1. An HREC application should be submitted for every research study that involves human participants (as Research Subjects) carried out by TU Delft researchers
2. Your HREC application should be submitted and approved **before** potential participants are approached to take part in your study
3. All submissions from Master's Students for their research thesis need approval from the relevant Responsible Researcher
4. The Responsible Researcher must indicate their approval of the completeness and quality of the submission by signing and dating this form OR by providing approval to the corresponding researcher via email (included as a PDF with the full HREC submission)
5. There are various aspects of human research compliance which fall outside of the remit of the HREC, but which must be in place to obtain HREC approval. These often require input from internal or external experts such as Faculty Data Stewards, Faculty HSE advisors, the TU Delft Privacy Team or external Medical research partners.
6. You can find detailed guidance on completing your HREC application here
7. Please note that incomplete submissions (whether in terms of documentation or the information provided therein) will be returned for completion **prior to any assessment**
8. If you have any feedback on any aspect of the HREC approval tools and/or process you can leave your comments here

I. Applicant Information

PROJECT TITLE:	**Sustainability in Project Management**
Research period: *Over what period of time will this specific part of the research take place*	**June 2022 – November 2022**
Faculty:	**Faculty of Civil Engineering and Geosciences**
Department:	**Materials, Mechanics, Management & Design (3MD)**
Type of the research project: *(Bachelor's, Master's, DreamTeam, PhD, PostDoc, Senior Researcher, Organisational etc.)*	**Master's thesis**
Funder of research: *(EU, NWO, TUD, other – in which case please elaborate)*	
Name of Corresponding Researcher: *(If different from the Responsible Researcher)*	**Anna Nevostrueva**
E-mail Corresponding Researcher: *(If different from the Responsible Researcher)*	**A.M.Nevostrueva@student.tudelft.nl**
Position of Corresponding Researcher: *(Masters, DreamTeam, PhD, PostDoc, Assistant/ Associate/ Full Professor)*	**Master's student**
Name of Responsible Researcher: ***Note:** all student work must have a named Responsible Researcher to approve, sign and submit this application*	**Daan Schraven**
E-mail of Responsible Researcher: *Please ensure that an institutional email address (**no Gmail, Yahoo, etc.**) is used for all project documentation/ communications including Informed Consent materials*	**D.F.J.Schraven@tudelft.nl**
Position of Responsible Researcher : *(PhD, PostDoc, Associate/ Assistant/ Full Professor)*	**Assistant Professor**

II. Research Overview

***NOTE:** You can find more guidance on completing this checklist here*

a) Please summarise your research very briefly (100-200 words)

What are you looking into, who is involved, how many participants there will be, how they will be recruited and what are they expected to do?

Add your text here – (please avoid jargon and abbrevations)
This survey is intended for the Project Managers of one business line in an independent consultancy firm. The expected number of participants is 110 employees located in three countries. The survey aims to evaluate Project Managers' 'willingness to change'. Here, the 'willingness to change' means willingness to adopt and implement sustainability - the core element of a new strategy introduced by the top management of the company in April 2022. The participants are expected to answer 7 demographic questions, 49 questions dedicated to factors influencing willingness to change and 3 open questions allowing to bring up the problems concerning the change process which were not covered by the questionnaire. The survey will be launched online via email providing the link to Microsoft Forms.

b) **If your application is an additional project** related to an existing approved HREC submission, please provide a brief explanation including the existing relevant HREC submission number/s.

Add your text here – (please avoid jargon and abbrevations)

c) **If your application is a simple extension of, or amendment to,** an existing approved HREC submission, you can simply submit an HREC Amendment Form as a submission through LabServant.

III. Risk Assessment and Mitigation Plan

NOTE: You can find more guidance on completing this checklist here

Please complete the following table in full for all points to which your answer is "yes". Bear in mind that the vast majority of projects involving human participants as Research Subjects also involve the collection of **Personally Identifiable Information (PII)** and/or **Personally Identifiable Research Data (PIRD)** which may pose potential risks to participants as detailed in Section G: Data Processing and Privacy below.

To ensure alignment between your risk assessment, data management and what you agree with your Research Subjects you can use the last two columns in the table below to refer to specific points in your Data Management Plan (DMP) and Informed Consent Form (ICF) – **but this is not compulsory**.

It's worth noting that **you're much more likely to need to resubmit your application if you neglect to identify potential risks**, than if you identify a potential risk and demonstrate how you will mitigate it. If necessary, the HREC will always work with you and colleagues in the Privacy Team and Data Management Services to see how, if at all possible, your research can be conducted.

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
A: Partners and collaboration						
1. Will the research be carried out in collaboration with additional organisational partners such as: • One or more collaborating research and/or commercial organisations • Either a research, or a work experience internship provider[1] [1] *If yes, please include the graduation agreement in this application*	**yes**		**Internship provider surveys their employees, which can expose participant to a risk of being judged by their responces.**	All data is collected exclusively by the researcher. Raw data will not be shared with the internship provider and will be deleted when the research project is complete. Any sensitive information will be deleted by the researcher, only aggregated anonymous results will be shared.		
2. Is this research dependent on a Data Transfer or Processing Agreement with a collaborating partner or third party supplier? *If yes please provide a copy of the signed DTA/DPA*		**no**				
3. Has this research been approved by another (external) research ethics committee (e.g.: HREC and/or MREC/METC)? *If yes, please provide a copy of the approval (if possible) and summarise any key points in your Risk Management section below*		**no**				
B: Location						

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
4. Will the research take place in a country or countries, other than the Netherlands, within the EU?		**no**				
5. Will the research take place in a country or countries outside the EU?	**yes**		**Different legislative requirements may apply in Vietnam and Nigeria.**	Consult, notify and gain approval for the research from the relevant local bodies. Check with local company's representatives.		
6. Will the research take place in a place/region or of higher risk – including known dangerous locations (in any country) or locations with non-democratic regimes?	**yes**		**Ethical acceptability of the research.** **Safeguard of participants.**	Make sure there is no potential risk involved with the questions, data collection, storage and access. No sensitive questions included. Online survey is sent via internet, researcher is not going to the countries physically.		
C: Participants						
7. Will the study involve participants who **may** be vulnerable and possibly (legally) unable to give informed consent? (e.g., children below the legal age for giving consent, people with learning difficulties, people living in care or nursing homes,).		**no**				
8. Will the study involve participants who **may** be vulnerable under specific circumstances and in specific contexts, such as victims and witnesses of violence, including domestic violence; sex workers; members of minority groups, refugees, irregular migrants or dissidents?		**no**				
9. Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator (such as own children, own students or employees of either TU Delft and/or a collaborating partner organisation)? *It is essential that you safeguard against possible adverse consequences of this situation (such as allowing a student's failure to participate to your satisfaction to affect your evaluation of their coursework).*		**no**				
10. Is there a high possibility of re-identification for your participants? (e.g., do they have a very specialist job of which there are only a small number in a given country, are they members of a small community, or employees from a partner company collaborating in the research? Or are they one of only a handful of (expert) participants in the study?	**yes**		**Specific focus group, in some countries there are a handful of people in that capacity, which can cause a possibility to re-identification**	Avoid describing people in a way that will enable re-identification (ex.: the title of their job can be renamed; the country can't be named)		
D: Recruiting Participants						
11. Will your participants be recruited through your own, professional, channels such as conference attendance lists, or through specific network/s such as self-help groups	**yes**		**Selecting participants may lead to collecting unintended personal data and/or possible reidentification**	In Informed Consent included both that participation is voluntary and that participants can withdraw at any point without adverse consequence.		

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
				Avoid describing people in a way that will enable re-identification (ex.: the title of their job can be renamed; the country can't be named)		
12. Will the participants be recruited or accessed in the longer term by a (legal or customary) gatekeeper? (e.g., an adult professional working with children; a community leader or family member who has this customary role – within or outside the EU; the data producer of a long-term cohort study)		**no**				
13. Will you be recruiting your participants through a crowd-sourcing service and/or involve a third party data-gathering service, such as a survey platform?		**no**				
14. Will you be offering any financial, or other, remuneration to participants, and might this induce or bias participation?		**no**				
E: Subject Matter *Research related to medical questions/health may require special attention. See also the website of the CCMO before contacting the HREC.*						
15. Will your research involve any of the following: • Medical research and/or clinical trials • Invasive sampling and/or medical imaging • Medical and *In Vitro Diagnostic Medical* Devices Research		**no**				
16. Will drugs, placebos, or other substances (e.g., drinks, foods, food or drink constituents, dietary supplements) be administered to the study participants? *If yes see here to determine whether medical ethical approval is required*		**no**				
17. Will blood or tissue samples be obtained from participants? *If yes see here to determine whether medical ethical approval is required*		**no**				
18. Does the study risk causing psychological stress or anxiety beyond that normally encountered by the participants in their life outside research?		**no**				
19. Will the study involve discussion of personal sensitive data which could put participants at increased legal, financial, reputational, security or other risk? (e.g., financial data, location data, data relating to children or other vulnerable groups) *Definitions of sensitive personal data, and special cases are provided on the TUD Privacy Team website.*		**no**				
20. Will the study involve disclosing commercially or professionally sensitive, or confidential information? (e.g., relating to decision-making processes or business strategies which might, for example, be of interest to competitors)		**no**				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
21. Has your study been identified by the TU Delft Privacy Team as requiring a Data Processing Impact Assessment (DPIA)? *If yes please attach the advice/ approval from the Privacy Team to this application*		**no**				
22. Does your research investigate causes or areas of conflict? *If yes please confirm that your fieldwork has been discussed with the appropriate safety/security advisors and approved by your Department/Faculty.*		**no**				
23. Does your research involve observing illegal activities or data processed or provided by authorities responsible for preventing, investigating, detecting or prosecuting criminal offences *If so please confirm that your work has been discussed with the appropriate legal advisors and approved by your Department/Faculty.*		**no**				
F: Research Methods						
24. Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people in non-public places).		**no**				
25. Will the study involve actively deceiving the participants? (For example, will participants be deliberately falsely informed, will information be withheld from them or will they be misled in such a way that they are likely to object or show unease when debriefed about the study).		**no**				
26. Is pain or more than mild discomfort likely to result from the study? And/or could your research activity cause an accident involving (non-) participants?		**no**				
27. Will the experiment involve the use of devices that are not 'CE' certified? *Only, if 'yes': continue with the following questions:*		**no**				
• Was the device built in-house?						
• Was it inspected by a safety expert at TU Delft? *If yes, please provide a signed device report*						
• If it was not built in-house and not CE-certified, was it inspected by some other, qualified authority in safety and approved? *If yes, please provide records of the inspection*						
28. Will your research involve face-to-face encounters with your participants and if so how will you assess and address Covid considerations?		**no**				
29. Will your research involve **either:** a) "big data", combined datasets, new data-gathering or new data-merging techniques which might lead to re-identification of your participants **and/or**		**no**				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
b) artificial intelligence or algorithm training where, for example biased datasets could lead to biased outcomes?						
G: Data Processing and Privacy						
30. Will the research involve collecting, processing and/or storing any directly identifiable PII (Personally Identifiable Information) including name or email address that will be used for administrative purposes only? (eg: obtaining Informed Consent or disbursing remuneration)		**no**				
31. Will the research involve collecting, processing and/or storing any directly or indirectly identifiable PIRD (Personally Identifiable Research Data) including videos, pictures, IP address, gender, age etc and **what other Personal Research Data** (including personal or professional views) will you be collecting?	**yes**		**Loss or misuse of personally identifiable data**	Use as little personal data as possible (only age and gender). Disable collection of personal data(email, IP addresses) by the survey platform. Ask explicitly for consent Identifiers of an individual will be removed; data will be anonymised		
32. Will this research involve collecting data from the internet, social media and/or publicly available datasets which have been originally contributed by human participants		**no**				
33. Will your research findings be published in one or more forms in the public domain, as e.g., Masters thesis, journal publication, conference presentation or wider public dissemination?	**yes**		**Unauthorised data collection and sharing** **Published results may impact the image of the company**	All personal data will be deleted. Data sharing conditions are to be discussed and agreed with the research internship provider. The information used in the final thesis report will be reviewed by the research internship provider and permission to publish this information in open source will be obtained.		
34. Will your research data be archived for re-use and/or teaching in an open, private or semi-open archive?	**yes**					

H: More on Informed Consent and Data Management

NOTE: *You can find guidance and templates for preparing your Informed Consent materials) here*

Your research involves human participants as Research Subjects if you are recruiting them or actively involving or influencing, manipulating or directing them in any way in your research activities. This means you must seek informed consent and agree/ implement appropriate safeguards regardless of whether you are collecting any PIRD.

Where you are also collecting PIRD, and using Informed Consent as the legal basis for your research, you need to also make sure that your IC materials are clear on any related risks and the mitigating measures you will take – including through responsible data management.

Got a comment on this checklist or the HREC process? You can leave your comments here

IV. Signature/s

Please note that by signing this checklist list as the sole, or Responsible, researcher you are providing approval of the completeness and quality of the submission, as well as confirming alignment between GDPR, Data Management and Informed Consent requirements.

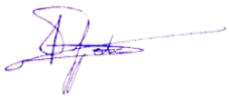
Name of Corresponding Researcher (if different from the Responsible Researcher) (print)
Anna Nevostrueva

Signature of Corresponding Researcher:

Date: 26-09-2022

Name of Responsible Researcher (print)
Daan Schraven

Signature (or upload consent by mail) Responsible Researcher:



Date:26-09-2022

V. Completing your HREC application

Please use the following list to check that you have provided all relevant documentation

Required:

- **Always:** This completed HREC checklist
- **Always:** A data management plan (reviewed, where necessary, by a data-steward)
- **Usually:** A complete Informed Consent form (including Participant Information) and/or Opening Statement (for online consent)

Please also attach any of the following, if relevant to your research:

Document or approval	Contact/s
Full Research Ethics Application	After the assessment of your initial application **HREC will let you know if and when you need to submit additional information**
Signed, valid Device Report	Your Faculty HSE advisor
Ethics approval from an external Medical Committee	TU Delft Policy Advisor, Medical (Devices) Research
Ethics approval from an external Research Ethics Committee	Please append, if possible, with your submission
Approved Data Transfer or Data Processing Agreement	Your Faculty Data Steward and/or TU Delft Privacy Team
Approved Graduation Agreement	Your Master's thesis supervisor
Data Processing Impact Assessment (DPIA)	TU Delft Privacy Team
Other specific requirement	Please reference/explain in your checklist and append with your submission

MSc Thesis: Sustainability in Project Management

0. Administrative questions

1. Name of data management support staff consulted during the preparation of this plan.

Data Steward Coordinator, Yan Wang, reviewed this DMP on 24-08-2022 and 30-08-2022. Data Steward of CEG faculty Lora Armstrong reviewed this DMP on 31-08-2022.

2. Date of consultation with support staff.

2022-08-31

I. Data description and collection or re-use of existing data

3. Provide a general description of the type of data you will be working with, including any re-used data:

Type of data	File format(s)	How will data be collected (for re-used data: source and terms of use)?	Purpose of processing	Storage location	Who will have access to the data
Age, occupation, etc	.csv files	Online survey		local storage on the researcher's hard drive, TU Delft provided OneDrive	The company in anonymous aggregated form; the graduation committee under a confidentiality agreement
Likert responses to survey on willingness to change	.csv files	Online survey		local storage on the researcher's hard drive, TU Delft provided OneDrive	The company in anonymous aggregated form; the graduation committee under a confidentiality agreement

4. How much data storage will you require during the project lifetime?

- < 250 GB

II. Documentation and data quality

5. What documentation will accompany data?

- Other - explain below
- Data dictionary explaining the variables used
- Methodology of data collection

Data will be processed in a manuscript which will be shared in the TUD educational repository

III. Storage and backup during research process

6. Where will the data (and code, if applicable) be stored and backed-up during the project lifetime?

- Another storage system - please explain below, including provided security measures
- OneDrive

1. TU Delft provided OneDrive
2. Hard drive, access protected by a password.

IV. Legal and ethical requirements, codes of conduct

7. Does your research involve human subjects or 3rd party datasets collected from human participants?

- Yes

8A. Will you work with personal data? (information about an identified or identifiable natural person)

If you are not sure which option to select, ask your Faculty Data Steward for advice. You can also check with the privacy website or contact the privacy team: privacy-tud@tudelft.nl

- Yes

Demographic data in first seven questions

8B. Will you work with any other types of confidential or classified data or code as listed below? (tick all that apply)

If you are not sure which option to select, ask your Faculty Data Steward for advice.

- No, I will not work with any confidential or classified data/code

9. How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your Faculty Contract Manager when answering this question. If this is not the case, you can use the example below.

Will be managed by the main researcher. Will be shared only by request with graduation committee.

10. Which personal data will you process? Tick all that apply

- Other types of personal data - please explain below
- Email addresses and/or other addresses for digital communication
- Gender, date of birth and/or age

Educational and job backgrounds

11. Please list the categories of data subjects

Employees of a consultancy firm in the construction industry, from three offices in the Netherlands, Vietnam and Nigeria.

12. Will you be sharing personal data with individuals/organisations outside of the EEA (European Economic Area)?

- No

15. What is the legal ground for personal data processing?

- Informed consent

In the survey, it is explained before the actual participation that the participants provide consent to the data management plan when they send the survey. The data collection and analysis are explained to them before they commence the survey.

16. Please describe the informed consent procedure you will follow:

In the survey, it is explained before the actual participation that the participants provide consent to the data management plan when they send the survey. The data collection and analysis, and the fact that aggregated anonymous results will be shared with the company are explained to them before they commence the survey.

17. Where will you store the signed consent forms?

- Same storage solutions as explained in question 6

The consent will be separated from the survey results and stored in a secure location.

18. Does the processing of the personal data result in a high risk to the data subjects?

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data during your research (check all that apply).
If two or more of the options listed below apply, you will have to complete the DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to receive support with DPIA.
If only one of the options listed below applies, your project might need a DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to get advice as to whether DPIA is necessary.
If you have any additional comments, please add them in the box below.

- None of the above applies

Data is entered in the online survey anonymously and no personal risk is involved.
The nature of the questions is not high risk.

22. What will happen with personal research data after the end of the research project?

- Personal research data will be destroyed after the end of the research project
- Anonymised or aggregated data will be shared with others

23. How long will (pseudonymised) personal data be stored for?

- 10 years or more, in accordance with the TU Delft Research Data Framework Policy

24. What is the purpose of sharing personal data?

- For research purposes, which are in-line with the original research purpose for which data have been collected

No personal data will be shared, only anonymised data will be shared for the research purposes

25. Will your study participants be asked for their consent for data sharing?

- Yes, in consent form - please explain below what you will do with data from participants who did not consent to data sharing

Before participating in the survey and offering consent it will be explained in the introduction page.

V. Data sharing and long-term preservation

27. Apart from personal data mentioned in question 22, will any other data be publicly shared?

- All other non-personal data (and code) underlying published articles / reports / theses

The question is understood as referring to all data analysed as part of the MSc thesis which will be published on the TUD repository including Appendixes with raw data

29. How will you share research data (and code), including the one mentioned in question 22?

- My data will be shared in a different way - please explain below

The main researcher that publishes the data will seek explicit consent from all participating organisations. The data will be shared in the educational repository in a form of an MSc Thesis report including Appendixes.

30. How much of your data will be shared in a research data repository?

- < 100 GB

31. When will the data (or code) be shared?

- As soon as corresponding results (papers, theses, reports) are published

32. Under what licence will be the data/code released?

- CC BY

Goes only to the TUD educational repository

VI. Data management responsibilities and resources

33. Is TU Delft the lead institution for this project?

- Yes, the only institution involved

34. If you leave TU Delft (or are unavailable), who is going to be responsible for the data resulting from this project?

I retain the rights to the published work. Questions about the data can be stated to the graduation committee members from TUD: D.F.J.Schraven@tudelft.nl; E.J.Houwing@tudelft.nl

35. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

Data management is performed by the researcher, with no costs involved. Publishing the data has no cost either (within the threshold for 4TU. ResearchData)