

**PROMOTING SUSTAINABILITY IN A
CONSTRUCTION COMPANY WITH THE FOCUS ON
COMPETENCE DEVELOPMENT - PERSPECTIVES OF
PRODUCTION**

**Jyväskylä University
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Master's Thesis

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ABSTRACT

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<p>These days climate change and other global crises affect extensively to business, including construction business. Increasing demands in sustainability create needs for multidisciplinary development of competences in business as well as in other sectors of society. The learning capability of an organisation together with motivation of individuals and management builds the foundation for systematic development of sustainability competences. The case study was conducted by interviewing people who work with management of construction production. As a result aspects affecting sustainability competence development, means for developing sustainability competences and topics for competence development in production and in other parts of the organisation were found. According to the results, interactive leadership, motivating through objectives and incorporating sustainability in processes should be considered when managing sustainability. Promoting sustainability in an organisation requires the management of sustainability and similarly it is a prerequisite for the development of sustainability competences. Based on the results other means for promoting sustainability were identified, such as influencing stakeholders and integrating sustainability in business processes. In the construction sector there are still challenges in achieving sustainability: as an example, committing to clients' lower sustainability demands or rapidly evolving national and international legislation. The interviewees saw that sustainability will be in the future a more and more important viewpoint to consider in business and they also saw that the case company should be aiming at being a forerunner in it.</p>	
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TIIVISTELMÄ

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<p>Ilmastonmuutos ja muut globaalit kriisit vaikuttavat tänä päivänä laajasti liiketoimintaan, myös rakentamiseen. Kasvavat vastuullisuusvaatimukset luovat tarpeita monialaiselle osaamisen kehittämiselle niin liiketoiminnassa kuin muillakin yhteiskunnan alueilla. Organisaation kyvykkyys oppia luo pohjan systemaattiselle vastuullisuusosaamisen kehittämiselle yhdessä yksilöiden motivaation sekä johtamisen kanssa. Tapaustutkimus toteutettiin haastatteleamalla pääosin rakennustuotannon johtamisen parissa työskenteleviä henkilöitä ja tutkimuksen tuloksena löydettiin osaamisen kehittämisessä huomioon otettavia taustalla vaikuttavia seikkoja, keinoja kehittää vastuullisuusosaamista sekä vastuullisuusosaamisen kehittämisen aihepiirejä rakennustuotannossa ja muualla organisaatiossa. Vastuullisuuden johtamisessa on tulosten mukaan huomioitava vuorovaikutuksellisuus, motivointi tavoitteiden kautta sekä johtamisen integroiminen liiketoimintaprosesseihin. Vastuullisuuden johtaminen on edellytys vastuullisuuden edistämiseksi organisaatiossa, niin kuin myös vastuullisuusosaamisen kehittämiselle. Lisäksi tutkimuksessa tunnistettiin useita muita keinoja edistää vastuullisuutta, kuten sidosryhmiin vaikuttaminen sekä vastuullisuuden sisällyttäminen liiketoimintaprosesseihin. Vastuullisuuden saavuttamiseen rakennusalalla liittyy myös haasteita, kuten asiakkaiden asettamiin vaatimuksiin sitoutuminen, vaikka ne eivät yltäisi yrityksen omien vastuullisuustavoitteiden tasolle, sekä nopeasti kehittyvä kansallinen ja kansainvälinen vastuullisuuslainsäädäntö. Haastateltavat näkivät vastuullisuuden olevan tulevaisuudessa yhä vahvemmin liiketoiminnassa huomioitava näkökulma, jonka mukaisessa toiminnassa tapausyrityksen tulisi pyrkiä olemaan edelläkävijä.</p>	
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CONTENTS

ABSTRACT.....	2
TIIVISTELMÄ (ABSTRACT IN FINNISH).....	3
LIST OF TABLES AND FIGURES.....	6
1 INTRODUCTION	7
1.1 Background	7
1.2 Reason for the study	8
1.3 Objectives and research questions.....	9
1.4 Structure of the research report.....	10
2 PROMOTING SUSTAINABILITY IN A CONSTRUCTION COMPANY..	11
2.1 Organisational learning.....	11
2.2 Conditions for promoting sustainability	13
2.3 Management of sustainability.....	14
2.3.1 Sustainability management.....	14
2.3.2 Sustainable project management.....	16
3 SUSTAINABILITY COMPETENCE DEVELOPMENT.....	18
3.1 Sustainability competences	18
3.2 The importance of developing sustainability competences	20
3.3 Development of sustainability competences	20
4 DATA AND METHODOLOGY	25
4.1 Case study	25
4.2 Studied case: sustainability perceptions of production personnel in YIT Business Premises and Infrastructure segments – focus on sustainability competence development.....	26
4.3 Data collection.....	28
4.4 Data analysis	30
5 RESULTS.....	31
5.1 Sustainability competence development	31
5.1.1 On the background of sustainability competence development. 31	
5.1.2 Topics of sustainability competence development.....	34
5.1.2.1 Topics in which competences are already at a decent level 35	
5.1.2.2 Topics in which competences should be developed	36
5.1.3 Means for developing sustainability competence.....	37
5.1.4 Summary of production perceptions about sustainability competence development	40
5.2 Sustainability management.....	42
5.3 Developing the construction business towards sustainability.....	45

5.3.1	Other concrete means for promoting sustainability	45
5.3.2	Background factors promoting sustainability	47
5.3.3	Challenges in achieving sustainability.....	52
5.3.4	Characteristics of a sustainable construction project.....	55
5.4	Summary of results.....	57
6	DISCUSSION AND CONCLUSIONS	60
6.1	Connections between the literature and results.....	60
6.2	Recommendations for the case company	62
6.3	Limitations of the research.....	63
6.4	Future research recommendations	64
6.5	Conclusions	64
	REFERENCES.....	66
	APPENDICES.....	73

LIST OF TABLES AND FIGURES

TABLE 1	Interview groups of representatives of the case company	29
FIGURE 1	Research questions	9
FIGURE 2	YIT strategy 2022-2025	27
FIGURE 3	Factors affecting sustainability competence development	32
FIGURE 4	Sustainability topics for competence development	34
FIGURE 5	Means for development of sustainability competences	38
FIGURE 6	Model of sustainability competence development	41
FIGURE 7	Sustainability management	42
FIGURE 8	Concrete means for promoting sustainability in construction ..	45
FIGURE 9	Background factors of promoting sustainability	48
FIGURE 10	Challenges achieving sustainability	52
FIGURE 11	Sustainable construction project	56
FIGURE 12	Illustration of results	59
FIGURE 13	Recommendations for the case company	63

1 INTRODUCTION

1.1 Background

Sustainability has been lately a hot topic in the construction sector and the influence of the topic is spreading all the time among the companies. Clients are already demanding sustainability related aspects in their tender requests and new professions of sustainability experts are established in companies. Also, investors are interested about how their investments contribute to climate change and is there perhaps higher returns in sustainable investments.

Sustainable Development Goals (SDG) are presented by United Nations (UN, 2015) to guide the actions taken for people, planet and prosperity. The purposes of SDG's include ending poverty and hunger, protecting the planet from defilement and fostering peaceful and inclusive societies. SDG framework includes goals such as climate action, sustainable cities and communities, industry, innovation and infrastructure, good health and well-being, and life below water (UN, 2023). The setting of worldwide goals for sustainability indicates the importance for taking actions towards sustainability, also in business context. The Science Based Targets initiative (SBTi) is a global group of organisations which help businesses to set emission reduction targets which are ambitious and based on climate science (SBTi, 2023). The establishment of such an initiative can be seen highlighting the importance of businesses to get involved to tackling sustainability together with nations and non-governmental organisation.

Construction sector is in response of about one third of all waste (European Commission, 2014), almost 40 % of all of the energy consumed in Finland and more than 30 % of greenhouse emissions (Rakennusteollisuus, n.d.d). Especially from the environmental sustainability side, construction sector is a significant sector when it comes to developing actions towards sustainability. Due to new stricter regulation affecting to construction industry in Finland, there is pressure

to set more ambitious sustainability goals in construction companies and contribute to mitigation of climate change and biodiversity loss and sustainability of the value chain. One way to get involved to the solutions is to develop sustainability competences of personnel working with construction. As it is known that there will be a need for sustainable solutions in construction, the companies should consider is it better to be early and proactive or late and reactive.

1.2 Reason for the study

There is an increasing need for competence development in sustainability topics across organisations since sustainability is these days integrated into companies' business strategy. At the same time, outside pressure from regulation and customers are demanding faster actions to be taken towards sustainable future. Under these circumstances the case company regards that it is not enough to rely on certain group of sustainability specialists in the organisation and sustainability competences should be expanded to other employee groups too. The case company has created a carbon roadmap where different actions are gathered to fulfil the company's targets regarding carbon emissions. One of the defined actions is competence development of personnel in sustainability. Even though the carbon roadmap refers to reducing the company's carbon emissions, the company strategy includes social dimension of sustainability as well as good governance. Construction production can be seen as one of the employee groups where competences development activities should be placed. In construction production there is a great amount of personnel and multiple different topics where sustainability competences could be developed. There is a need to create an understanding of current situation in production and how they see competence development in that context. Since the production personnel of the case company is mainly participating in managing production activities in different levels of the projects it is justified to focus on managerial competences. However, the scope is not only limited to production personnel's sustainability competence development needs, also their perceptions and thoughts about company level sustainability performance development is searched.

Research topic of this master's thesis is how to promote sustainability in a construction company, and the focus of promotional activities is on sustainability competence as a means for promoting sustainability. Since the case company operates in the field of engineering and most of the employees are engineers, a thesis written from human perspective brings something a bit different from usually preferred technical and process perspective.

When it comes to the importance of this study, a research gap in the field of sustainability competence development can be identified. Sustainability in business context and sustainable management are researched thoroughly, as well as competence development but the combination of these topics is still missing in the field. According to Cullen (2020), there is not much research about how

managers as individuals learn responsible practices within the workplace. Preget (2023) further develops the learning theory in work setting into responsible management development. There was not found any research contributing exactly to the sustainability competence development of construction production personnel, which highlights the importance of this case study for the field.

1.3 Objectives and research questions

Objective of this study is to find out how production personnel perceive sustainability and sustainability competence development and what kind of experiences do they have regarding sustainability work and managing sustainability. The objective of the case company which have ordered this thesis study is to build knowledge about competence development in sustainability topics and based on the thesis to be able to plan and implement sustainability competence development activities and measurement. In addition, the company wanted to find out what could be done according to production in the company to promote sustainability, what aspects they see valuable in sustainability work, and how they perceive a current situation of sustainability and sustainability work within the case company. As a result, a framework of promoting sustainability with the focus of sustainability competence development for construction production is created. This thesis answers to two identified research questions, first building the theoretical framework and then the results of the case study. The research questions are presented in the Figure 1:



FIGURE 1 Research questions

The aim of the first research question is to survey attitudes and viewpoints of production on sustainability and sustainability competence development: *how*

sustainability and sustainability competence development is perceived in construction production. The aim is to present a comprehensive picture of their views about what should be done concretely, what should be taken into account when promoting sustainability, how sustainability should be managed and what kind of challenges sustainability promotion faces in production and more broadly in the whole organisation. The second research question is *how sustainability competences can be developed in construction production.* The aim is to identify the needed topics in which sustainability competences should be developed and which forms of competence development should be used to ensure competence development in sustainability. The first question is wider and observes sustainability of construction from the holistic angle while the second question directs the attention to the main focus of this thesis, sustainability competence development.

1.4 Structure of the research report

This master's thesis study has a following structure: in the first chapter an introduction for the topic, reasons for the study, objectives and research questions are presented to inform the reader what the purpose of this study is. Chapter two gives insights about promoting sustainability in a construction company starting from organisational learning, continuing to illustrate a picture of the construction field and its relation to sustainability, and finally describing sustainability management and going deeper to sustainable project management. In the chapter three the focus is on sustainability competence development, the importance of it and how it could be done in an organisation.

Data and methodology are presented in the fourth chapter: case study method is presented as well as the case company and its relation to sustainability. Data collection through focus group interviews and qualitative data analysis phase is described in order to clarify the research process. In the fifth chapter the results are presented starting from sustainability competence development model, continuing with sustainability management and ending to insights of other means for the promotion of sustainability in a construction company. Finally, in the sixth chapter discussion of the theory and case study results as well as suggestions for the case company and conclusions are made.

2 PROMOTING SUSTAINABILITY IN A CONSTRUCTION COMPANY

2.1 Organisational learning

Organisational learning is an ongoing process including organisation level, group level and individual level learning. It can be seen as one of the fundamentals for developing organisational sustainability because development of the organisation needs learning. According to Drejer (2000), competence development can be seen as a result of learning. Then again, process of learning can be understood as a result of reflective thought (Drejer, 2000). Argyris and Schön (1978) presents the concept of double-loop learning, which means that during the learning, basic assumptions behind the topic are changed, whereas in single-loop learning the assumptions are not changing and the foundation for improvement is weaker (Argyris & Schön, 1978). When learning happens in organisational context it is the individuals who become agents and influence the way other individuals in the organisation think, act and finally learn (Drejer, 2000.) Organisational culture favourable for educating and learning can be achieved when opinions of management support it and when employees have a subjective need for competence development, and they are motivated to participate in educations and other learning activities (Ellström & Kock, 2008).

Evenseth, Sydnes and Gausdal (2022) view organisational learning from the angle of organisational resilience, and they present connections between organisational learning and improving organisational resilience. According to Duchek (2020), organisational resilience includes the ability to prepare for potential threats, to cope effectively with emerging harmful issues and to adapt to changing situations. Evenseth et al. (2022) argue that the main elements of organisational learning for improvement of organisational resilience are learning from experience, a systemic approach in learning, informal and formal practices of learning, the ability to unlearn in organisation and a contextual basis for

learning (Evenseth et al., 2022). When it comes to organisational learning of sustainability, similarities can be seen with improving resilience: learning sustainability is also about preparing for potential threats regarding i.e. climate change or biodiversity, to coping effectively with harmful issues related to them, and adapting to changing situations for example in markets or changing weather conditions.

According to Evenseth et al. (2022), the value of unintentional organisational learning has been overlooked generally. To transform unintentional learning to explicit learning might require the organisation to be flexible and attentive to be able to notice the opportunities of learning which enables collecting, transferring and sharing knowledge. Unlearning from old practices and knowledge which does not favour the organisation anymore was highlighted by Evenseth et al. (2022) since it enables constructing new and more relevant knowledge in organisation. According to Melissen et al. (2016) assimilation means reducing unsustainability of existing practices and activities. In order to transformation to take place, its prerequisite is to unlearn from existing unsustainable practices and creating structures for sustainability (Dzhengiz & Niesten, 2020). Evenseth et al. (2022) stress that effective learning in organisation requires a learning system which includes the variety of learning practices that are on the other hand flexible but on the other hand integrated in organisational processes. This kind of system for effective learning in organisation seems to be critical also in terms of organisational resilience since learning must be transformed into resilience capabilities (Evenseth et al., 2022). Adopting a new way of thinking through sustainability must also need unlearning from old practices to be able to see and create new kind of knowledge and ideas contributing to a more sustainable future.

Dzhengiz and Niesten (2020) have a different viewpoint for organisational learning, and they combine the concepts of organisational learning and responsible management together and show how managers' environmental competences contribute to the organisation-level environmental capabilities. They analyse also further how organisational level environmental capabilities may help managers with developing their individual level environmental competences. Dzhengiz and Niesten (2020) have used a multi-level learning process called absorptive capacity to explain deeper the connections between responsible management and organisational learning. Absorptive capacity is a holistic and dynamic capability which consists of multiple dimensions of learning: it links personal learning to competence development and similarly links learning in organisation to the capability development (Sun & Anderson, 2008). According to Gluch et al. (2009), absorptive capacity conceptualises the individual acquisition of external knowledge and transformation of it into capabilities of an organisation. When it comes to organisational learning, three dimensions of absorptive capacity are related and develop organisational capabilities: knowledge assimilation, knowledge transformation and exploitation of external knowledge (Todorova & Durisin, 2007). Dzhengiz and Niesten (2020) define in the light of previous research that environmental

capabilities are organisational abilities to reduce the damage or create benefits for natural environment, and at the same time manage the contradictory bottom lines of environment and economy.

Organisational learning of sustainability in the context of a construction organisation must require at the same time adopting new ways of thinking towards sustainability but also unlearning from existing practices which are not promoting sustainability. When it comes to organisational resilience, organisational learning of sustainability seems to promote organisational resilience and enable coping with harms that nature and society are facing due to climate crisis and other sustainability threats. Organisational sustainability learning and promoting sustainability is affected by the conditions of construction field when it comes to sustainability. In the next section the conditions are touched to give create an understanding of the reality where sustainability is promoted.

2.2 Conditions for promoting sustainability

Gluch and Hellsvik (2023) have studied multiple logics affecting the work of sustainability professionals in construction sector. These partly contradictory logics and narratives created by them reveals the reality where sustainability is applied in construction business, not limiting only to sustainability professionals' work. The first narrative, 'thankless work', refers to the conditions where sustainability work is generally seen as something additional and something that belongs to someone else's responsibilities. Thankless work narrative aligns to construction project's logic which has the aim to inform and control the project. Project logic is short-term and ends often to short-term problem-solving and efficiency (Gluch, 2009). Governance logic, according to Gluch and Hellsvik (2023), refers to regulation, client's demands and certification schemes, and this is where sustainability activities are reasoned. The second narrative, 'rewarding collaborative work', describes the situation when sustainability work is considered to be essential to the delivery of a construction project. Rewarding collaborative work can be seen to include project and sustainability logics, but instead of among thankless work, both of the logics coexists and works together enabling fruitful sustainability work. Collaborative work also requires sustainability professionals to participate it in a construction project. The third narrative, 'visionary work', means advancing the sustainability agenda forward through challenging the current project management and business practice. Visionary work includes setting the sustainability agenda and reasoning and justifying the actions planned in the future. The logics in visionary work are corporate business logic and sustainability logics (Gluch & Hellsvik, 2023). Corporate business logic includes the idea of separating decentralised and temporary projects from permanent organisation (Dubois & Gadde, 2002). In corporate business logic sustainable business is developed through top-down goal-setting and strategic work, and various key performance indicators are

created to measurement and follow-up (Chan & Cooper, 2010). The presented logics and narratives characterise the contradictory environment of construction industry and projects where sustainability should be incorporated and developed but it is not often straightforward or natural due to the existing logics.

Another condition for sustainability work in a construction organisation is how 'green' the work climate is. Green work climate, according to Zientara and Zamojska (2018), includes workers' collective opinions about organisational practices, processes and strategies regarding environmental protection and is usually learned through interactive sensemaking among employees of a unit. It is possible to presume that when employees feel that they are working within green work climate, they are likely to get involved in pro-environmental initiatives on the construction site (Zientara & Zamojska, 2018). Yong et al. (2020) present that green work climate can influence positively on environmental sustainability in business. When an organisation, including its line managers, promote pro-environmental behaviour by providing a fruitful green work climate, it is more likely for employees to be more engaged with the organisation's sustainability goals (Raineri & Paillé, 2016). Onubi et al. (2023) concludes that green human competences can lead to the adoption of pro-environmental construction practices when there is green work climate. Since construction business is project business, green work climate can be experienced in some projects, and then again some projects might not have it. It seems that also participating sustainability competence development activities is affected by green work climate, and participants are more engaged if they work within green work climate.

2.3 Management of sustainability

2.3.1 Sustainability management

Sustainability management plays an essential role when organisational sustainability is decided to be developed in promoted. Without sustainability management the actions and practices towards sustainability are not coordinated and the management enables the sustainability work to be more systematically organised. Williams and her colleagues (2017) have identified eight different themes where systems thinking approach is used to understand sustainability management. Systems thinking approach to sustainability management is presented here because the whole construction industry can be seen deeply systemic and the systems thinking approach illustrates well what kind of management is needed when there are sustainability challenges to tackle. Holling (2001) presents systems thinking as a way to realise the complexity of systems, such as ecological, social and economic systems. As far as sustainability management is concerned, with applying systems thinking it is possible to identify where in a system positive change can be made (Holling, 2001). First, behavioural changes refer to the need for managers to understand

interconnections between elements of the system and the decisions made over time (Gao & Bansal, 2013). Behavioural changes play a key role in business transformation via taking concrete action and promoting systemic change (Marcus et al., 2010; Raivio, 2011).

Second theme, sustainability leadership, requires holistic perspective on the complex issues in organisations (Lozano, 2012). With holistic perspective a potential problem may occur with reducing and narrowing data for decision-making since holistic perspective requires often managing a great amount of complex information (Metcalf & Benn, 2012). In addition, leadership skills in maintaining a long-term focus (Boiral et al., 2014) and combining different viewpoints are seen to be important (Wong et al. 2011). Boirat et al. (2014) state that research on complex systems and leadership highlights resilience and unpredictability as well as the demand for adapting conflicting goals together (Boirat et al., 2014).

Third, managing sustainability-oriented innovations requires managers to understand the relationship between product, sustainable process and the innovation to manage business performance (Cheng et al., 2014). For instance, developing systemic understanding of supply chains can provide a fruitful ground for sustainability-oriented innovations (Isaksson et al., 2010). Bocken et al. (2014) presents that innovative business models and other firm innovations offer opportunities to thoroughly change the way a business creates, captures and delivers value. Fourth theme refers to industrial ecology (Williams et al., 2017). According to Ramaswami et al. (2012) transdisciplinary learning is needed when frameworks of interconnected industrial-social-ecological systems are built and developed.

Fifth theme includes social-ecological systems (Williams et al., 2017), which refers to an approach where systems are seen to have interconnections between society and business, and at the same time both are nested in natural systems (Marcus et al., 2010). In managerial context, if managers understand the complexity of social-ecological systems they have an opportunity to improve management (Kunz et al., 2013). Transition management is the sixth theme identified by Williams et al. (2017). In the research field of transition management, the purpose is to understand more deeply how long-term systems change and what is the process behind them (Rotmans & Loorbach, 2009).

Seventh theme, paradigm shifts, that is, changes in the world view are in a central position in promoting sustainability (Seiffert & Loch, 2005). Behind the management field paradigm shift, there are much wider shifts in the society as well (Valente, 2010). The last theme refers to education and how leaders could achieve the most useful understanding of sustainability as a holistic concept (Williams et al., 2017). The systemic approach for sustainability management illustrates how wide and complex theme sustainability is to manage. The presented eight themes are quite abstract and under them are various different practical topics and actions which need to be managed as well. When it comes to construction business, sustainable project management can be viewed as one

application of bringing sustainability to the core of the business – construction projects.

2.3.2 Sustainable project management

Since construction business consists of construction projects, sustainable project management can be seen as an application of how to incorporate sustainability management in construction projects. Sustainable project management is a set of project management techniques for achieving sustainability throughout the project lifecycle and as outcomes of a project (Ershadi & Goodarzi, 2021). Triple bottom line, i.e., environmental, economic and social dimensions of sustainability, is incorporated in the sustainable project management concept (Todorović, Toljaga-Nikolić & Bjelica, 2018). Armenia et al. (2019) show that resource management, life cycle orientation, corporate policies, organisational learning and stakeholders' engagement build a ground for sustainable project management in order to establishing environmental, economic and social aspects of sustainability. Sustainability can be fully achieved in projects when sustainability principles are integrated into the construction process and every stakeholder of the project is responsible for carrying out sustainability practices (Matar, Georgy & Ibrahim, 2008). Ershadi and Goodarzi (2021) argue that sustainable construction project management involves practices of sustainable construction development and sustainable management, as well as knowledge of sustainable building materials. Therefore, possible barriers for integrating sustainability into construction project management are inadequate understanding of the potential benefits, lack of cooperation between different practitioners and lack of systemic approach to achieve sustainability goals (Fathalizadeh et al., 2021).

In their literature review, Ershadi and Goodarzi (2021) have identified capabilities from environmental, social and economic viewpoints forming the foundation for sustainable construction project management. When these capabilities are considered in a project, it ensures that main sustainability aspects are taken into account during the lifecycle of a project. From environmental point of view there are 14 capabilities. Waste recycling and waste reuse on construction sites were highlighted the most. Resource conservation refers to considering lifetime energy consumption as well as minimum emissions. Renewable materials capability includes the use of them as construction materials. Sustainable design means considering sustainable engineering design features with the aim to end up minimising environmental risks for the whole lifetime of the building. The effects of noise can be minimised by supplying equipment that have minimum vibration and noise. Sustainable packaging capability refers to reducing packaging material. Proper ventilation should be considered to ensuring proper air quality on site. Environmental remediation means decontamination of site and removing waste after the contract closure. Waste disposal is disposing waste carefully during the construction process. Visual impacts is a capability meaning considering landscape and visual impacts of the infrastructure. Again, a capability related to waste is coaching employees on

waste management to apply better waste management methods. Lean production techniques can be encouraged to reduce waste on site. Sustainable maintenance refers to maintaining facilities. Lastly, erosion control capability means applying soil erosion control techniques in construction. Ershadi and Goodarzi (2021) identified also social aspects to consider in sustainable construction project management: ensuring safety on construction sites, incorporating professional code of conduct in activities, ensuring diversity in the project team and transferring sustainability knowledge in professional bodies.

Williams et al. (2017) presented eight themes describing sustainability management while Ershadi and Goodarzi (2021) had a more practical approach for presenting sustainability project management capabilities. The eight themes from Williams' et al study (2017) can be seen staying on the background of everyday decision-making and management, and Ershadi and Goodarzi's (2021) project management capabilities describes the daily management and can be viewed as the visible sustainability project management.

There are various aspects related to organisation and management when sustainability is promoted in an organisation. The prerequisite for promoting sustainability is to enable organisational learning of sustainability and realise what kind of the organisational reality for the promotion is. Without systematic management of sustainability there are no proper conditions for achieving the deepest sustainability as possible. Now that organisational context for promoting and developing sustainability is touched, sustainability competence development can be understood in its context which is in this thesis a construction company.

3 SUSTAINABILITY COMPETENCE DEVELOPMENT

3.1 Sustainability competences

Ellström and Kock (2008) define competence as an attribute of an employee and it can be seen as human capital or a human resource that can be translated into some level of performance. 'Competence' can also refer to the capacity of an employee to successfully handle certain situations or complete a certain job (Ellström & Kock, 2008). It is important to understand that, as mentioned, competence is a characteristic of an individual person. Onubi, Carpio and Hassan (2023) presents an example of a competence in the construction personnel context: pro-environmental construction practices (PCP). They are practices engaged in construction to overcome issues such as climate change and environmental pollution. The construction employees have an essential role in PCP adoption on construction sites (Onubi, Carpio & Hassan, 2023).

According to Dzhengiz and Niesten (2020) environmental competences include aspects as the knowledge, skills, behaviours, attitudes and personal traits of individuals that lead to the solution of complex environmental problems, therefore promoting the achievement of a sustainable future. They base the definition of environmental competences in responsible management competences since they see that it is a part of responsible management competences and aims at improving environmental sustainability which requires managerial skills. Dzhengiz and Niesten (2020) presents five prominent environmental competences: entrepreneurial thinking, interactive problem-solving skills, systems thinking, future orientation and transdisciplinary work. Entrepreneurial thinking refers to innovativeness, creativity and being visionary in order to tackle ecological problems from entrepreneurial mindset. Interactive problem-solving skills forms the basis for managers to collaboratively complement scarcity of resources and technical know-how, and to enable solving problems in a way to promote environmental sustainability. Systems thinking

competence enables managers to understand environmental sustainability as dynamic and interrelated complex system, instead of being an independent process: individual organisational activities' impacts cannot be viewed to be separate from the whole system (Ryan, et al., 2012). Future orientation, presented by Dzhengiz and Niesten (2020), is a capacity to deal with uncertainty and future expectations. Transdisciplinary work includes the ability to communicate across different disciplines and discourses, and cooperation with scholars and practitioners from other disciplines. The ability to apply sustainability knowledge from different disciplines is required in addition to only having the sustainability knowledge (Dzhengiz & Niesten, 2020). Even though the presented environmental competences were mentioned to be part of managerial competences, they are competences that employees without managerial position can also have. It is notable that Dzhengiz and Niesten (2020) is talking about environmental competences instead of sustainability competences but there does not seem to be any reason why these competences could not be applied in other dimensions of sustainability as well.

According to Van Kleef and Roome (2007) promotion of the development of environmental competences requires organisations to have individuals with collaboration competences who share their colleagues' external information and with that builds the basis for creativity and learning about environmental sustainability, as well as commitment building.

Laasch, Moosmayer and Antonacopoulou (2022) introduces a responsible management competence framework. According to them, responsible management has three dimensions of competences: ethics, responsibility and sustainability discipline. It includes competences to engage in ethical decision-making and behaviour, to realise stakeholder responsibilities and to consider environmental, social and economic aspects. Therefore, the responsible management competence can be understood as the capacity to expertly perform the practices of responsible management (Laasch, et al., 2022). Similarly, Nonet, Kassel and Meijs (2016) presents the characteristics of responsible management to include soft skills, development of formal knowledge and critical thinking, as well as a broad and holistic triple-bottom-line understanding of management and the development of a shared vision for all stakeholders. According to Dzhengiz and Niesten (2020) the definition of responsible management is fundamentally based on the role of learning, which is mutually a prerequisite for the development of responsible management competences. Nonet et al. (2016) state that responsible management should begin at the individual level with self-awareness and knowledge. After that the individual relying on self-awareness and knowledge will interact with others when practically implementing responsible management (Nonet et al., 2016).

As it can be seen in the light of theory, frameworks of sustainability competences consist of various extensive competences. Frameworks are presented to describe sustainability competences of individuals in general and specifically focusing on sustainability management competences. Next, the purpose and importance of sustainability competence development is reasoned.

3.2 The importance of developing sustainability competences

According to Wiek, Withycombe and Redman (2011), the development of interdependent and interconnected variety of human competences can result in organisational conditions where sustainability challenges are considered and responded if the human competences are linked to organisational capabilities. Kinnunen et al. (2022) show that investing resources in sustainability, including sustainability competence development, can result in longer term implications for company performance. Strategic sustainability approach of a company is essential in construction industry because operations should respond to constantly changing market environment and increasing sustainability demands of stakeholders (Kinnunen et al., 2022). Carvalho and Rabechini (2017) show the connection between sustainability and project success. Project sustainability management has a positive impact on social and environmental sustainability as well as on project success (Carvalho & Rabechini, 2017). Pham and Kim (2019) argue that there is a positive connection between sustainable construction practices and leadership competences of construction managers. Together they affect the sustainability performance of the construction project (Pham & Kim, 2019). Dzhengiz and Niesten (2020) in turn argue that environmental competences have an impact on organisation level environmental capabilities and the relationship between them is dynamic.

Investing in development of sustainability competences seems to be beneficial because in the light of previous research it seems to affect the business sustainability and enables running sustainable construction projects. As it can be understood from the reasons above, sustainability management competences play an important role in sustainability competence development. In the next section, the main topic in this thesis is covered: how to develop sustainability competences.

3.3 Development of sustainability competences

Drejer (2000) presents an idea where developing a competence is improving the performance of a group of people as regards to the output of the competence of which they are involved. This development happens via a process of learning to do things closer to the objectives for the output of the competence. In this master's thesis the term competence development is defined based on Ellström and Kock's (2008) definition: it is education and training for personnel but also planned changes of tasks through different types of measures and with the aim of deepening informal learning on the job. They also present promotion, recruitment and personnel mobility to refer to the term of competence development (Ellström & Kock, 2008).

According to Galleli, Hourneaux and Munck (2020), usually human competence development belongs to department of human resources management (HRM). Recently new approaches combining sustainability and HRM have emerged: Macke and Genari (2019) introduce approach called Green HRM or sustainable HRM which refers to development of human competences necessary in sustainable business. Benevene and Buonomo (2020) argue that if an organisation decides to incorporate an environmentally conscious attitude to its activities, the employees have a vital role to its success or failure. Song, Yu and Xu (2020) point out that giving an opportunity to participate in pro-environmental practices can establish a climate for employees to get interested in pro-environmental matters in the workplace. That enables them sharing and spreading their environmental expertise and competences for environmental management through the learned pro-environmental practices (Song et al., 2020). In a similar manner, Onubi, Carpio and Hassan (2023) show that when organisations develop green human competences through developing green skills of their employees, it leads to the increase of employees' awareness of environmental issues. That affects employees to become more and more concerned on environmental matters and getting interested and willing to participate in pro-environmental construction practices. Focusing on developing green human competences through green skills development and training in organisation leads to the adoption of pro-environmental construction practices on sites (Onubi et al., 2023). Dzhengiz and Niesten (2020) in turn state that absorptive capacities of recognising the value of external knowledge and knowledge acquisition have a positive impact on environmental competence development.

The first step to begin with sustainability competence development is to identify relevant topics in which competence should be developed. According to Arshad et al. (2015), the assessment can be done reactively, relying on the difference between expected and actual performance in work, or it can be done proactively. The proactive approach is based on the identification of skills and knowledge that is necessary to the important changes and demands occurring in the organisation responding to the fundamental requirements for the competitiveness of the organisation (Arshad et al., 2015). Training needs analysis is one tool to understand what the topic of the training should be, where should it take place, in what form and when (Swanson, 1995). Utilising model of Organisation-task-person (McGehee & Thayer, 1961) is one way to prepare the analysis on a high level: in organisational analysis training needs in organisation are identified. Task analysis is made to identify the nature of the tasks and the knowledge, skills and abilities required to perform the tasks included in employees' work. The goal is to identify the right content of trainings and how the trainings should be arranged. In person analysis the aim is to analyse how well an employee performs the task and individual training needs are then identified (McGehee & Thayer, 1961).

Malik and colleagues (2023) suggest that green project management practices are positively related to sustainable competitive advantage. Green

knowledge acquisition has a significant role in connecting green project management practices and sustainable competitive advantage. Organisation's capability to acquire green knowledge may be seen as its ability to build competence aiming to create green business insights from variety of information sources (Malik et al., 2023). According to Maltzman and Shirley (2010), green project management practices help organisations to act according to their strategy and adopt a deeper focus on sustainability. The role of the green knowledge acquisition can be viewed through the idea that organisations identify their critical resources through green knowledge which is an inevitable resource to achieve sustainable competitive advantage (Martins et al., 2019). In order for company to move towards sustainable competitive advantage, solely with green project management practices organisations effectively identify green knowledge and find the best means to knowledge acquisition and finally incorporate green knowledge to their activities. It is also studied that reducing emissions is implemented by acquiring knowledge more than integrating and using physical resources (Malik et al., 2023).

According to Ellström and Kock (2008), not all forms of competence development are formal and intentional (that is formal training): competence development can be related to activities that do not have it as their primary objective, but it can be a secondary effect and can be seen as developing competence. However, according to Orth and Schuldis (2021), informal and unintentional practices of organisational learning are more vulnerable whereas formal practices enable more thorough transfer for knowledge. Ellström and Kock (2008) argue that a technological-functional perspective for competence development can be viewed as the most popular foundation for organisations to allocate resources to competence development since it is based on conscious and rationally planned strategy for meeting increased competence requirements related to changes in market environment. The learning in individual level resulting in increased knowledge and competence is seen as a tool for meeting the objectives in the form of growth, increased productivity and welfare in organisation (Ellström & Kock, 2008).

When it comes to success factors of competence development in organisations, Ellström and Kock (2008) state on the light of previous research that when competence development programme is planned, it seems to be important that the motives for investing in competence development are problem-oriented and that it is also part of the strategy. Personnel should participate indirectly or directly in the planning of the development programme which should be based on combination of formal course session education and on-the-job learning. Regarding possibilities to on-the-job learning, Ellström and Kock (2008) state that compared to only formal training, on-the-job learning seems to be strongly related to greater effects of competence development. Competence development should also cover a large number of employees instead of only key employees. It is important to ensure that the programme is job-oriented rather than purely individual-oriented: aim is to deepen or widen the employees' competence in terms of business or job development and not to

increase the competence of the employees without any link to developing the business (Ellström & Kock, 2008).

Dzhengiz and Niesten (2020) have identified managerial antecedents which might have an impact on the sustainable behaviour of employees and managers. The antecedents are perception of individuals, their motivation, values and commitment, and the leadership in organisation. Dzhengiz and Niesten (2020) state that these attributes of managers and employees affect the development of their environmental competences. In addition, they stress that contextual conditions affect the development of environmental competences: stakeholder pressure and environmental uncertainty, to mention a few, might have an impact on environmental competences (Dzhengiz & Niesten, 2020).

Learning from experience was one of the findings in Evenseth and colleagues' (2022) study regarding connections between organisational learning and organisational resilience. Learning from positive and negative experiences is essential in order to realise how to promote positive outcomes and avoid negative ones (Anderson et al., 2020). However, according to Bhaskara and Filimonau (2021), learning from past experiences might result in limited learning opportunities since it might not ensure the preparedness for unpredicted events. There might also be challenges in identifying the need for new learning since organisations often relies on old practices instead of developing new practices (Manfield & Newey, 2018). Collecting, transforming and sharing best practices resulting from experiences is a way to utilise the knowledge which is already in organisation.

When it comes to the different forms of competence development activities, there is a wide range of options for various situations, and suitable forms can be selected depending on the needs of certain group of personnel. Some of the forms of competence development are presented next but there are still multiple other ways to contribute to the development of competences. Independent study of sustainability as a phenomenon or a more practical application can be put into practice during working hours, or it can be carried out as a voluntary leisure activity (Eklund, 2021). Studying can include, among others, reading books, internet articles, organisational material or news, watching videos, listening to podcasts or discussing with colleagues or friends about the topic (Eklund, 2021).

On-the-job learning has advantages since the development emerges when tasks are done again and again. Also, the ability to find good solutions to problems faced in work increases. On-the-job learning can happen subconsciously but when on-the-job learning is wanted to be more conscious, self-reflection should be practiced. It makes the development visible and through self-reflection it is possible to develop oneself more systematically (Eklund, 2021; Ellström & Kock, 2008).

Silva et al. (2019) presents the influence of environmental training on individual environmental sustainability competences. Environmental training is a process occurring at work with the aim of achieving corporate environmental management goals (Teixeira et al., 2016). According to Daily et al. (2012) environmental training and environmental empowerment for employees is

related to environmental performance. The mediator of the above is employee teamwork, which should be supported by managers when environmental improvement is pursued. Daily et al. (2012) have also recognized that environmental training leads stronger to environmental performance than employee empowerment which highlights the importance of environmental trainings in organisations. However, employee empowerment is required to teamwork (Daily et al., 2012).

Knowledge sharing is the behaviour in which one person shares possessed knowledge with other members of the organisation (Ryu et al., 2003) and through that the access to organisation's own and other organisations' knowledge is found (Cummings, 2003). Organisations have means for promoting their employees to share their knowledge because the knowledge sharing is an essential source of the organisational capability to solve problems (Muhammed and Zaim, 2020). According to Jackson et al. (2006), knowledge sharing is a fundamental way through which employees can contribute to sustainability and participating to building competitive advantage. One form of knowledge sharing is collecting and sharing best practices emerging within organisation. Alwazae, Perjons and Johannesson (2020) approach the topic through documentation and presents a model for structuring best practice documents, using them and evaluating them. However, they see the low quality of best practice documents as a challenge for utilising them in knowledge sharing. Based on the theory, sustainability competence development is perceived important in order to reach sustainability goals and contribute to sustainable development. In the next chapter data and methodology for the case study is presented.

4 DATA AND METHODOLOGY

4.1 Case study

This thesis research is made as a case study due to the need for collecting information about a specific organisation, and for the organisation to utilise the knowledge in its operations. According to Eriksson and Kovalainen (2008), case study is one of the methods to conduct qualitative research. Hair and his colleagues (2015) have described case study as a form of study where information is collected about a specific activity and a real-life example is a requirement to create a complete picture of the whole situation. This enables the researcher to identify interactions and relationships between all the variables in a real-life circumstance (Hair, et al., 2015). Case study in the context of organisation and management research can be seen as comprehensive research of a particular case where the case consists of social reality of the organisation, and individuals and different groups as a member of the organisation (Lee, 1989). Eisenhardt (1989) sees capturing the dynamics of the studied phenomenon as a benefit of the case study method.

According to Eriksson and Kovalainen (2008), intensive case study research includes the goal to understand a single and unique case from the inside by creating a holistic and contextualised illustration of the case. Extensive case study in turn aims at generations or testing of generalisable constructs by comparing different cases (Eriksson & Kovalainen, 2008). This thesis is an intensive case study due to the goal to understand the perceptions and means among a particular organisation and providing a holistic framework to be utilised in the case company.

Eriksson and Kovalainen (2008) presents a common challenge for intensive case study research, which is the difficulty to connect theoretical concepts with empirical data. Due to the nature of intensive case study being continuous interplay and dialogue of empirical data and theory, the final research questions

might be formed during the process instead of being confirmed in the very beginning (Eriksson & Kovalainen, 2008). Grounded theory approach was used in this very case study. According to Hair et al. (2015), the goal of grounded theory is to create theory and understand specific contexts using data gathered from the specific case.

As Halinen and Törnroos (2005) justify the use of case study approach in their study, the same reasons can be applied in this master's thesis study as well: case study allows the study of a contemporary phenomenon, organisational sustainability, which is difficult to separate from the organisational context, but is necessary to study within to realise the dynamics of the organisational setting. Next, the studied case of YIT is presented with the aim to build a comprehensive understanding of the setting where specific case study is conducted.

4.2 Studied case: sustainability perceptions of production personnel in YIT Business Premises and Infrastructure segments - focus on sustainability competence development

The case company in this master's thesis is YIT - the biggest construction company in Finland (YIT, n.d.a). YIT was selected to be the case company of this thesis study because I work there and therefore I am able to collect detailed information of perceptions among the organisation. YIT's revenue in 2022 was 2.4 billion euros and adjusted operating profit was 110 million euros (YIT, 2023). Around 5,000 employees work in nine countries in Finland, Scandinavia, Baltics and Central Europe. In YIT there are three business segments: Housing, Business Premises and Infrastructure (YIT, 2023). This case study is made to support decision making in Business Premises and Infrastructure segments due to a former organisational structure where the two segments had a mutual supporting organisation. Business Premises segment builds different premises to offices, schools, logistics and hospitals, among others and the focus is on renovation, new construction and life cycle projects (YIT, n.d.b). In Infrastructure segment, for example demanding projects of tunnel, rail and bridge construction are provided to customers (YIT, n.d.c). Even though building business premises and infrastructure construction is two different forms of business and construction, the results are not separated from each other. The purpose is to create understanding of production personnel's thoughts as a whole instead of comparing two segments' differences.

Personnel working in YIT's construction production usually include construction managers, site managers, site engineers and site supervisors. The role of project managers has more variation depending on business segment and project, but they are however connected to production and create circumstances for production to work. In some projects there are environmental professionals whose responsibility is to take care of environmental issues of the project and make sure that environmental goals of the project are achieved.



FIGURE 2 YIT strategy 2022-2025

As it is presented in the Figure 2, sustainability is integrated into YIT's strategy for years 2022-2025 since ESG is one of the three strategic priority areas together with Focus and Productivity (YIT, n.d.d). YIT has made a commitment to Science Based Targets initiative to participate limiting global warming to 1.5 degrees, which is in line with the Paris Agreement. On the social side YIT's goal is to be a zero-harm work community and when it comes to governance, there is a strict approach to grey economy (YIT, n.d.d). Climate targets for 2022-2030 has been set in 2022: 1. "sustainable living environments and products, 2. "carbon neutrality in own operations", 3. "design management & supply chain engagement" and 4. "sustainable ways of working" (YIT, 2022). The fourth target includes among others an action to develop environmental competences of personnel and the objective of the target is that sustainability is integrated into business processes (YIT, 2022). This master's thesis contributes to the fourth target and more specifically to the mentioned action, which highlights the importance of this thesis topic for the company.

The purpose of the specific case study conducted in YIT is to understand production personnel's perceptions about sustainability in YIT, with the focus on sustainability competence development. Competence development is one form of promoting sustainability in the organisation and it requires managing sustainability since otherwise developed competences do not result in more sustainable activities. Also, those possible activities are studied to form a clear picture of different means in the organisation to promote sustainability, sustainability competence development being one of the means. In the following section the process of collecting data is described.

4.3 Data collection

The data is collected by interviewing construction managers and project managers in the form of focus group interviews. According to Hair et al. (2015), in focus groups participants are allowed to answer the questions on their own words. The interviewees were selected based on recommendations of people working with multiple construction managers and project managers. They could recommend the ones who might contribute to the topic most deeply. Also, the interviewees were asked to propose new interviewees that they could see to have insights for the topic. A couple of interviewees suggested some people to be invited. The interviews were conducted in the groups of 2-3 interviewee, and the focus groups were decided based on timetables of interviewees. One interview was conducted personally due to unexpected challenges with participation. Two hours were dedicated to each interview to make sure that there is enough time to discuss about every theme and perhaps about something additional. They were held in Finnish to get the most comprehensive results and to avoid possible limitations to express oneself in English. In addition, one background interview was arranged with three participants who are working with production environmental sustainability on a daily basis. All the interviews were held in Microsoft Teams to be able to record the session which furthered the management of data and conducting analysis of results.

A short introduction (see Appendix 1) was sent to possible participants before they were invited to focus group interviews to make sure that if some of the potential participants were reluctant to take part in interviewer, they would have an opportunity to inform the interviewer about that. Some of the interviews needed to be rescheduled due to overlaps in timetables.

Semi-structured interview was chosen to be the method for collecting data through interviews. According to Hair et al. (2015), semi-structured interview has a structure and a direction but it is possible to ask other questions as well. A list of questions was prepared (see Appendix 2), and they were divided into theme groups. However, the interviews were not supposed to follow the questionnaire strictly and there was room for discussing topics emerging in the situation. Before officially starting the interviews, the participants were told not to be restricted to answer merely the questions asked and, as a matter of fact, they were encouraged to digress from the actual topic if something else related to sustainability would occur to them. Basic information about the thesis topic and goals for the session was told them, but any deeper insights about the topic was not presented for participants. They were given opportunity to ask anything regarding the interview before the recording was on and before officially starting the interview.

The reason for choosing semi-structured interviews to collect the data was an assumption that it would be the most reasonable way to get results and not to restrict the answers to certain questions. This turned out to be a good choice since interviewees gave multiple useful insights about topics outside the questions.

Furthermore, focus group setting functioned well since participants got ideas from each other, thus were able to build their insights more deeply and from different angles together. On the other side, it is possible that some of the interviewees were not given a chance to express all their thoughts they would have liked to share if other participants dominated the conversation.

In most of the focus groups at least some of the participants knew each other, which might have made the situation more relaxed for them. It was noticed that after the very first questions the interviewees began to seem more relaxed, and the discussions were more uninhibited. During the first two interviews all the prepared questions were asked but in the later ones some of the questions were excluded since they did not seem that relevant and unambiguous anymore. As the interview phase proceeded it was easier for the interviewer to ask new questions which occurred during the interview because other group's answers and discussions had already affected on how to approach to the topic with new perspectives.

TABLE 1 Interview groups of representatives of the case company

Focus group	Interviewees	Position of interviewee	Interview's length
FG1	E1	Quality and Environmental Manager	109:27
	E2	Environmental Engineer	
	E3	Environmental Manager	
FG2	C1	Construction Manager	95:25
	C2	Construction Manager	
	C3	Construction Manager	
FG3	C4	Construction Manager	51:59
FG4	P1	Project Manager	96:09
	P2	Project Manager	
	P3	Project Manager	
FG5	C5	Construction Manager	70:19
	C6	Construction Manager	
	C7	Construction Manager	
FG6	C8	Construction Manager	55:55
	P4	Project Manager	

In total, 15 persons have participated in the interviews and as it is seen in Table 1, eight of them are construction managers, four of them are project managers and three of them are environmental professionals. In Table 1 the code

E refers to environmental professionals, C to construction managers and P to project managers and numbers are used to separate participants from each other. In the results chapter citations are used and the codes are used to clarify who has said the comment. The interviews were conducted in 2023 during April and May and they lasted around 50 minutes to 110 minutes. After, and partly during, the data collecting phase was finished, the data were analysed. In the next section the process of data analysis is described.

4.4 Data analysis

Qualitative data analysis has a goal to identify, examine, compare and make interpretations of patterns and themes (Hair, et al., 2015). Unlike in quantitative research, the process of data analysis includes revisiting the data when new connections and questions emerge. Different phases of research are not strict in qualitative research and the need for data collection might be noticed during the analysis phase (Hair, et al., 2015).

During the interview phase transcriptions of interview recordings were started. In practice, Teams recordings were watched and everything relevant that interviewees said were written to a Word document. It was also marked who was the speaker of the sentence. After the transcriptions were finished, the sentences were coded according to their preparatory theme and they were transformed into simplified expressions. According to Hair et al. (2015), coding is a process of assigning meaningful expressions in order to reduce data from a great amount of text. Coding is required to simplifying the data which enables focusing on essential parts of it (Hair, et al., 2015). In this case coding unit (Hair et al., 2015) was selected to be a sentence because single words would not have been showing the whole thought behind the contribution. When the coding phase was ready, the data was reduced. Some sentences were assigned to another theme and some themes were combined and deleted. At the same time, the framework for how the themes would be connected to each other was crafted. As a result, there were themes and under every theme there were subthemes or aspects that includes to the themes. Some of the aspects belonged clearly to multiple themes and they were decided to be included in those all if it was essential. Due to the overlapping nature of data collection and analysis process in grounded theory, the themes and categories changed slightly during the result writing process as well. In the next chapter the results of the data analysis are presented. The chapter is divided into several sections, starting from sustainability competence development since it is the focus and one form of this thesis topics regarding sustainability promotion in a construction company. Citations from the interviews are used to deepen the perspectives gathered from the interviews and to deepen the results with full expressions.

5 RESULTS

5.1 Sustainability competence development

The results of the case study were conducted in focus group interviews where interviewees were asked to share their thoughts about sustainability in the company, how they would promote it and what in their opinion should be done to promote it. The focus of the group interviews was on sustainability competence development of production as a concrete mean for promoting sustainability in a construction company and how people working closely with production perceive the topic. A versatile set of insights were provided in the interviews regarding background factors, topics and means for developing sustainability competences.

Since developing sustainability competences is not merely enough to promote sustainability in a construction company, sustainability management as well as other concrete means are covered in the research. Sustainability management builds the foundation for sustainability competence development and the management of sustainability competence development. Sustainability competence development aims at promoting sustainability of the business, that is the construction projects, which justifies covering promotional activities together with sustainability competence development and management of sustainability. There are also some background factors and challenges that should be considered when sustainability promotion is planned and implemented in organisation.

5.1.1 On the background of sustainability competence development

Based on perceptions of production the following six themes were formed to be considered affecting sustainability competence development on the background: relevance, resources, communication, motivation, temporal factors and learning

(Figure 3). These factors should be taken into account especially when sustainability competence development activities are planned for construction production personnel. However, suitable parts of them might be relevant for other employee groups as well.



FIGURE 3 Factors affecting sustainability competence development

The interviewees agreed that sustainability topics and the knowledge in which competences are developed should be directed for the right people who need the knowledge and skills in their production or other work, which means that the knowledge should be *relevant* for employees. The knowledge should be presented in a way that it is applicable in practical work. However, background knowledge of the topic was seen important, but they saw that the focus should be in practice. Some participants highlighted that the difference between standard sustainability practices and higher level of sustainability should be distinguished:

Topics should be brought to production in a way that everyone could understand what is relevant in their job, and the person who is in charge of introduction to work would understand what the requirements are, what is compulsory and what would be nice extra (C2).

Interviewees mentioned also that there is a big variation in competences between different projects as well as variation between employees. That should also be considered when planning competence development activities.

When it comes to *resources*, it was highlighted by one construction manager that developing sustainability competences should be done in a way that it does not increase bureaucracy, that is, documentation and reporting. There were different viewpoints whether sustainability already is included in standard practices: some of them told that it is, but some of them had the view that sustainability is not yet resourced in standard practices:

Sustainability is integrated in all our operations. Perhaps it is a term that is kind of included in all our activities somehow, and you cannot remove the concept from what we do (C6).

Sometimes it feels like all the information that we have in the organisation is on the high level and it will not transform to concrete means in grass-root level (C2).

Regarding scarcity of personnel resources, consultant assistance is one solution for gaining sustainability knowledge for projects.

Communicational aspects were seen important when new information and requirements are brought to production personnel: they should be brought in the most receptive way because otherwise the knowledge might not be adopted:

It must be pondered how the sustainability message is communicated: is there only one truth or can you explain it better with pros and cons (C6).

Using 'site parlance', that is, the way people communicate on-site, usually results to deeper receptiveness.

The participants brought out aspects related to *motivating* production personnel to the development of sustainability competences. When sustainability is integrated to rewarding, it might motivate to the acquisition of sustainability skills and knowledge. Inclusion of production personnel in competence development activity planning was seen remarkable by most of the interviewees. In a project level, familiarity with the project personnel might be an advantage when competence development activities are implemented in a project: it is easier to recognise what motivates the specific group to participate in competence development. C8 describes the importance of motivating personnel in the following way:

We need the people who carry out the practical work: we must be able to manage, motivate and bind them to the same strategy and sustainability goals. I am not sure whether the solution is inclusion of personnel, or something else. I do believe that most of our personnel support sustainability activities and only few resist them.

A couple of *temporal factors* arose in responses: competence development action should take place close to its practical application and the temporal focus in competence development should be prior to practical work:

If you do not have any contact to the theme, it will be forgotten. If there is a chance after the training to do something differently than before, the new way of doing it will remain. But if the training is run in a way that 'when you have this kind of situation, you can make it that way', and the situation will occur two years after the training, you will not remember it anymore (C3).

Altogether, the interviewees agreed that competence development should be a constant process and sustainability related knowledge and skills should be learned time after time.

Based on the interviewees' experience, *learning* in production occurs the best besides the practical work. However, if it is not possible and classroom training is the form of sustainability training, there should be relatively small

groups to ensure personal learning experience. Furthermore, the interviewees preferred trainings in the present mode on-site instead of online participation. The goal of sustainability competence development should be to realise yourself what are the best solutions and how something should be done. According to construction managers' experiences, this kind of learning is the most long-lasting. C1 summarised the learning aspect:

We should be able to make people realise themselves what could be done. 'Talking head' or online training is not the best solution. Learning by doing is more effective.

To pull together the factors affecting sustainability competence development on the background: at least these themes should be considered before deciding the topics and means for developing sustainability competences. The covered factors can also be considered when competence development actions are planned concerning something else in which production employees' competence development is needed.

5.1.2 Topics of sustainability competence development

Interviewees were able to identify specific topics in which competence from their viewpoint should be developed in organisational level as well as in personal level. In addition to that, they described abstract themes that they would like to personally learn more. The overall view of sustainability and how the company contributes to that were seen important to realise as a foundation for competence development in more specific and practical sustainability topics. Figure 4 presents the overall picture of sustainability topics in which there are competence needs.



FIGURE 4 Sustainability topics for competence development

The sustainability topics are divided to two categories: the ones that according to the interviewees are already at a decent level in the organisation and the ones in which competence should be developed further. Some topics are included in both categories which reflects that opinions and views of respondents are partly different from each other's. Since the interviewees are representing both infrastructure construction and house building (business premises), there are varying needs for competence development, especially in terms of environmental sustainability. However, the results are presented together to be able to form a comprehensive picture of what is actually included in necessary sustainability competences in a construction company.

5.1.2.1 Topics in which competences are already at a decent level

When it comes to *environmental sustainability*, monitoring of waste management and sorting of waste was seen to be at a good level. Water management, which is essential especially among infrastructure construction, was mentioned to be a standard practice. Applying for environmental permits and other authority issues were viewed as business as usual.

The most popular association for *social sustainability* was occupational safety which was seen to be at a decent level and integral part of operations. C1 contemplates the possible future scenario of sustainability based on occupational safety:

I was wondering whether sustainability and the costs of it will have the similar cultural change that has happened among occupational safety. You do not have to discuss a lot with customers these days what are the costs of occupational safety. Now we are discussing with customers what is the cost of sustainability but perhaps in ten years we do not need to do that, and sustainability is more or less automatically integrated and a presumption. For example, everyone will know what the price of low-carbon concrete is, and everyone will include it in the tenders.

Some participants mentioned that identifying inappropriate treatment is at a good level as well as taking hand on it. Contractor's obligation and grey economy are part of *good governance*, and they were seen to be managed well. Altogether, statutory sustainability topics, such as waste management, were seen to be at a good level as well as the sustainability topics that are measurable. One possible reason for that might be that due to their statutory nature, they are also managed in projects.

Even though some topics would already be at a good level, P1 reminds the importance of repetition:

All topics require regular repetition and training of fundamentals. When a person jumps from site or position to another, she/he knows how a site works but all specific aspects cannot be remembered.

The list of topics in which competence should be developed turned out to be longer and the interviewees were able to bring out also quite specific topics. It includes partly same topics than the list of decent-level topics, but it shows well the variation of opinions regarding the theme. It is also notable that some of these

topics goes beyond production, but they are important to be covered since they still have impacts on production work.

5.1.2.2 Topics in which competences should be developed

Among *environmental sustainability*, the interviewees found multiple sustainability topics for development of competence. Topics identified contributing to climate change were energy use and efficiency, carbon footprint and on-site logistics. Energy efficiency begins to be a usual requirement in tender requests, but also on-site energy use is a topic that needs to be practiced. Carbon footprint management is connected strongly to construction materials, and it requires carbon footprint calculations. The biggest impact on carbon footprint competence development is before the production phase: the biggest decisions affecting carbon footprint are made in planning phase. C2 commented on production competence development needs:

In production there must be a need for concrete means. Not in a way that 'choose materials based on the smallest carbon footprint': it should be said in a way that 'choose this certain material instead of this one'.

However, for example on-site logistics affects construction phase emissions through fuel use.

Nature related topics includes biodiversity, water management, noise, dust and ground vibration, and deep excavations. Among environmental professionals', biodiversity was identified as a current topic, especially invasive alien species were seen to be a topic that needs competence development. Others commented biodiversity too:

I hope that competence would be developed in biodiversity. It would be fun and a good thing if everyone in a project would discover a goal or a way to maintain biodiversity on-site (C4).

From infrastructure construction side, noise, dust and ground vibration was mentioned briefly as well as deep excavations. Water management was brought out in infrastructure respondents too: warming of water, detrimental elements and solid matters had been causing some consideration there.

Circular economy was identified as a wide topic to be considered in competence development. Even though according to some interviewees waste management is already at a good level, separation of waste was pointed out as an area of competence development. There are new requirements, such as regarding separation of plastics. On the site level there is a need for competence development in internal recycling: how to reuse material on-site. Design for disassembly and recycled materials were in project managers' mind and belongs strongly to planning phase:

A new aspect is the reuse of final product: how the building is made to be demolished and how products can be reused then somewhere else. This is going to be a big theme and will bring a lot of changes to management of planning and everything else. Some of the personnel will be facing the theme but perhaps the production personnel is not

the first group. At some point this will affect the way of building and therefore will also change production personnel's viewpoints (P4).

From the *social sustainability* dimension, work well-being was an area in which some construction managers wished to be able to contribute more:

Work well-being is a difficult area to measure, and it is difficult to get help from organisation to the topic. There is a need for tools for that. Staff turnover has been lately quite big which might tell about that not all is well at work. Perhaps it would be possible to take a hand on work well-being earlier and not just when someone is about to quit (C5).

One interviewee pointed out the ability to design solutions promoting social equality. Stakeholders were identified as an area to be considered more in production: how to cooperate with residents living nearby and how to minimise the effects of construction phase for them, including traffic during construction.

Regarding daily work, the interviewees recognised the need in production to learn what are the concrete corporate sustainability goals so that they would be able to identify what is actually already 'sustainability' among production personnel's daily practices and work:

We should absolutely emphasise and make clear what is sustainability, what are we already doing and how, and these are the things that we do not do yet. Sustainability is a challenging complex. In that way it would begin to take shape (C3).

Furthermore, what are the essential sustainability practices to implement in production. That would also enable the ability to communicate with customers about sustainability.

Some interviewees pointed out that they would personally want to develop their competence in sustainable finance, including EU taxonomy, which is a framework for classifying sustainable business. Environmental certificates were also an area of competence development among respondents. Documentation requirements are strongly connected to environmental certificates but also to many legal and organisational requirements:

An environmental certificate requires documentation of even commonplaces: 'if you haven't documented it, it doesn't exist' (E1).

According to interviewees documentation requirements are constantly changing and expanding, which causes needs for competence development.

5.1.3 Means for developing sustainability competence

Finally, after examining aspects to consider in sustainability competence development and after identifying the sustainability topics for competence development we are able to look at different means of how the competence development activities can be arranged. The interviewees were able to present concrete means for competence development which they have seen to be

working and might have also good experiences of using these means. In the Figure 5 an overview of the means is presented:

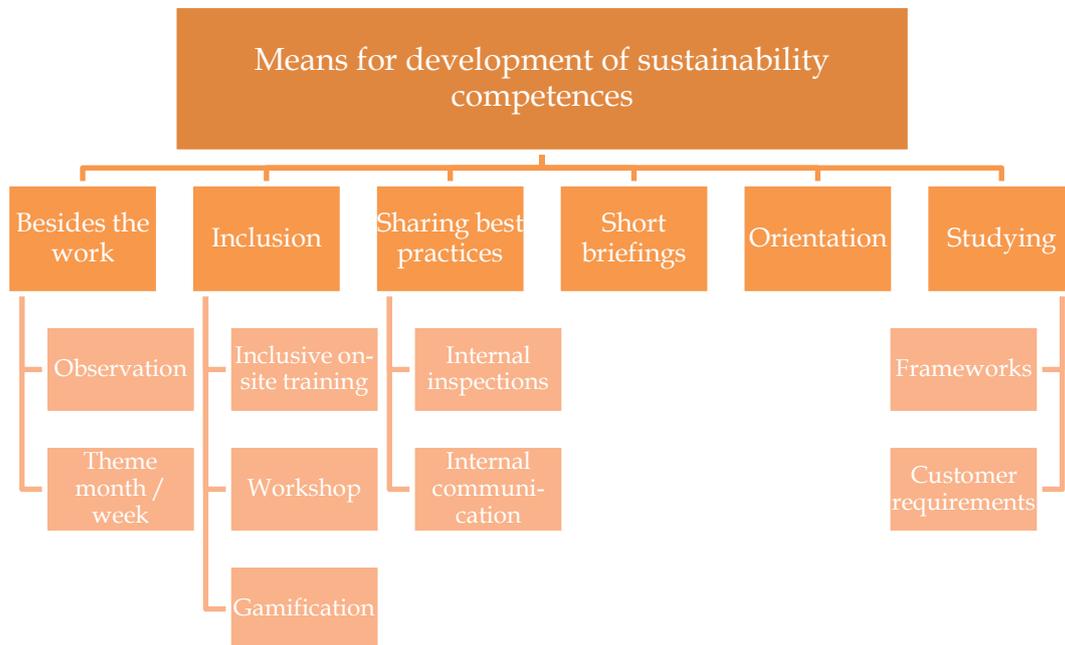


FIGURE 5 Means for development of sustainability competences

Competence development and learning can take place also *besides the work*. It can be intentional or happen without the aim of learning. Observation besides the practical work might result in learning and bring new ideas to utilise at work. Arranging a theme week or a theme month is a tool to focus production personnel’s attention to a certain theme, e.g., sorting waste, and let everyone make observation of their own work. Perhaps some discussions of the theme with personnel are beneficial and supports the learning. C1 describes theme week in the following way:

We should be able to make people realise themselves what could be done... Using theme weeks is a good idea. There could be a goal that this week there won’t be any mixed waste, and the site personnel could observe themselves how it happens in this particular site and perhaps it could be a permanent object in the future. Basically, testing with small steps.

The term ‘*inclusion*’ emerged in almost every focus group in some context. When it comes to inclusion in sustainability competence development, some practical means came up. Inclusive training on site requires the trainer the ability to engage the participants to training activities and discussions. E2 presents an example based on an experience:

In a project we had in the beginning an environmental training with slide show, and the training was basically the trainer’s monologue. In the project we had a person with a background as a teacher and she/he brought the inclusion to the training: just throw a question to the participants: ‘how you have done this’ or ‘how you could have done this’. Probably the participants will have more insights from the training this way.

From the training participants we got good examples which we hadn't used on-site before and couldn't take into account in trainings. For the next training group, we were able to talk about them as well.

In C2's opinion, traditional trainings in classroom or online platform are not working. P2 came up with an example of workshop type way of working and brainstorming:

Workshop type working ... you can mask it to be something else. If you get the site personnel somehow pondering and discussing together about how to solve some problem and why. It is usually fruitful because it involves the ones who will carry out the action and gives them the possibility to influence the action: there is not only construction manager or project manager saying what you have to do. This way it is possible to form a practice of how to manage some new issue. Even though there is a good high level management system, there should always be the opportunity in projects to contemplate what would be the best system to operate and how to include personnel.

Gamification was mentioned in some of the interviews and there had been good experiences with utilising gamification on-site. E1 had been developing games and likes it since she/he sees that based on experiences it is a functional tool for learning:

Inclusion is the key. It won't help if managers talk about topics that listeners don't care about. I have been aiming at gamifying sustainability, safety and quality topics. For example, I have developed 'Who wants to be a quality engineer?' game which includes 15 questions and best ones 'win money': perhaps something will stay in mind.

I have developed and created a sustainability game as well: the aim is to bring category thinking of an environmental certificate to personnel. The first version was published in a sustainability event. Actions made in the project were identified and the actions were supposed to be classified to right categories. At the same time, we presented what is behind the environmental certificate and brought information. We have been visiting and playing the game in site huts (E1).

Some of the interviewees had participated in takt production simulation¹. The aim of the simulation is to realise how takt production is done in practice and the participants of the simulation can actually build a scale model of building and observe the process. According to C1, takt production simulation is a good method because you can participate in simulation yourself. It is more efficient when you can realise by yourself and learn by doing (C1).

Collecting and *sharing best practices* is a way to spread means inside the organisation, from project to another. C4 suggests that the best sustainability practices could be collected in project inspections included in the management system. Internal communication in the organisation level about on-site sustainability practices was seen valuable among interviewees. Every project should not then have to innovate solutions for same problems. C2 points out also the made mistakes:

¹ More information about learning simulation game by Binninger et al. (2017).

Sharing best practices and experiences... What could we learn from other projects as well as other's mistakes. We should be able to share regularly good experiences. It is a big cornerstone of success.

C1 continues about challenges of sharing best practices:

In my previous position I tried to figure out how to share the best practices and I couldn't find the solution for that. Perhaps through some audits a third part could collect, refine and promote the best practices. Best practices are tacit knowledge and collecting and refining them is challenging.

Different existing and ongoing regular meetings can also be a platform for competence development. E1 raised a 'sustainability quarter' which could be held regularly and in which different sustainability topics could be presented and discussed, and project personnel must participate them. In addition, in a project where E1 works, there is a weekly letter including actions in which sustainability is promoted. *Short briefings* focusing on certain topic seemed to work best when they are included in a regular meeting or information event. However, C4 is feeling that short online briefings are not that functional since there is usually not too much time for listening to them and assimilating the information, because the flood of information is so heavy:

They don't feel that personal anymore. I feel like I have got numb to them.

Many interviewees highlighted *orientation* as a competence development practice: sustainability topics should be part of on-site orientation and introductions. However, it seems not to be enough if personnel is orientated only in the beginning of site work to sustainability: sustainability should be covered regularly during the construction project.

Sustainability related topics can be also *studied* different ways: i.e., independently, online, in a group or besides the work. Different frameworks, such as EU taxonomy for sustainable activities or environmental certificates, can be used to study what is sustainability in the context of construction industry. In competition contract projects there might be sustainability requirements set by the customer, which might include unfamiliar practices for the project personnel:

The extra sustainability practices that are unfamiliar for the process... They might vary depending on the customer. We should be able to train the project personnel in the beginning of the project for the sustainability objects: what they mean, who should be taking responsibility of them and from who are we expecting actions (C3).

5.1.4 Summary of production perceptions about sustainability competence development

Based on perceptions of interviewed construction managers, project managers and environmental professionals, a model of sustainability competence development could be formed (Figure 6):

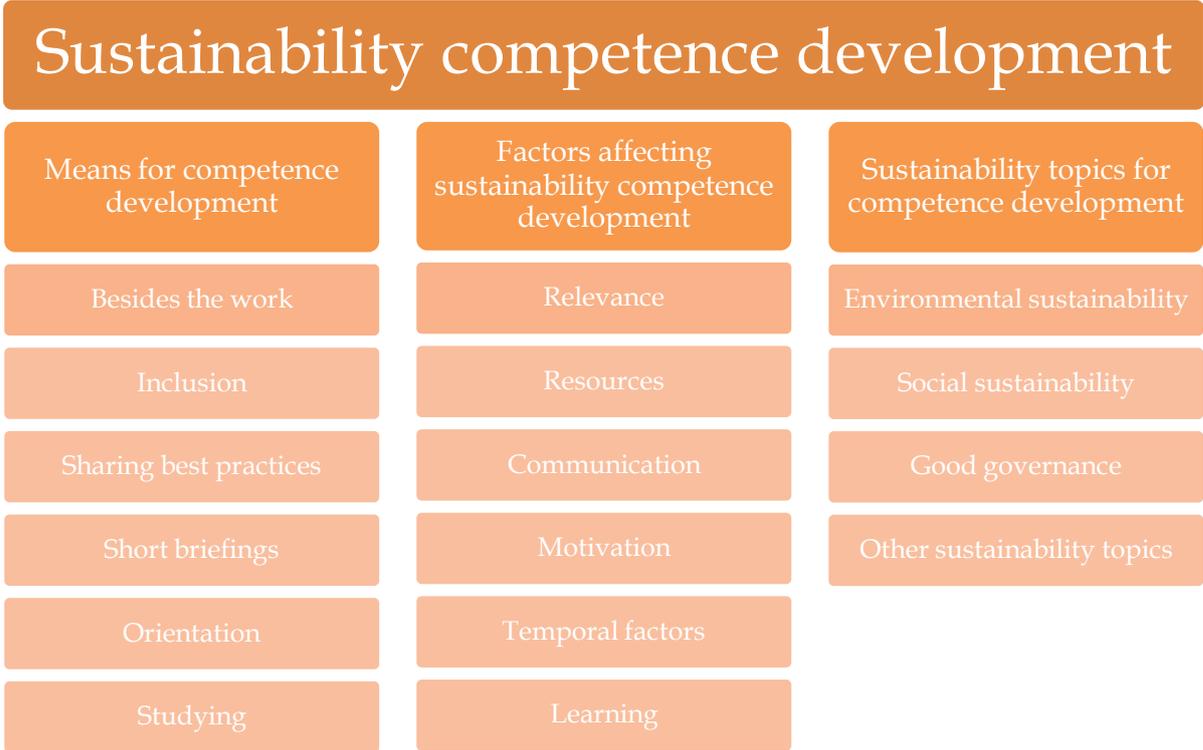


FIGURE 6 Model of sustainability competence development

There is a variety of different sustainability topics in which competence should be developed and they relate to environmental sustainability, social sustainability, good governance and other sustainability topics. In order to plan competence development activities, factors affecting the sustainability competence development should be taken into account: relevance, resources, communication, motivation, temporal factors and learning. Based on that information, the right means for competence development can be decided and implemented. Competence development can take place besides the work, sharing best practices or through inclusion, short briefings, orientation or studying.

To make sure that developing sustainability competences is effective and finally results to sustainability promoting activities there is a need for management of sustainability and for management of sustainability competence development. The sustainability as a whole should be managed in all parts of the organisation where sustainability related activities are implemented and needed. When sustainability is managed comprehensively also in construction projects, it creates a foundation for sustainability competence development and on the other hand management of sustainability enhances the learning for sustainability when the topic is shown to be relevant constantly through management. In the next section sustainability management is covered based on the interviewees' perceptions and experiences.

5.2 Sustainability management

An essential part of sustainability work is managing sustainability. The concept of sustainability competence development was connected in responses often to management. Most of the interviewees work in managerial positions which might enable the thinking through management. Even though the focus is on production, some of the insights can be applied in sustainability management in general. At the same time, the aspects that are included in the sustainability management framework can be seen as sustainability management competences since they are skills and ways of managing with the aim of contributing to sustainable business. As it is seen in the Figure 7, the interviewees were talking about sustainability management from multiple angles:

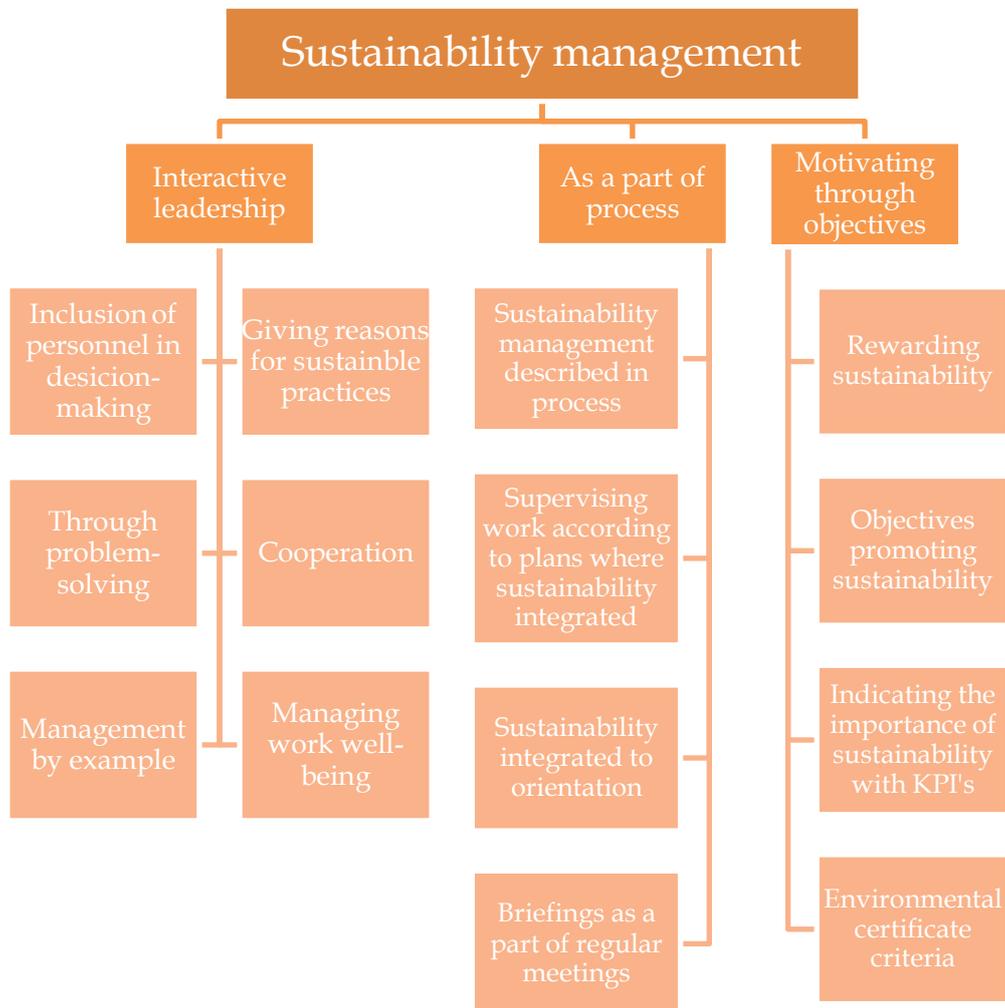


FIGURE 7 Sustainability management

Interactive leadership style seemed to be in favour of interviewees. When problems regarding sustainability are solved in projects, inclusion of project personnel helps them to committing to the practices. According to P3, there needs

to be quite good reasons and proofs to be able to 'sell' the production personnel why something should be done in a way that it results in a more sustainable outcome. P2 stresses that sustainability aspects should be reasoned on-site as something that is easier to do in a sustainable way, it saves money, or there is some other concrete benefit for the employee beyond 'saving polar bears', that is, something that is connected to your life directly. The same applies to justifying sustainability competence development activities to site personnel. Sometimes it might be the right means to make someone else to present an idea as her/his own idea (P1). E2 summarises comprehensively the importance of interaction in leadership:

Dialogue is important: if I notice a flaw during site visit, I discuss with site personnel and listen to them, and I aim at coming to the decision together with site personnel. When you take time to have dialogue you will receive questions of how some issues should be solved. We need to have an inclusive approach if we want to change the everyday life on-site and if we want attitudes to change. It should be done in cooperation with project personnel to be able to 'sell' and give reasons for certain practice or construction material etc. With justification through problem-solving, without blaming anyone.

Management by example was highlighted by many interviewees: they see management by example as valuable and effective leadership style. When it is not applied in production, it might cause problems when new skills and practices are required to adopt in production and production personnel should engage to the new way of working. The interviewees had been utilising managing by example in their own work and they had noted it to be a good tool in implementation of new ways of working. Managing and taking care of work wellbeing was also associated to sustainability management:

I haven't done any site visit with 'sustainability management' embroidered in my cap. Managerial work has been all the time such that with limited time I try to take care of my employees' workload to be in a proper level and take hand if it exceeds (C6).

Another aspect mentioned multiple times regarding sustainability management is integrating it to be *a part of the process*. There seems to be a need for readymade solutions determined in process. According to C1, this way actions would be visible and when there are changes in personnel, tasks would be described in the process instead of them being only inside someone's head:

Process image, process chart, game book thinking: sustainability management should be described as clear as possible.

P2 states that when sustainability is integrated to process, before long, it is part of the normal operations. The interviewees were willing to integrate sustainability also into orientation. P2 points out that production personnel do not actually need to know much beyond basics since the focus of sustainability should be in planning:

The real requirement for site supervision is to be able to supervise the work so that implementation is done according to plans, supposing that planning is made well.

Sustainability topics can be covered in regular meetings and briefings can be included in the meetings as well. Some of the interviewees were reluctant to specify sustainability from daily work and process because then it would feel like sustainability is something extra work. However, others saw that it enables learning when employees know what is in fact made sustainably in their work.

Motivating personnel through objectives to act towards sustainability is placed to be a part of the sustainability management according to interviewees. Based on experiences of interviewees, rewarding is an effective way to motivate personnel to act towards a certain direction. The form of reward is usually money, but it can also be something else, e.g., a day off. In order to reward personnel about sustainable behaviour, objectives promoting sustainability are required. Performance bonuses seem to guide the behaviour quite effectively. Also, customer's demands are usually affecting on project objectives. However, E3 stresses that it is important to really understand what sustainability and it should not be managed merely with performance bonuses. Further, in order to reward from meeting project objectives regarding sustainability, key performance indicators (KPI) are needed. According to C8, in the company management should be able to measure sustainability through KPI's and express with it that sustainability is important for us. E1 shows a concrete example that through environmental certificates personnel is required to consider sustainability in daily work. The certificate criteria force to think when you have to understand what is included in them to be able to act according to the requirements.

The interviewed professionals gave useful insights about sustainability management and which have they found effective ways to manage sustainability in the context of construction production. The same factors can be considered in other parts of the organisation as well when sustainability management is planned and implemented. Since sustainability competences are not yet developed systematically in the company, insights about how to manage the development of sustainability competences did not emerge in the interviews. The framework constructed of the production perspectives can be seen as a foundation and a starting point for future sustainability management where also management of sustainability competences is included. Part of the emerged sustainability management aspects can be also viewed as areas in which managers' sustainability competences could be developed.

Multiple other concrete means for promoting sustainability in the construction were described in the focus group interviews and they are presented next. Aspects affecting in the background as well as challenges for achieving sustainability are presented too. Since construction business is in fact project business, the sustainability of it can be conceptualised as an outcome of a construction project – what is a sustainable construction project. The interviewees described how they see a sustainable construction project and the results are presented after challenges.

5.3 Developing the construction business towards sustainability

5.3.1 Other concrete means for promoting sustainability

In the interviews multiple insights for promoting sustainability in construction business appeared. Some of the concrete means are already covered among sustainability competence development and sustainability management parts, but here they are described from another angle. They are not limited to concrete means that can be used in production only, but some of them have a wider scope. In the Figure 8 the means are named:



FIGURE 8 Concrete means for promoting sustainability in construction

When it comes to *management*, making time for planning the sustainability actions in production can ensure that the work is done in the most sustainable way. P1 describes that the following way:

The ability to consider sustainability in the company's operations works with sense: when everyone takes a moment to think how something could be done well, we are able to do it well... In an ideal situation we could be able to think for a moment what I could do to promote sustainability... There is usually someone who figures out that we could do this that way... Taking a while to think and using sense would get us far.

Setting *sustainability targets* aims to achieving sustainability in certain area. In addition to project sustainability objectives and rewarding of achieving sustainability goals, a project could be rewarded when it performs better than required:

If you build faster than is required, you could get money back. That would motivate everyone. The same with environmental values: there should be for example a bonus when you achieve better energy efficiency than the customer's demand is (P4).

Sustainability targets might also motivate individuals to develop their competence in certain sustainability areas relating to the targets. *Project resourcing* plays an essential role in sustainability and the foundation for production to promote sustainability is built from the above. C8 points out the following:

During my career we have been talking that key persons are attached to projects too late, and the site supervision comes too late to site... We should be able to switch the preparation and start to be more front oriented.

Also, attaching people who are motivated by sustainability to projects could promote the sustainability performance of the project if the motivation is harnessed to practice:

We should have the kind of people who are interested about these topics and who spreads the joyful news of sustainability forward. People who are willing for change and interested and who communicates sustainability to the largest group of people as possible (E2).

Those people who gets motivated about sustainability can be also so-called change agents who have the personality and ability to affect the practices towards sustainability. They can be essential in sustainability competence development of other employees in projects when the development happens informally besides the work.

Scaling best practices requires first collecting the practices from different sites and employees and then jointly refining the collected practices. After that the knowledge and practices are shared among certain group which can utilise it in their work. A supporting organisation was mentioned in the interviews to be the one organising the collecting of best practices and sharing them. One way to collect the best sustainability practices could be through internal site audits. C5 suggests a link in intranet where everyone could write their ideas for development. According to C8, the idea link could be also project specific. There are also different *tools* to support sustainability work but at the same time a lack of tools for specific areas. It was mentioned in an interview that some had developed their own tools in projects to be able to meet the client's requirements. It is also possible to aim at *influencing clients' requirements*:

For example, in a project management contract where we have the planning guidance, the client has the final power to decide but we can present the client sustainable solutions. Of course, among our management system we are able to consider sustainability (P2).

P4 continues the following way:

That is what we can do already. Nobody prevents us giving more information than the client asks.

The interviewees specify that influencing client's requirements happens in market dialogues and that is the place where the contractor can ask about the

client's thoughts regarding sustainability and present its own view and ideas of sustainability.

Project managers pointed out that *systematic decreasing of all kinds of waste* promotes sustainability. Waste refers to e.g., material waste, which occurs when material is ordered too much on site. However, they see that decreasing waste should be self-evident. It is also connected to skills of site supervision. Sustainability knowledge acquisition from *consultants* is one way to promote sustainability in production. However, there were also opposite opinions in utilising assistance by consultant. E1 argues that in *alliance projects*² you have to be flexible, forward-looking and innovative to succeed. These characteristics can also be seen to be connected to higher sustainability. It seems to be that in alliance projects sustainability is considered usually more careful than in regular project.

The ability to suggest new ways of taking actions towards sustainability can also be seen as an important sustainability competence. It requires naturally knowledge of sustainability in construction but also the ability to apply other organisational and project management knowledge with it. What can be seen in the interview discussions is that the interviewees were able to apply knowledge that they had gathered from other construction themes to promoting sustainability: in most of the suggestions they made they did not have the experience from actual sustainability practices, but they could combine learnings from other practices to be functioning in sustainability related actions. In addition to these more concrete means for promoting sustainability there are factors lying in the background but also promoting sustainability and they are suggested to be considered when actions towards sustainability are taken.

5.3.2 Background factors promoting sustainability

The interviewees were asked how they see preconditions for acting sustainably in the company. In general, the respondents answered that in their opinion there are good preconditions to promote sustainability and take sustainable actions in the case company. This can also be seen as a basis for sustainability competence development since it is the environment where competence development actions are implemented. According to some of the interviewees the company already is sustainable, and its actions are sustainable. On the other hand, some of the interviewees stress that sustainability is at this point only an empty phrase. The reasons some of the participants highlighted promoting sustainability in the company were related to inexpensiveness in the long term and maintaining tempting employer brand. Factors affecting the development and promotion of sustainability in the background are summarised in the Figure 9:

² A case study conducted by Kivilä, Martinsuo and Vuorinen (2017) reveals that alliance model of an infrastructure project was perceived as an enabler for sustainability because it promoted sharing of risks and benefits as well as made the cooperation between owner, customer and contractor easy. Aspects favourable for achieving sustainability are joint planning and shared incentive model which encourage innovations for attaining sustainability targets (Kivilä et al., 2017). Project control is encouraging behaviour needed to achieve organisational objectives and it is practiced through different control mechanisms (Cardinal et al., 2010, Malmi & Brown, 2008).

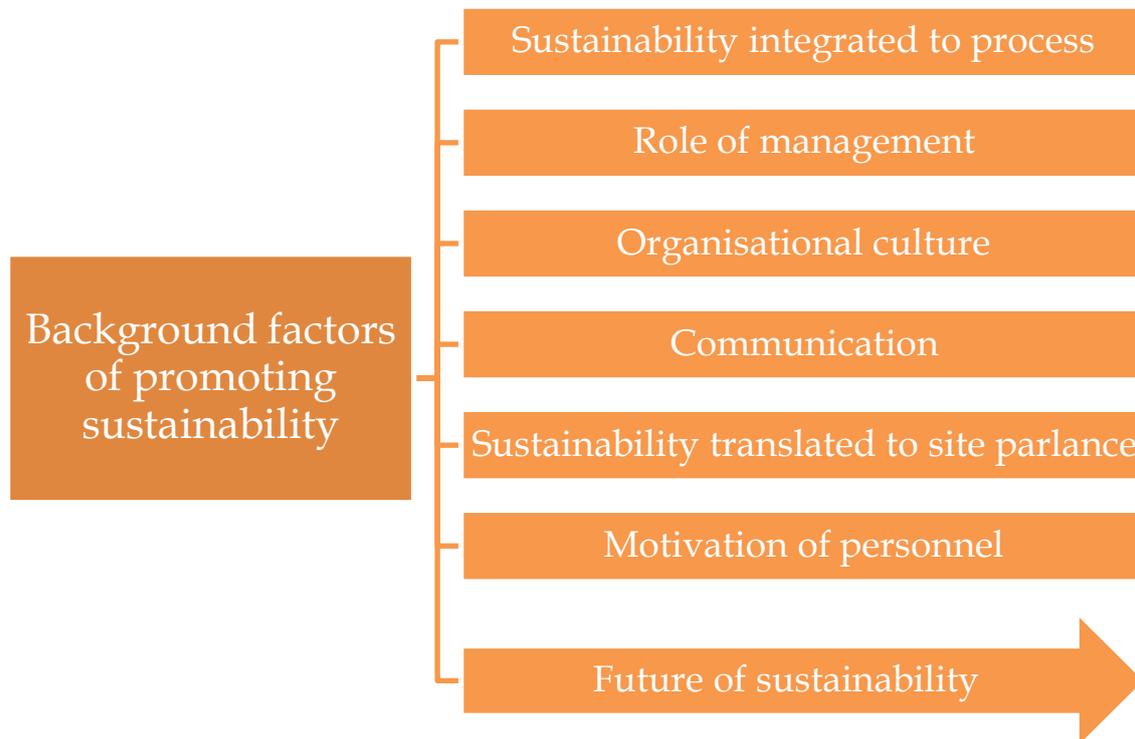


FIGURE 9 Background factors of promoting sustainability

It was highlighted multiple times by the interviewees that sustainability should be integrated as a *part of the process*. There is a need for ready-made operations models for sites, including different options, but the project should in the end have the power to decide which one they utilise, or do they utilise something they have invented themselves. A model of sharing responsibilities regarding sustainability work was also noted: there would not be a need for every project to figure out themselves who could be in charge of a particular sustainability practice. P4 shared her/his thoughts about the importance of common measures in sustainability:

From my point of view, prerequisites for acting according to strategy is that we should create measures that we can really observe and take it to a level which is concrete enough, which we don't have yet.

Planning management has an essential role in sustainability because the sooner in the project sustainability aspects are considered the better they are taken into account in practice. The role of project support in sustainability was seen necessary so that construction managers do not have to know details about everything, and the site personnel could ask the details from project support when needed. C3 raised an example of carbon footprint steering:

We are able to steer planning solutions at some precision level: for example, we know what the effect of green concrete or cellulose insulation at some level as a planning solution is. When we compare it in the same building to other materials... But this is the level of precision where we stay. And if we want it to be really in our hands, carbon footprint should be steered at the same level where costs are currently steered. We should have some kind of system for steering... In practice we don't have tools for steering and probably other construction companies have either... For example, green concrete: do we warm it in the winter more which increases carbon emissions. This is a complex issue, and this was only a narrow example about carbon footprint.

Also, competence development activities could be integrated into process if it is decided that certain competence development activities are conducted in certain phases of a project.

The *role of management* was addressed in focus groups. At the organisation level, sustainability is the area where competitive advantage could be pursued. The interviewees stressed the need in projects for support from leaders' side to sustainable operations. Preconditions for sustainability are created from above, including resourcing sustainability in projects. Clear and concrete approach in sustainability throughout the organisation was seen highly important according to interviewees:

We need a very clear line. It should be communicated clearly from above how we operate sustainably. They can be understood in many different ways. Often we have been told that YIT wants to be a pioneer, but we should be that in many levels (C4).

At the site level, management by example and qualified site supervision were mentioned as factors promoting sustainability in the background. When site supervision is qualified and of uniform quality, sustainability actions should not rely on who is on site supervising the work. A good dialogical connection with site management and site personnel was seen also as an enabler for sustainability. Sustainability should be on everyone's table. E1 reveals that statement from the angle of a bigger project:

Usually project sustainability team and management of project are committed to the theme and bringing it forward to practice, but it disappears sometimes when going among site supervision. In a sustainable project the theme sustains throughout the project organisation, and everyone understands why we are doing this.

Organisational culture where sustainability is integrated enables higher sustainability. In general, successful projects require working together for a common goal and the same applies within sustainability (E2). Encouraging employees to share their best sustainability practices and to bring out their new ideas was highlighted especially among environmental professionals:

If we do something great in the organisation, it should be raised to others too, and we should learn that sustainability actions are such actions that we should be proud of (E1).

Yes, the community should be supporting that this is something brilliant (E3).

Communication is also connected to organisational culture: it is internal communication when ideas and practices are shared from site to another. Sustainability related work is done all the time on sites, but it might not be highlighted in the organisation. E1 pointed out that it might be difficult to share good practices if nobody specifically asks about them. Stakeholder communication and cooperation was seen affecting to identifying new considerable sustainability aspects, especially in larger infrastructure projects. P4 brought out the role of the company as a sustainability promoter:

We have to be able to bring our value to the customer's operations: we can also be a promoter who offers the customer an option. We have to be able to tell them that if you want this kind of option, it affects that way.

The participants highlighted multiple times the importance of reasoning sustainable practices in production. Communicating the answer for 'why' should be done using concrete reasons instead of too abstract ones. Convincing reasoning requires knowledge about the culture and attitudes on site. Sustainability competence development activities might also need reasoning on-site.

Sometimes sustainability terms and the whole theme might be found difficult, and *translating the subject to site parlance* on site might help. Some of the interviewees saw it very important to be able to identify what is already sustainability in the daily work since something might not be perceived as sustainability even though it actually promotes it:

Clarifying what is sustainability, what are we already doing and at what level, these are the things that we are not yet doing. Sustainability is a challenging entity. Through clarifying it would start to take shape. We would understand that part of it is already in our possession, and these are the things that we should still practice (C3).

However, some of the interviewees were reluctant to label actions to be sustainability because they see that it would cause resistance. There seems to be a demand for concrete guidance regarding sustainability strategy: what it actually means in one's daily work. The aim should be that everyone could understand it through their own work. Regarding sustainability competence development, the 'labelling' is necessary for building understanding of what is sustainability.

Motivation of personnel is a wide theme and it was discussed from various perspectives in the interviews. C3 highlighted the importance of experiencing the ownership of sustainability:

In all of our actions someone actually experiences that she/he has the ownership: the next step of the organisation should be then motivated. As an example: it is difficult to get employees to make safety observations even though everyone thinks that they are important... It doesn't work in a way that a leader decides that we should make them: the leader has to experience the ownership for making them and make them herself/himself...

According to interviewees, internalising personnel in development and planning of sustainable actions enables them to understand, realise and even become interested about the topic. The personnel needs to be given opportunities to impact on their work and cooperation is the key. Furthermore, the personnel could be heard from what they would like to do to promote sustainability. This applies to sustainability competence development too, since when employees are given opportunities to participate in planning competence development activities, they are probably more motivated to develop their sustainability competences.

The shift in attitude towards seeing opportunities of new kind of business would enable adopting new and more sustainable way of doing. P4 contributed the topic following way:

It is good to remember that sustainability has arisen more and more during last years. There might be site supervisors whose competence is top class because they are interested and they find out answers. I guess that the bigger problem is the people who don't have unprompted interest and who don't care. Our job is then to manage the change in attitude on their work role somehow, and hopefully to the personal level as well.

One of the interviewees had an experience of a sustainability related idea which she/he had shared further but the idea never reached the practice on a larger scale due to the answer that it was too unforceful. According to the interviewee it would be valuable to take all, even smaller, ideas seriously since it might encourage people to share their ideas more openly also in the future.

From the participants' answers it was noticed that they wished to have enough time to learn new sustainability requirements and tasks. Work wellbeing was also touched in interviews: when the work is arranged to support wellbeing, there is room to consider sustainability aspects among other aspects.

The future of sustainability in construction industry and in the organisation level was also covered in the interviews. C1 predicted that sustainability is going to go through a similar cultural change in the construction field than work safety has gone through during past decades: it is going to be automatically integrated to processes and projects and it will not be questioned that much in the future. Multiple participants saw that customers' demands and requirements regarding sustainability are growing in the future and have already started to grow. They shared examples of customer requirements in projects where sustainability was considered thoroughly: customers are willing to have environmental certificates for the projects, they want the contractor to follow different sustainability frameworks and guidelines, and they expect a lot of sustainability knowledge from the contractor. The legislation was seen to get stricter in the future, but the hardening was seen also as a positive trend since it develops the field to be more sustainable and enables construction companies to think beyond money. Even though the future of sustainability was seen relatively positive among respondents, there are still challenges which are covered next.

5.3.3 Challenges in achieving sustainability

The interviewees in the focus groups had quite similar view of the challenges in achieving sustainability in the organisation and concerning the whole construction field. Challenges were identified from multiple angles and some of the challenges have been covered from another viewpoint earlier. Communication, for example, can be seen enabling sharing sustainable practices but lack of coherent communication can be experienced as an issue in reaching sustainability. These challenges are also related to sustainability competence development since if there are i.e. not enough resources to contribute to sustainability, are there any means to develop sustainability competences of personnel? In Figure 10 the nine categories of challenges are presented:



FIGURE 10 Challenges achieving sustainability

One of the questions in the group interviews was to define how the interviewee perceive sustainability and what she/he thinks that includes in it. Many of them said that defining sustainability is challenging but in the end they were able to answer to the question on their own words. This illustrates the larger scale challenge of *defining sustainability*. The interviewees were also conscious of the fact that there is not unambiguous set of criteria of sustainability, rather educated guesses of the best solutions. Sustainability targets might cause confusion if they are not concrete enough. It was also pointed out in the interviews that there are challenges in how to recognise what is already sustainability in the daily work and further what is the level of sustainability where the projects are currently

operating. According to the interviewees, there has already been searching of balance among different dimensions of sustainability: how to prioritise one aspect over another. Customers' requirements emerged frequently in the discussions and sometimes they might be contradictory if the customer is not that familiar what do they actually are demanding among sustainability. A need for concrete guidelines for contract construction emerged in responses as well. The interviewees were worried about the situation where the problem-solving in sustainability lays solely on project's shoulders.

Regarding *organisational culture*, E3 pointed out the tendency of discussions about sustainability to stay in smaller groups, that is, silos. C3 also recognised the problem of silos in organisation and expressed that sites are quite separate from each other and they might not have natural connections to other sites to share experiences and knowledge. Based on an interviewee's experiences, when new ideas are shared there is a possibility that they are not taken seriously and refined. That might lead to lack of innovating if organisation does not encourage to that. P2 had noticed that sustainability is a challenging theme because of the politicised nature of the topic: people might have different approach to climate change and environmental protection and these topics might separate people, which is important to remember in organisational context too.

Management related challenges includes challenges in project management level and in organisational management level. For sustainability themes which are not measurable, there seems to be not enough support from the organisation. A raised example of this is work wellbeing. If there is not enough support, something might be defaulted. Some of the participants saw that company management does not communicate strong enough about sustainability and they do not highlight the importance of it as much as needed. There seems to be at some cases lack of discussion between management and a site, which decreases the sharing of information of sustainability among other topics. Also lack of management by example was seen to be connected to the challenges in engaging in sustainability work on-site. If sustainability competence development is not managed, the targets of being competent to contribute to sustainability activities and promote sustainability of the company might not be achieved.

A theme which was repeated time after time in the interviews is *resources*, usually money, which seems to be often a key issue. In the circumstance of economic downswing, the participants had already noticed that in tenders there might not be room for costs of higher sustainability. Time and personnel are also valuable resources. In smaller projects, according to interviewees, there are smaller personnel which results naturally to smaller group of people to be involved in sustainability improving actions. Also, lack of time for open discussions and innovations was mentioned to be a challenge in acting sustainably since there might not be enough time to create new and more sustainable practices.

Communication seems to be a very important but also fragile activity in implementation of new sustainable practices. The interviewees highlighted that it should be thought carefully how the sustainability message is brought on-site:

It must be thought how the message is brought. Is there only one truth or could we reason the message better with advantages and disadvantages (C6).

There is a risk of bringing the sustainability message on-site with wrong angle and in a way that results to lower receptiveness. Sustainability actions that are not measured on-site were mentioned to be in general more difficult to reason. When it comes to internal communication in the company, in respondents' opinion sustainability related topics stays often in a too general level and the connection to the person's own work might be difficult to see. Similarly, the information from group level does not always end up to sites. From the interviewees viewpoint the company's sustainability policy does not seem straightforward to the outside. According to P2, it is challenging to translate the company's sustainability actions to the customer because a minority of those actions are measured and even able to be measured. Greenwashing was also pointed out by P3, and it was seen as a problem these days and affecting possibly to competition of projects.

Based on the interviews, it is clear that *demands are increasing*, not only related to sustainability. Documentary demands regarding sustainability work will increase since various data is needed about what is done to promote sustainability, some of them are legal requirements and some of them comes from for example certificate requirements. Some of the interviewees were worried about personnel to get numb because of increasing demands and constantly changing reforms. Among construction managers, they were also worried about their workload that increases when there are a lot of new topics that need to be implemented to site personnel. Customers are also demanding more sustainable solutions from construction companies, which might cause challenges to be able to answer those demands the best possible way. It was mentioned that sustainable solutions might be more challenging to implement than regular ones. Some of the interviews still saw these challenges as opportunities even though it requires new kind of thinking. Sustainability competence development is one solution for the challenge of increasing demands: with more sophisticated sustainability competences it is easier to answer those demands.

There are also *on-site challenges* to be solved. The participants had experience of challenges in carrying out targets coming from the upper level of organisation and there was agreement of the fact that the same means and solutions does not fit on every site: it is not realistic to demand all sites the same solutions. However, at the same time there seems to be a need for ready-though solutions to apply on-site. The responsibilities of sustainability activities on-site was also raised: who is responsible of sustainability activities and how to avoid the challenge of personification of responsibility. It was noticed by interviewees that when something is on everyone's responsibility it often leads to the situation when it is no one's responsibility. When there is a great staff turnover, according to participants it causes challenges to carry out sustainability activities and to the whole site work. The interviewees saw it as a challenge that ideas and best practices are not shared unprompted on-site, even though there are valuable knowledge and practices to be applied in other sites too.

From the *process* point of view, spreading of the best sustainability practices does not advantage sustainability – it is the actual adoption of the practices that advantages. As it has been mentioned earlier, there is a lack of comprehensive indicators in which decision-making could be based. Also, it was pointed out by P3 that indicators and measuring can result in less sustainable actions: for example, internal recycling of material is not reported to waste reports but if it would be sorted as waste which external waste company collects, it would be included in the report. Project managers highlighted the importance of planning and they strongly agreed on if sustainability is not considered in the planning phase enough it is difficult to consider in later phases of the project. Also, it was mentioned in the focus groups that when sustainability is excluded in regular on-site meetings, it will not help achieving sustainability targets. Single examples of other challenges were also mentioned regarding the lack of steering competence of carbon footprint and the steering subcontractors to sustainable practices. In general, if sustainability is not integrated to processes there seems to be various challenges to achieve sustainability.

Personnel related challenges in achieving sustainability are caused by attitudes and different level of competences in sustainability. Change resistance as a challenge emerged in discussions. However, P2 stressed that it is actually not always about change resistance but the way how sustainability is communicated to personnel. There seems to be many reasons for why sustainability is perceived as a difficult viewpoint on-site: P1 pointed out that it might be experienced as something additional to normal work. The interviewees had noticed that there is a great variety between employees in the sustainability competences and attitudes towards sustainability actions, which in turn causes work in sustainability competence development.

We have now covered the means for developing sustainability in a construction company, touched factors behind the development and identified challenges affecting to the promotion of sustainability. The goal of considering all of this is to result in sustainable construction projects. The characteristics of a sustainable construction project are presented next to give an illustration of how the theme contributes in practice on business.

5.3.4 Characteristics of a sustainable construction project

The interviewees defined a sustainable construction project to include aspects at many different levels. Some of them counted standard operations already to be sustainable but some had higher requirements for what can be labelled to be sustainable. In the Figure 11, three categories of characteristics of a sustainable project are described starting from lower requirements and proceeding towards higher requirements. It is notable that this framework is formed based on opinions of interviewees with different backgrounds of working with sustainability which can affect their thoughts of sustainable project.



FIGURE 11 Sustainable construction project

Some of the interviewees stressed that *standard operations* and a way of working should be enough to contribute to sustainability, that is, sustainability should be integrated to standard activities and processes. However, they added that in a sustainable project there is something extra added compared to a regular project. They also saw that a regular project in the company is already sustainable and anything else could not even be possible:

It is hard to imagine that we could do in a big, listed company, solutions that couldn't be explained or that would be less sustainable than some other solution (C7).

According to interviewees, standard operations include obeying the law and acting according to company management system. Also interventions to unsustainable operations were seen as a part of sustainability of standard operations.

The interviewees agreed on that sustainability is a large-scale theme and it should be *considered comprehensively*. They referred to ESG, which was understood as environmental sustainability, social sustainability and good governance. The participants saw that from environmental viewpoint, nature cannot be harmed, low-carbon equipment should be used, and low-carbon solutions should be considered, to mention a few. From social sustainability angle they mentioned work well-being and work safety, considering near traffic on-site and an excellent management culture. Good governance and economical sustainability, for example transparent project forecasting was also seen to be part of comprehensive sustainability of a project. Balancing between different sustainability dimensions was seen essential.

The highest level of sustainability was seen to be in projects where *sustainability is taken into account better than in a regular project*. Life cycle thinking was highlighted by E2, and it means that sustainability is considered through the whole life cycle of the project and even the life cycle of the building or other construction. Similarly thought, in the most sustainable project sustainability is a responsibility of the whole project personnel and not narrowed down to certain employees. The idea of identifying material sustainability aspects for the certain project was also expressed. There might be different aspects that are essential in different projects. As it was brought out multiple times in the interviews, especially in competition contracting, a sustainable construction project should include the customer's idea of sustainability. P4 concluded that a sustainable construction project could be such where the formerly mentioned aspects have been considered in the way that management system at that point of time enables to consider.

5.4 Summary of results

Sustainability competence development was found to be one of the three areas of concrete means for promoting sustainability in a construction company, in addition to other identified concrete means and managing sustainability. When sustainability competence development activities are planned there are factors that should be considered: the knowledge should be relevant for the certain employee group, the resources, including human resources and costs, should be taken into account, sustainability should be communicated the most receptive way for employees, the motivational aspects regarding sustainability work should be considered and timing as well as learning practices for competence development should be planned to ensure the connection to practical work. The topics in which sustainability competences could be developed can be divided to environmental sustainability, social sustainability, good governance and other topics. The most highlighted topics are related to climate change, circular economy, occupational safety, contractor's obligation, grey economy and different sustainability frameworks. Competences regarding legal requirements were seen to be at a decent level in the company, and environmental sustainability in general was seen to be in a need of competence development due to its wide concept. Six groups of means for the development of sustainability competences are defined: competence development besides the work, inclusive actions, competence development through sharing best practices, arranging short briefings, including sustainability in orientation and studying sustainability.

Sustainability management is an essential part in promoting company's sustainability and it is the foundation for development of sustainability competences. According to interviews, interactive leadership style is the most influential leadership style when it comes to managing sustainability among construction. Including personnel in decision-making regarding sustainability,

management by example and giving reasons for sustainability practices was highlighted the most. Sustainability should be part of processes in order to successfully be integrated to construction. Motivating through objectives and rewarding about sustainability as well was seen as a requirement in the implementation of sustainability practices.

Besides sustainability competence development, other concrete means for the promotion of sustainability were identified based on the interviewees' insights. They are covered in addition to means for sustainability competence development since they illustrate the field where sustainability competence development activities take place. These other concrete means also describe the future of sustainability work and in competence development planning it is important to be able to look at the future and see how the requirements for sustainability competence development are changing. They include managerial and leadership aspects, sustainability goals, project resourcing questions, the importance of scaling sustainability, different tools, influencing clients, decreasing all kinds of 'waste' in the light of lean thinking, consultant assistance and alliance project model. Variety of background factors for promoting sustainability of a construction company emerged in interviews regarding process integration, the role of management, organisational culture, communicational aspects and motivation of personnel, as well as view for the future. In general, the interviewees saw that we are for sure moving towards more sustainable future and there will be much higher requirements to act in the most sustainable way. However, challenges of sustainability work emerged in the interviews. There are challenges in defining what is included in sustainability, organisational culture and management might not support acting sustainably, scarcity of resources, pressure to be able to answer for increasing demands of stakeholders and other challenges related to on-site work, process and personnel. The goal of all sustainability promoting activities and aims is to be able to run sustainable construction projects where sustainability is considered comprehensively (Figure 12).

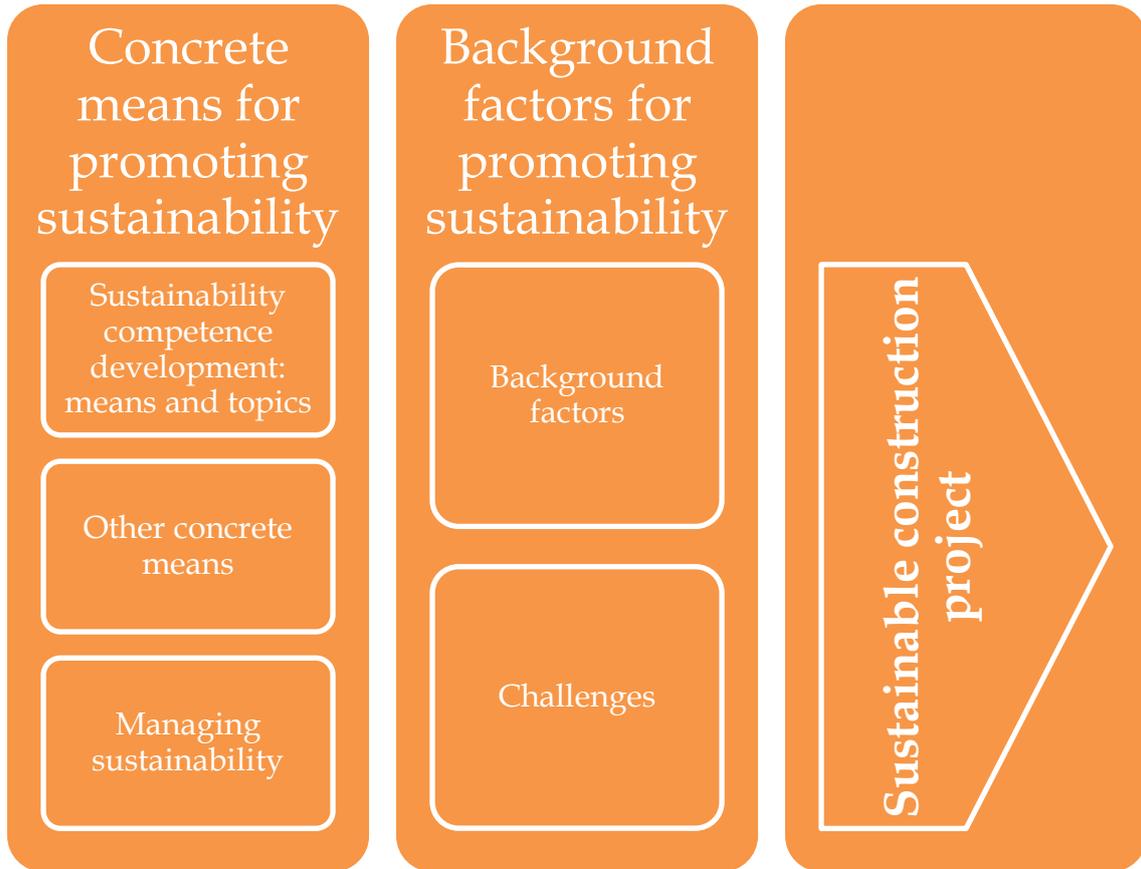


FIGURE 12 Illustration of results

In the next discussion and conclusions chapter findings of the master's thesis research are presented and connections between the literature and these results are discussed. Some suggestions for the case company YIT are presented, as well as for the construction field in Finland. Finally, conclusions are made.

6 DISCUSSION AND CONCLUSIONS

6.1 Connections between the literature and results

The results of the case study provided connections to the literature regarding promoting sustainability and sustainability competence development. According to Evenseth et al. (2022) and Matar et al. (2008), effective learning in an organisation requires the variety of flexible learning practices but also that the practices are integrated in organisation's processes. It was highlighted in the interviews that the same means might not work in every construction project since every project is a bit different, which applies to having a variety of flexible learning practices. Sustainability as a whole was seen important to be included in organisational processes, sustainability competence development as well.

One of the Gluch and Hellsvik's (2023) narratives of sustainability work is 'thankless work', which includes the conditions where sustainability work is seen as additional and extra work and that it is someone else's responsibility. The interviewees pointed out that at this point sustainability work is often seen as something additional to normal work in production. When the responsibility of sustainability work is not directed to certain employees, there is a threat that it is seen as nobody's responsibility: this is a similar finding with the literature. However, rewarding collaborative work narrative (Gluch & Hellsvik, 2023) was seen to happen especially in alliance projects according to environmental professionals.

Evenseth et al (2022) argue that knowledge sharing in organisation requires the organisation to be flexible and attentive. The interviewees saw sharing best practices highly important, but they realised that it is sometimes challenging and there is not yet a functional tool for that.

Lozano (2012) states that sustainability leadership requires holistic perspective to sustainability. The interviewees agreed that sustainability is a complex and wide-ranging topic which cannot be excluded from regular construction practices, and sometimes there is a need to balance between

different dimensions of it. However, it was said that sometimes it is challenging to identify what actually is sustainability.

Fathalizadeh et al. (2021) present inadequate understanding of potential benefits of sustainability to be a possible barrier for integrating sustainability into construction project management. From the interviews the message was that in the company there is a need for truly understanding what sustainability is and what are the benefits of it to the project. However, it was also said that the benefits of acting sustainably should be also seen from the angle of how we can contribute to the work i.e. against climate change or biodiversity loss.

Management by example was highlighted by multiple interviewees: they saw it important when new sustainability practices are implemented in construction projects. Similarly, Raineri and Paillé (2016), argue that when (line) managers promote pro-environmental behaviour, it enables employees to be more engaged with the sustainability goals of the organisation. Interactive problem-solving skills was highlighted by Dzhengiz and Niesten (2020) as one of the sustainability management competences. Interactive leadership style was addressed by the interviewees to be effective when sustainability activities are planned and implemented in production because it enables the employees to participate in forming the plans for their own work. This is also in line with Song et al. (2020) research: giving the employees an opportunity to participate in pro-environmental practices can create an atmosphere where employees get interested in sustainability matters and they are encouraged to share their knowledge and practices.

When it comes to planning competence development activities, according to Ellström and Kock (2008) personnel should participate the planning of the development program. It was highlighted in the interviews that inclusion of personnel is highly important when sustainability competence development activities are planned because it allows them to be more motivated to developing their sustainability competences. Ellström and Kock (2008) prefer on-the-job learning if greater effects are wanted in competence. On-the-job learning was seen effective also by the interviewees because it saves time and they also saw that learning by doing creates long-lasting learning. Ellström and Kock (2008) continue that the competence development program should be job-oriented, which is in the line with the interviewees' responses: they pointed out that only relevant topics which are useful at work should be directed to employees.

Bhaskara and Filimonau (2021) point out that learning only from past experiences might limit the learning because it might not ensure preparing for unpredicted events. In the light of the results of the case study, it is important to realise that if sustainability development is planned according to this master's thesis it will not be enough to rely only on the past experiences of the interviewees.

In the light of previous research, a comprehensive sustainability competence development research has not been conducted in construction production. This detailed case study describes the perspectives of production personnel towards sustainability, and it has not counterparts in previous

research. To summarise the connections between the literature and results, a great amount of the result seems to have connections to the literature. It builds a strong basis for the case company to utilise in their sustainability work and development of sustainability competences. In the next section recommendations for the case company YIT are presented.

6.2 Recommendations for the case company

It is clearly illustrated in the results that there is a great need for sustainability competence development in YIT and the whole Finnish construction field in order to ensure competitiveness and contribute to organisational, national and international targets in sustainability. The first recommendation for YIT is to create a comprehensive sustainability competence development program which aims at enabling the achievement of sustainability goals through increased competences of personnel at different parts in organisation. When it comes to production personnel, the insights of this master's thesis should be covered in the more detailed segment level plan.

Since running construction projects is the actual business of YIT, sustainability competence development should be part of projects. This could be done i.e. using project bonus model where sustainability competence development is integrated. Either way, project personnel should be somehow motivated to participate sustainability competence development activities. It is notable that there is a lot of variation between project which topics are relevant for competence development, but identifying the most important ones in each project would be the basis for sustainability competence development. So, the second recommendation is to integrate sustainability competence development to construction projects.

In competitive contracting, the client is the one who sets demands for the construction project and YIT as a contractor has to act according to them, otherwise there would be a breach of contract. Thus the actual power for sustainable construction projects rests with clients. The third recommendation is to systematically participate in influencing the clients i.e. through market dialogues to consider sustainability deeper and comprehensively in their calls for tenders.

The importance of collecting and sharing best sustainability practices was highlighted in the interviews which reflects the idea that there is a lot of valuable knowledge and skills in the company, but unfortunately they do not always spread between projects and segments. The fourth recommendation is to create a model for projects to reflect their sustainability actions, collecting them jointly, refining the experiences to best practices and sharing the best practices among the organisation. The recommendations are presented in the Figure 13:

Recommendations for YIT

1. Sustainability competence development program
2. Incorporation of sustainability competence development in construction projects
3. Systematic influencing of clients in sustainability
4. A model for sharing best sustainability practices

FIGURE 13 Recommendations for the case company

It is the case company's responsibility to evaluate if they are willing to take actions towards contributing to the recommended development tasks.

6.3 Limitations of the research

When it comes to the reliability of the study, it is possible that the results might be different if another group of employees would have been interviewed. Construction managers and project managers are the ones who work between the company and a construction project, which means that different insights might have been raised if the interviewees would have been for example site supervisors whose work is more connected to daily construction site work. Also, the interviewees were selected based on assumptions that they might have opinions and perspectives regarding sustainability which might have affected to the results in such a way that the number of insights is bigger.

Since the results are collected within only one company, all of the results cannot be absolutely generalised and applicable in other construction companies. However, the interviewees seem to be familiar with what is happening in construction markets and what kind of themes are relevant currently, and they were able to think beyond the case company. The purpose of this study is to reveal perspectives among the case company and not to describe what is the common viewpoint of the whole industry.

In previous research there was not found comprehensive construction related sustainability competence development studies which would have indicated what is essential in creating such framework for a company. Thus the

theoretical framework had to be created based on the author's own thinking and assumptions.

In the interviews a lot of informative insights were collected, and the interviewees participated to the discussions thoroughly. Even though the topic was not in the core of all interviewees' role they could provide perceptions from multiple angles.

6.4 Future research recommendations

Due to the nature of competitive contracting where the client sets the requirements for the construction project, I would suggest studying further the clients' role in promoting sustainability in construction sector and how would clients set more ambitious sustainability requirements in their tender requests.

If the case company or another construction company creates a sustainability competence development program, it would be essential to study what kind of effects the program has on company's sustainability performance. This would bring valuable knowledge for construction companies for the decision-making whether to invest in competence development.

Since this is a case study covering only one construction company, a wider study of the construction industry in Finland or in the Nordic countries would be valuable when an overview of the industry's sustainability competences and their development is needed. The results would help the cooperation in the field.

6.5 Conclusions

The purpose of this research was to find out how the construction production personnel in the case company perceive sustainability, sustainability management and especially sustainability competence development regarding their work. This thesis provides new frameworks regarding sustainability competence development, sustainability management and means for promoting sustainability in a construction company. In addition, overall picture about background factors and challenges for promoting sustainability are built. Due to the case company's needs for knowledge about sustainability competence development, this thesis can be used for planning and implementing sustainability competence development program and activities.

The first research question was *how sustainability and sustainability competence development is perceived in construction production*. The topic resonates in production personnel and various partly similar and partly contradictory insights were expressed. Contributing to sustainability was seen important even though challenges were identified. Agreement emerged in that in organisation it should be clear for everyone what is sustainability in our business and how it connects to each role. Sustainable construction was viewed also from systemic

perspective, and it was commonly understood what the company's role is in providing sustainable construction for the clients and which aspects affect the level of our sustainability. Among the interviewees the future was seen more and more to be about sustainability: clients' demand and legal requirements will increase and YIT as a construction company has to be able to answer them.

In this master's thesis the focus was on sustainability competence development as a part of means for promoting sustainability in an organisation. *How sustainability competences can be developed in construction production* was the second research question. Background factors for the development of sustainability competences were identified as well as essential topics for the competence development. A framework of concrete means for the development of sustainability competences is provided. Also, sustainability competence development is connected to sustainability management and to other concrete means for the promotion of sustainability in the company.

A possible limitation for the study is that due to lack of time it was not possible to interview more people working in production in different positions. A wider picture of the topic might have been created if there would have been for example site engineers and site supervisors as interviewees. Also, the interviewees were selected partly based on assumptions that they might have insights for the theme. However, different perceptions and opinions emerged among the interviewees, which indicates that the topic can be seen from various different angles among the same roles.

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APPENDICES

APPENDIX 1: "The preliminary invitation to focus group interviews, March 16, 2023 (in Finnish)"

Hei,

teen tällä hetkellä PMO:lla gradututkielmaani Jyväskylän kauppakorkeakouluun, jossa opiskelen ympäristöjohtamista. Gradun aiheena on vastuullisuusosaamisen kehittäminen tuotannossa ja tarkoituksena on tehdä haastattelututkimus, joka toteutettaisiin haastatteleamalla IN ja BP työpäälliköitä sekä projektipäälliköitä ryhmähaastatteluiden muodossa, 3-5 hengen ryhmissä. Haastattelut on tarkoitus pitää Teamsissa, jotta ne voidaan tallentaa sellaisenaan tulosten analysoinnin sujuvoittamiseksi. Aikaa yhteen haastatteluun varataan 1-2 tuntia, jotta kaikki kysymykset/teemat saadaan käsiteltyä.

Tutkielmassa keskitytään vastuullisuusosaamisen kehittämisessä ympäristövastuullisuuteen, mutta voidaan sivuta myös sosiaalista ja hallinnollista vastuullisuutta. Osaamisen kehittämistä tarkastellaan konkreettisten tuotannon aihepiirien kautta (kuten jätteiden lajittelu ja energiankäyttö), sekä vastuullisuuden johtamisen kautta: miten vastuullisuutta johdetaan tuotannossa. Tavoitteena on kerätä tuotannon näkemyksiä osaamisen nykytilasta, parhaista käytännöistä vastuullisuuden johtamiseen projekteilla, osaamisen kehittämistarpeista ja muista aiheeseen liittyvistä teemoista.

Sain vinkkejä, että teitä kannattaisi pyytää haastateltavaksi tutkielmaa varten ja arvostaisin todella näkemystänne aihepiiristä. Haastatteluissa ei etsitä "oikeita vastauksia", vaan nimenomaan teidän kokemuksen kautta tulleita näkemyksiä. Vastauksia ei yhdistetä tiettyyn henkilöön ja tulokset käsitellään kokonaisuutena. Toivoisin, että pystyisitte osallistumaan huhti-toukokuun aikana haastatteluun, mutta mikäli kieltäydytte, niin pyytäisin ilmoittamaan siitä minulle pikimmiten. Jos tulee mieleen muita haastateltavia, joita kannattaisi pyytää, niin otan nimiä mielelläni vastaan. Haastattelukutsuja pyrin laittamaan piakkoin teille eteenpäin. Jos tässä vaiheessa tulee jotakin kysyttävää graduun tai haastatteluihin liittyen, niin vastaan erittäin mielelläni.

Kiitos paljon osallistumisesta ja avusta!

Ystävällisin terveisin,
Sanna Koivisto

APPENDIX 2: "The interview questions (in Finnish)"

Teema 1: Vastuullisuuden nykytila rakennusprojekteilla

- Kertoisitko lyhyesti työkuvastasi työpäällikkönä/projektipäällikkönä?
- Miten ymmärrät ja käsität termin vastuullisuus?
- Minkälainen on mielestäsi vastuullinen projekti?
- Minkälaiset edellytykset meillä on tällä hetkellä ottaa vastuullisuus huomioon projekteilla?
- Miten sinusta vastuullisuus käy ilmi YIT:llä?

Teema 2: Vastuullisuuden johtaminen rakennusprojekteilla

- Minkälaisia keinoja olet käyttänyt tai nähnyt, kun on johdettu vastuullisuutta projekteilla?
- Miten koet työpäällikön/projektipäällikön roolissa voivasi vaikuttaa vastuullisuuteen projekteilla?
- Mitä on mielestäsi vastuullinen johtaminen?

Teema 3: Vastuullisuusosaamisen kehittäminen

- Minkälaisissa asioissa toivoisit, että voisit kehittää osaamistasi, jotta projekteillasi voitaisiin toimia vastuullisemmin?
- Minkälaisissa asioissa toivoisit, että työmaahenkilöstön vastuullisuusosaamista olisi hyvä kehittää?
- Mitkä vastuullisuusasiat ovat jo mielestäsi hyvin hallussa projekteilla?
- Miten mielestäsi tulisi arvioida oleelliset aiheet, joissa vastuullisuusosaamista kannattaisi kehittää?
- Mikä on mielestäsi avainasemassa, kun halutaan kehittää tuotannosta vastuullisempaa?
- Millä tavoin mielestäsi tuotantohenkilöstön vastuullisuusosaamista kannattaisi kehittää? Olisiko konkreettisia, myös innovatiivisempia esimerkkejä?

Teema 4: Vastuullisuuden tulevaisuus

- Mitä mielestäsi YIT:llä tulisi laajemminkin ajateltuna tehdä, jotta projekteilla pystyttäisiin toimimaan niin vastuullisesti kuin haluttaisiin? Olisiko konkreettisia esimerkkejä?
- Mitä muuta tulee vielä mieleen, mistä emme ole keskustelleet?